

BID DOCUMENTS
FOR
CAMBRIDGE STREET SEWER INTERCEPTOR
REHABILITATION PROJECT
CONTRACT NO.: S23-1
BID NO.: 7869-W3
DEPARTMENT OF PUBLIC WORKS & PARKS
ENGINEERING DIVISION
CITY OF WORCESTER, MASSACHUSETTS
PREPARED BY
WESTON & SAMPSON ENGINEERS, INC.

AUGUST 2022



08/04/2022

Frank E Occhipinti

Digitally signed by Frank
E Occhipinti
DN: C=US,
E=occhipif@wseinc.com,
O=Weston & Sampson,
CN=Frank E Occhipinti
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BID PREPARED BY: WESTON & SAMPSON ENGINEERS, INC.
55 Walkers Brook Drive, Suite 100
Reading, MA 01867

BID REVIEWED BY: WILLIAM A. COYLE, P.E.
Deputy Commissioner of Public Works & Parks

APPROVED BY: _____
JAY J. FINK, P.E.
Commissioner of Public Works & Parks

BID ADMINISTERED BY: CHRISTOPHER J. GAGLIASTRO, MCPPO
Purchasing Director

**PURCHASING DIVISION
CITY OF WORCESTER
MASSACHUSETTS 01608-1895
ROOM 201 - CITY HALL, 455 MAIN ST.
PHONE (508) 799-1220**

**SEALED BID INVITATION
(Labor, - Filed Sub-Bids NOT Required)
M.G.L. Chapter 30, §39M /
M.G.L. Chapter 149, s.44A (C)**

SEALED BID NO. 7869-W3
DATE: August 10, 2022
CITY OF WORCESTER Christopher J. Gagliastro, MCPPO Purchasing Agent
Buyer: Christopher Gagliastro

All bids are subject to the terms and conditions and specificity herein set forth.

COMPLETE FORM FOR GENERAL BID (ENCLOSED) MUST BE SUBMITTED IN A SEALED ENVELOPE:

DATE: September 9, 2022 TIME: 10:00 A.M. LOCAL TIME

PLACE: Purchasing Division, Room 201, City Hall, Worcester, Massachusetts

MARK SEALED ENVELOPE **"Sealed Bid No. 7869-W3, Sewer Rehabilitation – Cambridge Street Area (S23-1) / DPW & Parks"**

The name and address of the bidder must appear in the upper left-hand corner of the envelope. The City of Worcester is not responsible for bids not properly marked.

A COMPLETE BID PACKAGE SUBMISSION CONSISTS OF THE FOLLOWING:

- Form for General Bid (81 – 86) & Unit Price Pages
- Bid Security (5% of Total Bid)
- Forms required by City Policies & Programs

OTHER CONDITIONS:

- Please go to (www.worcesterma.gov) to review bid results.
- All questions **must** be referred in writing to Chris Gagliastro via e-mail at gagliastroc@worcesterma.gov
- A pre-bid meeting will be held on August 18, 2022 at 10:00 AM at DPWP Engineering, 20 East Worcester Street, Worcester, MA. All prospective bidders are encouraged to attend.

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ARTICLE 101: INSTRUCTIONS TO BIDDERS

SECTION 1 - INTRODUCTION; DEFINITIONS

1.1 In accordance with an Advertisement for Bids, the City of Worcester (the "Owner") has invited bids for the project described in the specifications contained herein.

1.2 These Instructions to Bidders (the "Instructions") are intended to assist bidders in the preparation of their bids, to call attention to various legal requirements and to set forth certain conditions upon which bids are submitted and received.

1.3 The award of the contract is governed by Chapter 30, s. 39M of the Massachusetts General Laws. Certain provisions of the foregoing statute and of other applicable statutes are summarized in these Instructions. Whenever these Instructions or any other contract documents set forth or summarize applicable statutory provisions, whether or not the statutes have been specifically referred to, such summaries are for convenience only, do not purport to be complete or correct as summaries of any particular material, and shall in no respect supersede, expand or limit rights or duties of the Owner or bidders in matters governed by the statute.

1.4 The following definitions shall apply in these Instructions and in the other Contract Documents:

- 1) The term "bidding documents" shall include the Advertisement for Bids, these Instructions, the bid forms, contract forms and other Contract Documents bound herewith, the Drawings, the Specifications, and all Addenda issued prior to receipt of bids.
- 2) The terms "Addenda" and "Addendum" shall mean written documents and/or drawings issued by the Owner prior to execution of the contract which supplement, modify, correct, explain or interpret the bidding documents.
- 3) All definitions set forth in the Conditions of the Contract or the other Contract Documents as therein defined are applicable to these Instructions and to the other bidding documents
- 4) On any project for the construction, reconstruction, installation, demolition, maintenance or repair of any building, or public work, to be funded in whole or in part by city funds, or funds which, in accordance with a federal or state grant, program, or otherwise, the city expends or administers, or any such project to which the city is a signatory to the contract therefore, the provisions of this section shall apply and the same shall be referenced in every invitation to bid for such project and,

the following paragraphs shall be contained in every resulting contract there from: "It shall be a material breach of this contract if the contractor and each subcontractor shall not at all times adhere to the provisions of § 1A(e)(9) of chapter nine of the Revised Ordinances of the city by limiting their on- site, noise producing construction and related work to the hours specified by said ordinance".

- 5) The director of purchasing, commissioner of code enforcement and the head of any department shall have the authority to adopt any rules and regulations they deem necessary to implement this subsection with respect to contracts generally and the head of the department awarding any such contract shall have the authority to adopt any rules and regulations he or she deems necessary to implement this subsection with respect to any particular project.

SECTION 2 - AVAILABILITY OF CONTRACT DOCUMENTS

2.1 Each person requesting Contract Documents including bid forms, plans and specifications shall proceed as directed in the Advertisement for Bids.

SECTION 3 - EXAMINATION OF SITE AND CONTRACT DOCUMENTS; PRE-BID CONFERENCE

3.1 Before submitting a bid, each bidder must: (a) thoroughly examine the Contract Documents (b) visit the site to fully examine and acquaint himself with local conditions that may in any manner affect cost, progress, or performance of the Work, (c) familiarize himself with federal, state and local laws, ordinances, rules and regulations that may in any manner affect cost, progress or performance of the Work, and (d) study and carefully correlate his observations with the requirements of the Contract Documents. Failure of a bidder to visit the site and acquaint himself with the Contract Documents or to attend the pre-bid conference, if any, shall in no way relieve the bidder from any obligation with respect to his bid.

3.2 On request, the Owner will provide each bidder access to the site to conduct such reasonable investigations and tests as such bidder deems necessary to prepare his bid.

3.3 Each bidder shall promptly notify the Contracting Officer of any ambiguity, inconsistency or error he may discover upon examination of the Contract Documents, the site or other local conditions. Whenever the title "Contracting Officer" is referenced it shall be interpreted as follows: Purchasing Director, City of Worcester. The submission of a bid will constitute a representation by the bidder that he has complied with every requirement of this Section 3 and that the Contract Documents are sufficient in scope and detail to indicate and convey understanding of all terms and conditions for performance of the work of this contract.

SECTION 4 - ADDENDA AND INTERPRETATION OF CONTRACT DOCUMENTS

4.1 All questions and requests for clarifications or interpretations of the meaning of the Contract Documents shall be in writing, addressed to the Purchasing Department, City of Worcester, and to be given consideration must be received at least five (5) days prior to the date fixed for opening of bids.

4.2 Clarifications or such interpretations and any supplemental instructions or forms, if issued, will be issued in the form of written Addenda and when possible, not later than two days before the date fixed for opening of bids. Each bidder shall be responsible for determining that he has received all Addenda issued, and failure of any bidder to receive any such Addendum shall not relieve such bidder from any obligation under its bid as submitted.

4.3 All Addenda so issued shall become part of the Contract Documents.

4.4. Oral clarifications or interpretations will be of no legal effect. The Owner will not be responsible for, and no bidder may rely upon or use as the basis of a claim against the Owner or the Owner's agent, any information, explanation or interpretation of the Contract Documents rendered in any fashion except as herein provided.

SECTION 5 - WAGE RATES

5.1 Minimum rates of wages for work performed under this contract will be as predetermined by the state Department of Labor and Workforce Development, in accordance with the provisions of Sections 27 of Chapter 149 of the Massachusetts General Laws.

5.2 Section 27B of said Chapter 149 provides record-keeping requirements for contractors and subcontractors with respect to employees, hours, wages and other matters.

5.3 Bidders' attention is called to Section 148 of Chapter 149 of the Massachusetts General Laws, relating to the weekly payment of wages.

SECTION 6 - SALES TAX

6.1 Section 6(f) of Chapter 54H of the Massachusetts General Laws exempts from Massachusetts sales tax, building materials and supplies to be used in the project, and bidders shall not include in their bids any amount therefor. The number of the certificate granted by the Commissioner of Revenue for use in obtaining the exemption may be obtained from the City of Worcester.

SECTION 7 - PREPARATION AND SUBMISSION OF BIDS

7.1 Each bid shall be submitted upon the bid forms furnished by the Owner, copies of which are bound with the bid documents. The bid forms shall be submitted, as bound, with the balance of the Contract Documents. All blank spaces shall be filled in, in ink or typewritten, in words or figures. The bid prices for each item on the bid forms shall be stated in both words and figures. Where itemized lump sum or unit prices are called for, all such prices shall be provided by the bidder. In the event of a discrepancy between prices written in words and prices written in figures, the written words shall govern. In the event of a discrepancy between the indicated sum of any column of figures and the correct sum thereof, the correct sum shall govern. The bid shall state the legal name of the bidder and shall be signed in ink by a person or persons legally authorized to bind the bidder to a contract. The name and title of the person or persons signing the bid shall be typed or printed below the signatures.

7.2 Each bid and the bid deposit (described below) shall be submitted to the Owner at the place stated in the Advertisement for Bids in a sealed opaque envelope bearing on the outside the name of the bidder, his address and the title of the project for which the bid is submitted. If forwarded by mail, the sealed bid and the bid deposit shall be enclosed in an envelope with the notation "BID ENCLOSED" on the face and addressed as indicated in the Advertisement for Bids.

7.3 Section 39L of Chapter 30 of the Massachusetts General Laws prohibits the Owner from entering into a contract for this work with, and shall not approve as a subcontractor furnishing labor and materials for a part of any such work, a foreign corporation which has not filed with the Owner, a certificate of the state secretary stating that such corporation has complied with M.G.L. c. 181, sections 3 and 5. Therefore, every Foreign Corporation must furnish a certified copy of its Certificate of Registration that has been duly filed with the state secretary's office. Any bid, general or sub, of a foreign corporation submitted without a Certificate may be rejected pursuant to Section 11.

SECTION 8 - RECEIPT OF BIDS

8.1 All bidders are cautioned to allow ample time for transmittal of bids. Bidders are solely responsible for delivery to and receipt by the Owner of bids at the place stated in the advertisement for Bids. Bids received after the specified time or at other than the specified location will not be accepted or recognized. The time of receipt will determine the acceptability of mailed bids, regardless of postmark.

8.2 Any bid may be withdrawn by the bidder or his duly authorized representative by written notice received by the Owner at the address for receipt of bids specified in the Advertisement for Bids prior to the time scheduled for the opening of such bids or authorized postponement thereof. No bid may be withdrawn for sixty (60) days, Saturdays, Sundays and legal holidays excluded, after the opening of general bids. No telephone or telegraphic bid, change in bid or withdrawal of bid

will be received or recognized. A bid may be amended or modified only by withdrawing the bid and resubmitting another bid prior to the time for the opening of bids.

8.3 Bids will be opened and read publicly at the place and time stated in the Advertisement for Bids or the authorized postponement thereof. Bidders or their authorized representatives are invited to be present.

SECTION 9 - BID DEPOSIT

9.1 Each bid must be accompanied by a bid deposit in the form of a bid bond, or a certified check on, or a treasurer's or cashier check issued by, a responsible bank or trust company, payable to the City of Worcester. A bid bond shall be

- a) in form satisfactory to the Owner substantially conforming to the sample contained in the Contract Documents,
- b) with a surety company qualified to do business (licensed) in the Commonwealth of Massachusetts and satisfactory to the Owner, and
- c) conditioned upon the faithful performance by the principal of the agreements contained in the bid. The bid deposit shall be in the amount of 5% of the value of the bid.

SECTION 10 - REJECTION OF BIDS

10.1 The Owner shall reject every general bid which is not accompanied by the required bid deposit, or which otherwise does not conform to the statutory requirements or the bid documents.

10.2 The Owner reserves the right to reject any and all general bids which contains erasures, alterations, additions, errors or irregularities of any kind, or which contains proposed prices for any class or item of work which are, in the judgment of the Owner, substantially less or more than the actual cost to complete the work; provided, however, that the Owner reserves the right to waive any and all informalities as to form. Matters as to substance shall not be waived.

SECTION 11 - AWARD OF CONTRACT

11.1 The general contract will be awarded to the lowest responsible and eligible general bidder complying with the conditions and requirements provided in these Instructions, the bid forms and the other bid documents.

11.2 Award of the contract will be made within ninety (90) days, Saturdays, Sundays and legal holidays excluded, after (i) the opening of the bids or (ii) the

receipt by the Owner of any approvals necessary from federal or state agencies in connection with the project, whichever is later.

11.3 The successful bidder will be notified in writing, by mail or otherwise, that his bid has been accepted and that he has been awarded the contract. The successful bidder shall execute the contract and furnish the required bonds, at the offices of the Owner within five (5) days, Saturdays, Sundays and legal holidays excluded, after presentation of the contract to him or notice to him that the contract is ready for execution.

11.4 If the bidder selected as the general contractor fails to perform his agreement to execute the contract in accordance with the terms of his bid and furnish a performance bond and also a labor and materials payment bond as stated in his bid, the award will be made to the next lowest responsible and eligible general bidder.

SECTION 12 - CERTIFICATES AND DOCUMENTS TO BE FURNISHED UPON EXECUTION OF THE CONTRACT

12.1 Pursuant to Sections 49A of Chapter 62C of the Massachusetts General Laws the contractor must certify that it has complied with all laws of the Commonwealth of Massachusetts relating to taxes. A form of certificate for this purpose is included in the Contract Documents.

12.2 Prior to commencement of work, the contractor must furnish to the Owner certificates evidencing required insurance coverage in accordance with the provisions of the insurance requirements contained in the Supplementary Conditions of the Contract.

12.3 The affidavit of compliance with certain laws of the Commonwealth relating to corporations, and evidence of corporate authority with respect to execution of the contract documents on behalf of the contractor, on the form contained in the bidding documents, must be furnished by the contractor to the Owner at the time of execution of the contract.

12.4 A performance bond and a labor and materials payment bond, each in the amount of the contract sum, must be furnished by the general contractor as stated in the bid form. Such bonds must be on the forms contained in the bid documents and must be executed and delivered to the Owner at the time of execution of the contract. Each attorney-in-fact who executes such a bond on behalf of the surety must affix thereto a certified and current copy of his power of attorney.

SECTION 13 - MINORITY/WOMEN BUSINESS ENTERPRISE PROGRAM

- 13.1 The Owner has established goals for the participation of minority and women contractors and subcontractors on all City projects. In furtherance thereof, the City of Worcester's Supplemental Equal Employment Opportunity Anti-Discrimination and Affirmative Action Program is included in the Bidding Documents, and all bidders shall comply with the requirements set forth therein.

**ARTICLE 102:
GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION**

**SECTION 1
GENERAL PROVISIONS**

1.1 DEFINITIONS

1.1.1 THE CONTRACT DOCUMENTS

The Contract Documents consist of the Owner-Contractor Agreement, the Conditions of the Contract (General, Supplementary and other Conditions), Performance Bond, Payment Bond, Vote of Corporation, Information to Bidders, Bid Proposal, the Drawings, the Specifications, and all Addenda issued prior to and all Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a written interpretation issued by the Contracting Officer pursuant to Subparagraph 2.2.3, or (4) a written order for a minor change in the Work issued by the Contracting Officer pursuant to Paragraph 12.3. The Contract Documents do not include Bidding Documents such as, sample forms, or portions of Addenda relating to any of these, or any other documents, unless specifically enumerated in the Owner-Contractor Agreement. The Drawings of this Contract shall be as listed on the cover sheet of the Drawings, as applicable. The Specifications of this Contract shall be listed on the Index to the Technical Specifications. In the event of any conflict among the Contract Documents, the Documents shall be construed according to the following priorities: Highest Priority - Modifications, Second Priority-Agreement, Third Priority - Addenda-later date to take precedence, Fourth Priority - Special Requirements, Fifth Priority - Special Conditions, Sixth Priority - Supplementary General Conditions, Seventh Priority - General Conditions, Eighth Priority - Specifications, Ninth Priority - Drawings.

1.1.2 THE CONTRACT

The Contract Documents form the Contract for Construction. This Contract represents the entire and integrated agreement between the parties hereto and supersedes all prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification as defined in Subparagraph 1.1.1. These General Conditions, wherever applicable, shall be construed consistent with, and terms of the Owner-Contractor Agreement, provided further however, that the terms of such Agreement shall take

precedence, as provided in Subparagraph 1.1.1. Except for the special agreements in Paragraph 4.18, nothing contained in the Contract Documents shall be construed to create any contractual relationship of any kind between the Architect and the Contractor. Nothing contained in the Contract Documents shall create any contractual relationship between the Owner or the Architect and any Subcontractor or Sub-subcontractor.

1.1.3 THE WORK

The Work comprises the completed construction required by the Contract Documents and includes all labor necessary to produce such construction, and all materials and equipment incorporated or to be incorporated in such construction.

1.1.4 THE PROJECT

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part.

1.2 EXECUTION, CORRELATION AND INTENT

1.2.1 The Contract Documents shall be signed in not less than duplicate by the Owner and the Contractor.

1.2.2 By executing the Contract, the Contractor represents that he has visited the site, familiarized himself with the local conditions under which the Work is to be performed, and correlated his observations with the requirements of the Contract Documents.

1.2.3 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work. The Contract Documents are complementary, and what is required by any one shall be as binding as if required by all. Work not covered in the Contract Documents will not be required unless it is consistent therewith and is reasonably inferable therefrom as being necessary to produce the intended results. Words and abbreviations which have well-known technical or trade meanings are used in the Contract Documents in accordance with such recognized meanings. All work mentioned or indicated in the Contract Documents shall be performed by the Contractor as part of this Contract unless it is specifically indicated in the Contract Documents that such work is to be done by others. Should the drawings or the Specifications disagree in themselves or with each other, the Contractor shall provide the better quality or greater quantity of work and/or materials unless otherwise directed by written addendum to the Contract.

1.2.4 The organization of the Specifications into divisions, sections and articles, and the arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade. The Contractor and all Subcontractors shall refer to all of the

Drawings, including those showing primarily the work of the mechanical, electrical and other specialized trades, and to all of the Sections of the Specifications, and shall perform all work reasonably inferable therefrom as being necessary to produce the indicated results.

1.2.5 All indications or notations which apply to one of a number of similar situations, materials or processes shall be deemed to apply to all such situations, materials or processes wherever they appear in the Work, except where a contrary result is clearly indicated by the Contract Documents.

1.2.6 Where codes, standards, requirements and publications of public and private bodies are referred to in the Specifications, references shall be understood to be to the latest revision prior to the date of receiving bids, except where otherwise indicated.

1.2.7 Where no explicit quality or standards for materials or workmanship are established for work, such work is to be of good quality for the intended use and consistent with the quality of the surrounding work and of the construction of the Project generally.

1.2.8 All manufactured articles, materials, and equipment shall be applied, installed, connected, erected, used, cleaned, and conditioned in accordance with the manufacturer's written or printed directions and instructions unless otherwise indicated in the Contract Documents.

1.2.9 Any test boring or soil test information included with the Contract Documents or otherwise made accessible to the Contractor was obtained by the Owner or Architect for use by the Architect in the design. The Owner and Architect do not hold out such information to the Contractor as an accurate or approximate indication of subsurface conditions, and no claim for extra cost or extension of time resulting from a reliance by the Contractor on such information shall be allowed except as provided in M.G.L. c. 30, section 39N.

1.3 OWNERSHIP AND USE OF DOCUMENTS

1.3.1 All Drawings and Specifications furnished by the Architect, and all copies thereof and the copyright therein, are the property of the Architect or the Owner. They are to be used only with respect to this Project and are not to be used on any other project. With the exception of one contract set for each party to the Contract, such documents are to be returned or suitably accounted for to the Architect on request at the completion of the Work. Submission or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect's or Owner's common law copyright or other reserved rights.

SECTION 2 ARCHITECT

2.1 DEFINITION

2.1.1 The term Architect refers to either, (a) a professionally licensed architect, engineer, or landscape architect, hired or used by the City, or in the absence of thereof, (b) the Contracting Officer identified in the Instruction to Bidders. The Architect is referred to throughout the Contract Documents as if singular in number and masculine in gender.

2.2 ADMINISTRATION OF THE CONTRACT

2.2.1 The Architect will provide administration of the Contract as herein described and pursuant to the terms of the contract between the Architect and the Owner.

2.2.2 The Architect will be the Owner's representative during construction and until final payment is due. The Architect will advise and consult with the Owner. The Owner's instructions to the Contractor shall be forwarded through the Architect. The Architect will have the authority to act on behalf of the Owner only to the extent provided in the Contract Documents and the Design Services Agreement between the two, unless otherwise modified by written instrument in accordance with Subparagraph 2.2.17.

2.2.3 The Architect will visit the site at intervals appropriate to the stage of construction to familiarize himself generally with the progress and quality of the Work and to determine in general if the Work is proceeding in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. On the basis of his on-site observations as an architect, he will keep the Owner informed of the progress of the Work, and will endeavor to guard the Owner against defects and deficiencies in the Work of the Contractor.

2.2.4 The Architect will not be responsible for and will not have control or charge of construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with the Work, and he will not be responsible for the Contractor's failure to carry out the Work in accordance with the Contract Documents. The Architect will not be responsible for or have control or charge over the acts or omissions of the Contractor, Subcontractors, or any of their agents or employees, or any other persons performing any of the Work.

2.2.5 The Architect shall at all times have access to the Work wherever it is in preparation and progress. The Contractor shall provide facilities for such access so the Architect may perform his functions under the Contract Documents.

2.2.6 Based on the Architect's observations and an evaluation of the Contractor's Applications for Payment, the Architect will determine the amounts owing to the Contractor and will certify Certificates for Payment in such amounts, as provided in Paragraph 9.4.

2.2.7 The Architect will be the interpreter of the requirements of the Contract Documents and the judge of the performance thereunder by both the Owner and Contractor.

2.2.8 The Architect will render interpretations necessary for the proper execution or progress of the Work, with reasonable promptness and in accordance with M.G.L. c. 30, section 39P, or any lesser time limit agreed upon. Either party to the Contract may make written request to the Architect for such interpretations.

2.2.9 Claims, disputes and other matters in question between the Contractor and the Owner relating to the execution of progress of the Work or the interpretation of the Contract Documents shall be referred initially to the Architect for decision, which he will render in writing within a reasonable time.

2.2.10 All interpretations and decisions of the Architect shall be consistent with the intent of and reasonably inferable from the Contract Documents and will be in writing or in the form of drawings. In his capacity as interpreter and judge, he will endeavor to secure faithful performance by both the Owner and the Contractor, will not show partiality to either, and will not be liable for the result of any interpretation or decision rendered in good faith, and in the absence of negligence, in such capacity.

2.2.11 The Architect's decisions in matters relating to artistic effect will be final if consistent with the intent of the Contract Documents.

2.2.12 The Architect will have authority to reject Work that does not conform to the Contract Documents. Whenever, in his opinion, he considers it necessary or advisable for the implementation of the intent of the Contract Documents, he will have authority to require special inspection or testing of the Work in accordance with Subparagraph 7.7.2, whether or not such Work be then fabricated, installed or completed. However, neither the Architect's authority to act under this Subparagraph 2.2.12 nor any decision made by him in good faith either to exercise or not to exercise such authority, shall give rise to any duty or responsibility of the Architect to the Contractor, any Subcontractor, any of their agents or employees, or any other person performing any of the Work.

2.2.13 The Architect will review and approve or take other appropriate action upon Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for conformance with the design concept of the Work and with the information given in the Contract Documents. Such action shall be taken with reasonable promptness so as to cause no delay. The Architect's approval of a special item shall not indicate approval of an assembly of which the item is a component.

2.2.14 The Architect will prepare Change Orders in accordance with Article 12, and will have authority to order minor changes in the Work as provided in Subparagraph 12.3.1.

2.2.15 The Architect will conduct inspections to determine the dates of Substantial Completion and final completion, will receive and forward to the Owner for the Owner's review written warranties and related documents required by the Contract and assembled by the Contractor, and will issue a final Certificate of Payment upon compliance with the requirements of Paragraph 9.9.

2.2.16 If the Owner and Architect agree, the Architect will provide one or more Project Representatives to assist the Architect in carrying out his responsibilities at the site. The duties, responsibilities and limitations of authority of any such Project Representative shall be as set forth in an exhibit to be incorporated in the Contract Documents.

2.2.17 The duties, responsibilities, and limitations of authority of the Architect as the Owner's representative during construction, as set forth in the Contract Documents and the contract between the two, will not be modified or extended without consent of the Owner and the Architect.

2.2.18 In case of the termination of the employment of the Architect, the Owner shall appoint an architect against whom the Contractor makes no reasonable objection whose status under the Contract Documents shall be the same as that of the former architect.

SECTION 3 OWNER

3.1 DEFINITION

3.1.1 The term Owner means the city of Worcester.

INFORMATION AND SERVICES REQUIRED OF THE OWNER

3.2.1 The Owner shall, at the time of execution of the Owner-Contractor Agreement, furnish the certification of adequate appropriation pursuant to M. G. L. Chapter 44, section 31C of the General Laws.

3.2.2 The Owner shall furnish existing surveys, if any, describing the physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site.

3.2.3 Except as provided in Subparagraph 4.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for the construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

3.2.4 Information or services under the Owner's control shall be furnished by the Owner with reasonable promptness after receipt from the Contractor of a written request for such information or services.

3.2.5 Unless otherwise provided in the Contract Documents, the Contractor will be furnished, free of charge, three (3) copies of Drawings and Specifications reasonably necessary for the execution of the Work.

3.2.6 The Owner shall forward all instructions to the Contractor through the Architect.

3.2.7 The foregoing are in addition to other duties and responsibilities of the Owner enumerated herein and especially those in respect to Work by Owner or by Separate Contractors, Payments and Completion, and Insurance in Articles 6, 9 and 11 respectively.

3.3 OWNER'S RIGHT TO STOP THE WORK

3.3.1 If the Contractor fails to correct defective Work as required by Paragraph 13.2 or persistently fails to carry out the Work in accordance with the Contract Documents, the Owner, by a written order signed personally or by an agent specifically so empowered by the Owner in writing, may order the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of the Owner to stop the Work shall not give rise to any duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Subparagraph 6.1.3.

3.4 OWNER'S RIGHT TO CARRY OUT THE WORK

3.4.1 If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within seven days after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to any other remedy he may have, make good such deficiencies. In such case an appropriate Change Order shall be issued deducting from the payments then or thereafter due the Contractor the cost of correcting such deficiencies, including compensation for the Architect's additional services made necessary by such default, neglect or failure. Such action by the Owner and the amount charged to the Contractor are both subject to prior notice being given to the Architect by the Owner. If the payments then or thereafter due the Contractor are not sufficient to cover such amount, the Contractor shall pay the difference to the Owner.

SECTION 4 CONTRACTOR

4.1 DEFINITION

4.1.1 The Contractor is the person or entity identified as such in the Owner-Contractor Agreement and is referred to throughout the Contract Documents as if

singular in number and masculine in gender. The term Contractor means the Contractor or his authorized representative.

4.2 REVIEW OF CONTRACT DOCUMENTS

4.2.1 Before starting the Work, and at frequent intervals during the progress thereof, the Contractor shall carefully study and compare the Agreement, Conditions of the Contract, Drawings, Specifications, Addenda and other Contract Documents and shall at once report to the Architect any error, inconsistency or omission he may discover. Any necessary change shall be ordered as provided in Article 12, subject to the requirements of paragraph 1.2 and other provisions of the Contract Documents. If the Contractor proceeds with the Work without such notice to the Architect, having discovered such errors, inconsistencies or omissions, or if by reasonably study of the Contract Documents he could have discovered such, the Contractor shall bear all costs arising therefrom.

4.2.2 The Contractor shall give the Architect timely notice of any additional design drawings, specifications, or instructions required to define the Work in greater detail, or to permit the proper progress of the Work.

4.2.3 The Contractor shall not proceed with any Work not clearly and consistently defined in detail in the Contract Documents, but shall request additional drawings or instructions from the Architect as provided in subparagraph 4.2.2. If the Contractor proceeds with such Work without obtaining further drawings or instructions, he shall correct Work incorrectly done at his own expense.

SUPERVISION AND CONSTRUCTION PROCEDURES

4.3.1 The Contractor shall supervise and direct the Work, using his best skill and attention. He shall be solely responsible for all construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract.

4.3.2 The Contractor shall be responsible to the Owner for the acts and omissions of his employees, Subcontractors and their agents and employees, and other persons performing any of the Work under a contract with the Contractor.

4.3.3 The Contractor shall not be relieved from his obligations to perform the Work in accordance with the Contract Documents either by the activities or duties of the Architect in his administration of the Contract, or by inspections, tests or approvals required or performed under Paragraph 7.7 by persons other than the Contractor.

4.3.4 Where the Contract Documents refer to particular construction means, methods, techniques, sequences or procedures or indicate or imply that such are to be used in the Work, such mention is intended only to indicate that the operations of the Contractor shall be as to produce at least the quality of work implied by the operations described, but the actual determination of whether or not

the described operations may be safely and suitably employed on the Work shall be the responsibility of the Contractor, who shall notify the Architect in writing of the actual means, methods, techniques, sequences or procedures which will be employed on the Work, if these differ from those mentioned in the Contract Documents. All loss, damage, or liability, or cost of correcting defective work arising from the employment of any construction means, methods, techniques, sequences or procedures shall be borne by the Contractor, notwithstanding that such construction means, methods, techniques, sequences or procedures are referred to, indicated or implied by the Contract Documents, unless the Contractor has given timely notice to the Architect in writing that such means, methods, techniques, sequences or procedures are not safe or suitable, and the Contractor has then been instructed in writing by the Owner to proceed at the Owner's risk.

4.4 LABOR AND MATERIALS

4.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for all labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for the proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work. The word 'provide' shall mean furnish and install complete, including connections, unless otherwise specified.

4.4.2 The Contractor shall at all times enforce strict discipline and good order among his employees and shall not employ on the Work any unfit person or anyone not skilled in the task assigned to him.

4.5 WARRANTY

4.5.1 The Contractor warrants to the Owner and the Architect that all materials and equipment furnished under this Contract will be new and of recent manufacture unless otherwise specified, and that all Work will be of good quality, free from faults and defects and in conformance with the Contract Documents. All Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective.

4.5.2 The Contractor shall be responsible for determining that all materials furnished for the Work meet all requirements of the Contract Documents. The Architect may require the Contractor to produce reasonable evidence that a material meets such requirements, such as certified reports of past tests by qualified testing laboratories, reports of studies by qualified experts, or other evidence which, in the opinion of the Architect, would lead to a reasonable certainty that any material used, or proposed to be used, in the Work meets the requirements of the Contract Documents. All such data shall be furnished at the Contractor's expense. This provision shall not require the Contractor to pay for periodic testing of different batches of the same material, unless such testing is specifically required by the Contract Documents to be performed at the Contractor's expense.

4.5.3 If the Contractor proposed to use a material which, while suitable for the intended use, deviates in any way from the detailed requirements of the Contract Documents, he shall inform the Architect in writing of the nature of such deviations at the time the material is submitted for approval, and shall request written approval of the deviation from the requirements of the Contract Documents.

4.5.4 In requesting approval of the deviations or substitutions, the Contractor shall provide, upon request, evidence leading to a reasonable certainty that the proposed substitution or deviation will provide a quality of result at least equal to that otherwise attainable. If, in the opinion of the Architect, the evidence presented by the Contractor does not provide a sufficient basis for such reasonable certainty, the Architect may reject such substitution or deviation without further investigation.

4.5.5 The Contract Documents are intended to produce a completed project of consistent character and quality of design. All components of the project have been selected to have a coordinated design in relation to the overall appearance. The Architect shall judge the design and appearance of proposed substitutes on the basis of their suitability in relation to the overall design of the project, as well as for their intrinsic merits. The Architect will not approve as equal to materials specified proposed substitutes which, in his opinion, would be out of character, obtrusive, or otherwise inconsistent with the character or quality of design of the project. In order to permit coordinated design of color and finishes the Contractor shall, if required by the Architect, furnish the substituted material in any color, finish, texture, or pattern that would have been available from the manufacturer originally specified, at no additional cost to the Owner.

4.5.6 Any additional cost, or any loss or damage arising from the substitution of any material or any method for those originally specified shall be borne by the Contractor, notwithstanding approval or acceptance of such substitution by the Owner or the Architect, unless such substitution was made at the written request or direction of the Owner.

4.5.7 The warranty provided in this paragraph 4.5 shall be in addition to and not in limitation of any other warranty required by the Contract Documents or otherwise prescribed by law.

4.5.8 The Contractor shall procure and deliver to the Architect, no later than the date claimed by the Contractor as the date of Substantial Completion, all special warranties required by the Contract Documents. Delivery by the Contractor shall constitute the Contractor's guarantee to the Owner that the warranty will be performed in accordance with its terms and conditions.

4.6 TAXES

4.6.1 The Contractor shall pay all sales, consumer, use and other similar taxes for the Work or portions thereof provided by the Contractor which are legally enacted at the time bids are received, whether or not yet effective.

4.6.2 IMPORTANT TAX NOTE: This project, being constructed for a political subdivision of the Commonwealth of Massachusetts, is exempt from certain taxes. It is therefore required that the Contractor and all Subcontractors purchasing taxable goods covered by the governing tax codes make known to suppliers the tax-exempt status of the institution in order that such taxes will not appear in the Contract Sum. The Owner will provide the necessary evidence and certificates of its tax exemption upon request of those concerned. The most applicable taxes concerned are:

- a. Federal Excise Taxes as applied to articles which are taxable under Chapter 12 of the Internal Revenue Code of 1954, as amended.
- b. Commonwealth of Massachusetts Sales tax.

4.7 PERMITS, FEES AND NOTICES

4.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit and for all other permits and governmental fees, licenses and inspections necessary for the proper execution and completion of the Work which are customarily secured after execution of the Contract and which are legally required at the time the bids are received.

4.7.2 The Contractor shall give all notices and comply with all laws, ordinances, rules, regulations, and lawful orders of any public authority bearing on the performance of the Work.

4.7.3 It is not the responsibility of the Contractor to make certain the Contract Documents are in accordance with the applicable laws, statutes, building codes and regulations. If the Contractor observes that any of the Contract Documents are at variance therewith in any respect, he shall promptly notify the Architect in writing, and any necessary changes shall be accomplished by appropriate Modification.

4.7.4 If the Contractor performs any Work knowing it to be contrary to such laws, ordinances, rules and regulations, and without such notice to the Architect, he shall assume full responsibility therefore and shall bear all costs attributable thereto.

4.8 ALLOWANCES

4.8.1. The Contract shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by these allowances shall be supplied for such amounts and by such persons as the Owner may direct, but the Contractor will not be required to employ persons against whom he makes a reasonable objection. Note, however, that the use of such allowances are prohibited in any contract or work subject to the provisions of M.G.L. c. 149, section 44A.

4.8.2 Unless otherwise provided in the Contract Documents:

.1 these allowances shall cover the cost to the Contractor, less any applicable trade discount, of the materials and equipment required by the allowance delivered at the site, and all applicable taxes;

.2 the Contractor's costs for unloading and handling of the site, labor, installation costs, overhead, profit and other expenses contemplated for the original allowance shall be included in the Contract Sum and not in the allowance;

.3 whenever the cost is more than or less than the allowance, the Contract Sum shall be adjusted accordingly by Change Order, the amount of which will recognize changes, if any, in handling costs on the site, labor, installation costs, overhead, profit and other expenses.

4.9 SUPERINTENDENCE

4.9.1 The Contractor shall employ one (1) competent superintendent who shall be in attendance at the Project site full time during the progress of the Work until the date of substantial completion, and for such additional time thereafter as the Architect may determine to be necessary for the expeditious completion of the Work. The superintendent shall represent the Contractor and all communications given to the superintendent shall be as binding as if given to the Contractor. Important communications shall be confirmed in writing. Other communications shall be so confirmed on written request in each case.

4.9.2 The Contractor shall retain a competent Registered Professional Engineer or Registered Land Surveyor, registered in the Commonwealth of Massachusetts, acceptable to the Architect, who shall establish, where necessary, the exterior lines and required elevations of all buildings and structures to be erected on the site and shall establish sufficient lines and grades for the construction of associated work such as, but not limited to, layout, utilities and site grading. The Engineer or Land Surveyor shall certify as to the actual location of the constructed facilities in relation to property lines, building lines, easements, and other restrictive boundaries and shall establish survey control points onsite.

4.9.3 The Contractor shall establish the grades, lines, levels, and necessary layout required by the various subcontractors in laying out their work.

4.9.4 The Contractor shall coordinate and supervise the work performed by Subcontractors to the end that the work, is carried out without conflict between trades and so that no trade, at any time, causes delay to the general progress of the Work. The Contractor and all Subcontractors shall at all times afford each trade, any separate contractor, or the Owner, every reasonable opportunity for the installation of work and the storage of materials.

4.10 PROGRESS SCHEDULE

4.10.1 The Contractor shall prepare and submit to the Landscape Architect a progress schedule as described in subparagraphs 8.2.3 through 8.2.9.

4.11 DOCUMENTS AND SAMPLES AT THE SITE

4.11.1 The Contractor shall maintain at the site for the Owner the record copy of all Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to record all changes made during construction, and approved Shop Drawings, Product Data and Samples. These shall be available to the Architect and shall be delivered to him for the Owner upon completion of the Work.

4.11.2 Refer to Specifications Section entitled CONTRACT CLOSEOUT, for additional requirements for Record Drawings and Maintenance and Operating Manuals.

4.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

4.12.1 Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or any Subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

4.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate a material, product or system for some portion of the Work.

4.12.3 Samples are physical examples that illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.

4.12.4 The Contractor shall review, approve and submit, with reasonable promptness and in such sequence as to cause no delay in the Work or in the work of the Owner or any separate contractor, all Shop Drawings, Product Data and Samples required by the Contract Documents.

4.12.5 By approving and submitting Shop Drawings, Product Data, and, Samples, the Contractor thereby represents that he has determined and verified all dimensions, quantities, field dimensions, relations to existing work, coordination with work to be installed later, coordination with information on previously accepted Shop Drawings, Product Data, or Samples and verification of compliance with all the requirements of the Contract Documents. The accuracy of all such information is the responsibility of the Contractor. In reviewing Shop Drawings, Product Data, and Samples, the Architect shall be entitled to rely upon the Contractor's representation that such information is correct and accurate.

4.12.6 The Contractor shall not be relieved of responsibility for any deviation from the requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data or Samples under Subparagraph 2.2.14 unless the Contractor has specifically informed the Architect in writing of such deviation at the time of submission and the Architect has given written approval to the specific deviation. The Contractor shall not be relieved from responsibility for errors or omissions in the Shop Drawings, Product Data or Samples by the Architect's approval thereof.

4.12.7 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data or Samples, to revisions other than those requested by the Architect on previous submittals. Unless such written notice has been given, the Architect's approval of a resubmitted Shop Drawing, Product Data, or Sample shall not constitute approval of any changes not requested on the prior submittal.

4.12.8 No portion of the Work requiring submission of a Shop Drawing, Product Data or Sample shall be commenced until the submittal has been approved by the Architect as provided in Subparagraph 2.2.14. All such portions of the Work shall be in accordance with approved submittals.

4.12.9 Refer to Specifications Section entitled, SUBMITTALS, for additional requirements.

4.13 USE OF SITE

4.13.1 The right of possession of the premises and the improvements made thereon by the Contractor shall remain at all times in the Owner. The Contractor's right of entry and use thereof arises solely from the permission granted by the Owner under the Contract Documents. The Contractor shall confine his apparatus, the storage of materials and the operations of his workmen to limits indicated by law, ordinances, the Contract Documents and permits and/or directions by the Architect and shall not unreasonably encumber the premises with his materials.

4.14 CUTTING AND PATCHING WORK

4.14.1 The Contractor shall be responsible for all cutting, fitting or patching that may be required to complete the Work or to make its several parts fit together properly.

4.14.2 The Contractor shall not damage or endanger any portion of the Work or the work of the Owner or any separate contractors by cutting, patching or otherwise altering any work, or by excavation. The Contractor shall not cut or otherwise alter the work of the Owner or any separate contractor except with the written consent of the Owner and such separate contractor. The Contractor shall not unreasonably withhold from the Owner or any separate contractor his consent to cutting or otherwise altering the Work.

4.15 CLEANING UP

4.15.1 The Contractor at all times shall keep the premises free from accumulation of waste materials or rubbish caused by his operations. At the completion of the Work he shall remove all his waste materials and rubbish from and about the Project as well as all his tools, construction equipment, machinery and surplus materials. Immediately prior to the Architect's inspection for Substantial Completion, the Contractor shall completely clean the premises. Concrete and ceramic surfaces shall be cleaned and washed. Resilient coverings shall be cleaned, waxed and buffed. Woodwork shall be dusted and cleaned. Sash, fixtures, and equipment shall be thoroughly cleaned. Stains, spots, dust, marks and smears shall be removed from all surfaces. Hardware and all metal surfaces shall be cleaned and polished. Glass and plastic surfaces shall be thoroughly

cleaned by professional window cleaners. All damaged, broken or scratched glass or plastic shall be replaced by the Contractor at this expense.

4.15.2 If the Contractor fails to clean up at the completion of the Work, the Owner may do so as provided in Paragraph 3.4 and the cost thereof shall be charged to the Contractor.

4.15.3 Refer to Specifications Section entitled, PROJECT CLOSEOUT, for additional requirements.

4.16 COMMUNICATIONS

4.16.1 The Contractor shall forward all communications to the Owner through the Architect.

4.17 ROYALTIES AND PATENTS

4.17.1 The Contractor shall pay all royalties and license fees. He shall defend all suits or claims for infringement of any patent rights and shall save the Owner harmless from loss on account thereof, except that the Architect shall be responsible for all such loss when a particular design, process or the product of a particular manufacturer or manufacturers is specified, but if the Contractor has reason to believe that the design, process or product specified is an infringement of a patent, he shall be responsible for such loss unless he promptly gives such information to the Architect.

4.18 INDEMNIFICATION

4.18.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Architect and its agents and employees from and against all claims, damages, losses and expenses, including but not limited to attorney's fees, arising out of or resulting from the performance of the Work, provided that any such claim, damage, loss or expense (1) 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 (2) is caused in whole or in part by any negligent act or omission of the Contractor, any Subcontractor, anyone directly or indirectly employed by any of them 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. Such obligation shall not be construed to negate, abridge, or otherwise reduce any other right or obligation of indemnity which would otherwise exist as to any party or person described in this Paragraph 4.18.

4.18.2 In any and all claims against the Architect or any of his agents or employees, by any employee of the Contractor, any Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, the indemnification obligation under this Paragraph 4.18 shall

not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the Contractor or any Subcontractor under workers' or workmen's compensation acts, disability benefit acts or other employee benefit acts.

4.18.3 The obligations of the Contractor under this Paragraph 4.18 shall not extend to the liability of the Architect, his agents or employees, arising out of (1) the preparation or approval of maps, drawings, opinions, reports, surveys, change orders, designs or specifications, or (2) the giving of or the failure to give directions or instructions by the Architect, his agents or employees provided, such giving or failure to give is the primary cause of the injury or damage.

SECTION 5 SUBCONTRACTORS

5.1 DEFINITION

5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform any of the Work at the site and as further defined by M.G.L. c. 30, section 39F(3). The term Subcontractor is referred to throughout the Contract Documents as if singular in number and masculine in gender and means a Subcontractor or his authorized representative. The term Subcontractor does not include any separate contractor or his subcontractors.

5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contact with a Subcontractor to perform any of the Work at the site. The term Sub-subcontractor is referred to throughout the Contract Documents as if singular in number and masculine in gender and means a Sub-subcontractor or an authorized representative thereof.

5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

5.2.1 Unless otherwise required by the Contract Documents or the Bidding Documents, the Contractor, as soon as practicable after the award of the Contract, shall furnish to the Owner and the Architect, in writing, the names of the persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each of the principal portions of the Work. The Architect will promptly reply to the Contractor in writing stating whether or not the Owner or the Architect, after due investigation, has reasonable objection to any such proposed person or entity. Failure of the Owner or Architect to reply promptly shall constitute notice of no reasonable objection.

5.2.2 The Contractor shall not contract with any such proposed person or entity to which the Owner or the Architect has made reasonable objection under the provisions of Subparagraph 5.2.1. The Contractor shall not be required to contract with anyone to whom he has a reasonable objection.

5.2.3 If the Owner or the Architect has reasonable objection to any such proposed person or entity, the Contractor shall submit a substitute to whom the Owner or the Architect has no reasonable objection, and the Contract Sum shall be increased or decreased by the difference in cost occasioned by such substitution and an appropriate Change Order shall be issued; however no increase in the Contract Sum shall be allowed for any such substitution unless the Contractor has acted promptly and responsively in submitting names as required by Subparagraph 5.2.1

5.2.4 The Contractor shall make no substitution for any Subcontractor, person or entity previously selected if the Owner or Architect makes reasonable objection to such substitution.

5.3 SUBCONTRACTUAL RELATIONS

5.3.1 By an appropriate agreement, written where legally required for validity, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by the terms of the Contract Documents, and to assume to the Contractor all the obligations and responsibilities which the Contractor, by these Documents, assumes toward the Owner and the Architect. Said agreement shall preserve and protect the rights of the Owner and the Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that the subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the Contractor-Subcontractor agreement, the benefit of all rights, remedies and redress against the Contractor that the Contractor, by these Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with his Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the Subcontract, copies of the Contract Documents to which the Subcontractor will be bound by this Paragraph 5.3, and identify to the Subcontractor any terms and conditions of the proposed Subcontract which may be at variance with the Contract Documents. Each Subcontractor shall similarly make copies of such Documents available to his Sub-subcontractors.

SECTION 6

WORK BY OWNER OR BY SEPARATE CONTRACTORS

6.1 OWNER'S RIGHT TO PERFORM WORK AND TO AWARD SEPARATE CONTRACTS

6.1.1 The Owner reserves the right to perform work related to the Project with his own forces, and to award separate contracts in connection with other portions of the Project or other work on the site under these or similar Conditions of the Contract. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, he shall make such claim as provided elsewhere in the Contract Documents.

6.1.2 When separate contracts are awarded for different portions of the Project or other work on the site, the term Contractor in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

6.1.3 The Owner will provide for the coordination of the work of his own forces and of each separate contractor with the Work of the Contractor, who shall cooperate therewith as provided in Paragraph 6.2.

6.1.4 The Contractor shall permit the Owner to place and install as much equipment during the progress of the work as is possible before the completion of the various parts of the work, and agrees that such placing and the installation of equipment shall not in any way evidence the completion of the work or any portion of it, nor shall it signify the Owner's completion of the work or any portion thereof.

6.2 MUTUAL RESPONSIBILITY

6.2.1 The Contractor shall afford the Owner and separate contractors reasonable opportunity for the introduction and storage of their materials and equipment and the execution of their work, and shall connect and coordinate his Work with theirs as required by the Contract Documents.

6.2.2 If any part of the Contractor's Work depends for proper execution or results upon the work of the Owner or any separate contractor, the Contractor shall, prior to proceeding with the Work, promptly report to the Architect any apparent discrepancies or defects in such other work that render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acceptance of the Owner's or separate contractors' work as fit and proper to receive his Work, except as to defects which may subsequently become apparent in such work by others.

6.2.3 Any costs caused by defective or ill-timed work shall be borne by the party responsible therefor.

6.2.4 Should the Contractor wrongfully cause damage to the work or property of the Owner, or to other work on the site, the Contractor shall promptly remedy such damages as provided in Subparagraph 10.2.5.

6.2.5 Should the Contractor wrongfully cause damage to the work or property of any separate contractor, the Contractor shall upon due notice promptly attempt to settle with such other contractor by agreement, or otherwise to resolve the dispute. If such separate contractor sues the Owner on account of any damage alleged to have been caused by the Contractor, the Owner shall notify the Contractor.

6.3 OWNER'S RIGHT TO CLEAN UP

6.3.1 If a dispute arises between the Contractor and separate contractors as to their responsibility for cleaning up as required by Paragraph 4.15, the Owner may clean up and charge the cost thereof to the contractors responsible therefor as the Architect shall determine to be just.

SECTION 7 MISCELLANEOUS PROVISIONS

7.1 GOVERNING LAW

7.1.1 The Contract shall be governed by the law of the Commonwealth of Massachusetts.

7.2 SUCCESSORS AND ASSIGNS

7.2.1 The Owner and the Contractor each binds himself, his partners, successors, assigns and legal representatives to the other party hereto and to the partners, successors, assigns and legal representatives of such other party with respect to all covenants, agreements, and obligations contained in the Contract Documents. Neither party to the Contract shall assign the Contract or sublet it as a whole without the written consent of the other, nor shall the Contractor assign any moneys due or to become due to him hereunder, without the previous written consent of the Owner.

7.2.2 If, after making final payment, the Owner conveys to a third party any building or other improvement constructed under the Contract, any rights with respect to the property so conveyed which the Owner may have against the Contractor under Article 13 or by virtue of claims which, under the terms of subparagraph 9.9.4, are reserved to the Owner after the making and acceptance of final payment, shall automatically transfer to such third party.

7.3 WRITTEN NOTICE

7.3.1 Written notice shall be deemed to have been duly served if delivered in person to an authorized representative of the person or entity for whom it was

intended, or if delivered at or sent by registered or certified mail or by telegraph to the address of such person or entity set forth in the Agreement or in a subsequent written notice.

7.4 CONSENT OR WAIVER

7.4.1 No consent or waiver, express or implied, by the Owner or the Architect to, or of, any breach of any covenant, condition or duty of the Contractor shall be construed as a consent to or waiver of any other breach of the same or any other covenant, condition or duty.

7.5 PERFORMANCE BOND AND LABOR AND MATERIAL PAYMENT BOND

7.5.1 The Owner shall have the right to require the Contractor to furnish bonds covering the faithful performance of the Contract and the payment of all obligations arising thereunder if and as required in the Bidding Documents or in the Contract Documents.

7.6 RIGHTS AND REMEDIES

7.6.1 The duties and obligations imposed by the Contract Documents and the rights and remedies available thereunder shall be in addition to and not a limitation of any duties, obligations, rights and remedies otherwise imposed or available by law.

7.7 TESTS

7.7.1 If the Contract Documents, laws, ordinances, rules, regulations or orders of any public authority having jurisdiction require any portion of the Work to be inspected, tested or approved, the Contractor shall give the Architect timely notice of its readiness so the Architect may observe such inspection, testing or approval. The Contractor shall bear all costs of such inspections, tests or approvals conducted by public authorities. Unless otherwise provided, the Owner shall bear all costs of other inspections, tests or approvals.

7.7.2 If the Architect determines that any Work requires special inspection, testing, or approval which Subparagraph 7.7.1 does not include, he will, upon written authorization from the Owner, instruct the Contractor to order such special inspection, testing or approval, and the Contractor shall give notice as provided in Subparagraph 7.7.1. If such special inspection or testing reveals a failure of the Work to comply with the requirements of the Contract Documents, the Contractor shall bear all costs thereof, including compensation for the Architect's additional services made necessary by such failure, otherwise the Owner shall bear such costs, and an appropriate Change Order shall be issued.

7.7.3 The Contractor shall obtain and deliver promptly to the Architect any occupancy permit or any certificates of final inspection of any part of his work or

operating permits for any mechanical apparatus, such as elevators, escalators, boilers, air compressors, etc., which may be required by law to permit full use and occupancy of the premises by the Owner. Receipt of such permits or certificates by the Architect shall be a condition precedent to Substantial Completion of the Work.

SECTION 8 TIME

8.1 DEFINITIONS

8.1.1 Unless otherwise provided, the Contract Time is the period of time allotted in the Contract Documents for Substantial Completion of the Work as defined in Subparagraph 8.1.3, including authorized adjustments thereto.

8.1.2 The date of commencement of the Work is the date established in a notice to proceed. If there is no notice to proceed, it shall be the date of the Owner-Contractor Agreement or such other date as may be established therein.

8.1.3 The Date of Substantial Completion of the Work or designated portion thereof is the Date certified by the Architect when construction is sufficiently complete, in accordance with the Contract Documents, so the Owner can occupy or utilize the Work or designated portion thereof for the use for which it is intended and only minor items which can be corrected or completed without substantial interference with the Owner's use of the Work remain to be corrected or completed.

8.1.4 The term day as used in the Contract Documents shall mean calendar day unless otherwise specifically designated.

8.1.5 The term "working day" shall mean any calendar day except Saturdays, Sundays, and legal holidays at the place of the project.

8.2 PROGRESS AND COMPLETION

8.2.1 All time limits stated in the Contract Documents are of the essence of the Contract.

8.2.2 The Contractor shall begin the Work on the date of commencement as defined in Subparagraph 8.1.2. He shall carry the Work forward expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

8.2.3 Within two weeks after award of the Contract, the Contractor shall submit to the Architect a Progress Schedule showing for each class of work included in the Schedule of Values, the percentage completion to be obtained and the total dollar value of work to be completed as of the first of each month until Substantial

Completion. All calculations shall be on the basis of work in place, but not including the value of materials delivered but not in place.

8.2.4 The Progress Schedule shall be based on an orderly progression of the Work, allowing adequate time for each operation, and leading to a reasonable certainty of Substantial Completion by the date established in the Agreement. The Progress Schedule will be reviewed by the Architect for compliance with the requirements of this article and will be accepted by him or returned to the Contractor for revision and re-submittal. Unless specifically required by law, no payment under this Contract shall be due until the Progress Schedule has been approved by the Architect.

8.2.5 If in any Application for Payment the total value of the completed Work in place, as certified by the Architect, is less than 90% of the total value of the Work in place estimated in the Progress Schedule, the Owner may, at his option, require the Contractor to accelerate the progress of the work without cost to the Owner by increasing the work force or hours of work, or by other reasonable means approved by the Architect.

8.2.6 If each of three successive applications, as certified by the Architect, indicate that the actual work completed is less than 90% of the values estimated in the Progress Schedule to be completed by the respective dates, the Owner may at his option, treat the Contractor's delinquency as a default justifying the Owner to initiate a termination of the Contract.

8.2.7 If the Architect has determined that the Contractor should be permitted to extend the time for completion, as provided in paragraph 8.3, the calendar dates in the Progress Schedule shall be adjusted accordingly to retain their same relationship to the adjusted date of Substantial Completion, and the dollar value of work to be completed as of the first of each month shall be adjusted pro-rata.

8.2.8 If the Contractor fails to submit any Application for Payment in any month, the Architect shall, for the purpose of this evaluation of progress, certify separately to the actual value of the work in place and completed as of the first of the month, to the best of his knowledge.

8.2.9 Nothing herein shall limit the Owner's right to liquidated or other damages for delays by the Contractor or to any other remedy which he may possess under other provisions of the Contract Documents or by law.

8.3 DELAYS AND EXTENSIONS OF TIME

8.3.1 Any delay and subsequent request for an extension of time shall be governed by M.G.L. c. 30, section 39(O) and the Owner-Contractor Agreement.

8.3.2 No work shall be suspended without the written permission of the Owner or his representative.

8.3.3 If no agreement is made stating the dates upon which interpretations as provided in Subparagraph 2.2.8 shall be furnished, then no claim for delay shall be allowed on account of failure to furnish such interpretations until thirty days after written request is made for them, and not then unless such claim is reasonable.

8.3.4 This Paragraph 8.3 does not exclude the recovery of damages for delay by either party under other provisions of the Contract Documents.

SECTION 9 PAYMENTS AND COMPLETION

9.1.1 The Contract Sum is stated in the Owner-Contractor Agreement and, including authorized adjustments thereto, is the total amount payable by the Owner to the Contractor for the performance of the Work under the Contract Documents.

9.2 SCHEDULE OF VALUES

9.2.1 Before the first Application for Payment, the Contractor shall submit to the Architect a schedule of values allocated to the various portions of the Work, prepared in such form and supported by such data to substantiate its accuracy as the Architect may require and shall be revised if later found by the Architect to be inaccurate. This schedule, unless objected to by the Architect, shall be used only as a basis for the Contractor's Applications for Payment.

9.3 APPLICATIONS FOR PAYMENT

9.3.1 At least ten days before the date for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment notarized if required, supported by such data substantiating the Contractor's right to payment as the Owner or the Architect may require, and reflecting retainage, if any, as provided in Supplemental General Conditions-Part I, Article I, Paragraph 1.8 or 1.9; whichever is applicable. The format and number of copies of such Applications for Payment shall be as directed by the Architect.

9.3.2 Unless otherwise provided in the Contract Documents, payments will be made on account of materials or equipment not incorporated in the Work but delivered and suitably stored at the site and, if approved in advance by the Owner,

payments may similarly be made for materials or equipment suitably stored at some other location agreed upon in writing. Payments for materials or equipment stored on or off the site shall be conditioned upon submission by the Contractor of bills of sale or such other procedures satisfactory to the Owner to establish the Owner's title to such materials or equipment or otherwise protect the Owner's interest, including applicable insurance and transportation to the site for those materials and equipment stored off the site. The Contractor shall reimburse the Owner for any loss or damage to such unincorporated materials or equipment not covered by insurance.

9.3.3 The Contractor warrants that title to all Work, materials and equipment covered by an Application for Payment will pass to the Owner either by incorporation in the construction or upon the receipt of payment by the Contractor, whichever occurs first, free and clear of all liens, claims, security interests or encumbrances, hereinafter referred to in this Article 9 as "liens". The Contractor further agrees that the submission of any Application for Payment shall conclusively be deemed to waive all liens with respect to said work, materials and labor to which the Contractor then may be entitled; provided, however, that in no event shall such waiver of lien rights waive right to payment for said Work, materials and labor.

9.3.4 Each Application for Payment or periodic estimate requesting payment must be accompanied by a certificate from each subcontractor stating that he has been paid all amounts due him on the basis of the previous periodic payment to the Contractor, or else stating the amount not so paid and the reason for the discrepancy. In the event of any such discrepancy, the Contractor shall be required to furnish his own written explanation.

9.4 CERTIFICATES FOR PAYMENT

9.4.1 The Architect will, within seven days after the receipt of the Contractor's Application for Payment, either certify a Certificate for Payment to the Owner, with a copy to the Contractor, for such amount as the Architect determines is properly due, or notify the Contractor in writing his reasons for withholding certification of a Certificate as provided in Subparagraph 9.6.1.

9.4.2 The certification of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on his observations at the site as provided in Subparagraph 2.2.3 and the data comprising the Application for Payment, that the Work has progressed to the point indicated; that, to the best of his knowledge, information and belief, the quality of the Work is in accordance with the Contract Documents (subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to the results of any subsequent tests required by or performed under the Contract Documents, to minor deviations from the Contract Documents correctable prior to completion, and to any specific qualifications stated in his Certificate); and that the Contractor is entitled to payment in the amount certified. However, by certifying a Certificate

for Payment, the Architect shall not thereby be deemed to represent that he has made exhaustive or continuous on-site inspections to check the quality or quantity of the Work or that he has reviewed the construction means, methods, techniques, sequences or procedures, or that he has made any examination to ascertain how or for what purpose the Contractor has used the moneys previously paid on account of the Contract.

9.5 PROGRESS PAYMENTS

9.5.1 After the Architect has certified a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents.

9.5.2 The Contractor shall promptly pay each Subcontractor upon receipt of payment from the Owner, out of the amount paid to the Contractor on account of such Subcontractor's Work, the amount to which said Subcontractor is entitled, reflecting the percentage actually retained, if any, from payments to the Contractor on account of such Subcontractor's Work. The Contractor shall, by an appropriate agreement with each Subcontractor, require each Subcontractor to make payments to his Sub-subcontractors in similar manner.

9.5.3 The Architect may, on request and at his discretion, furnish to any Subcontractor, if practicable, information regarding the percentages of completion or the amounts applied for by the Contractor and the action taken thereon by the Architect on account of Work done by such Subcontractor.

9.5.4 Neither the Owner nor the Architect shall have any obligation to pay or to see the payment of any moneys to any Subcontractor except as may otherwise be required by law.

9.5.5 No Certificate for a progress payment, nor any progress payment, nor any partial or entire use or occupancy of the Project by the Owner, shall constitute an acceptance of any Work not in accordance with the Contract Documents.

9.6 PAYMENTS WITHHELD

9.6.1 The Architect may decline to certify payment, in whole or in part, to the extent reasonably necessary to protect the Owner, if in his/her opinion he/she is unable to make representations to the Owner as provided in Subparagraph 9.4.2. If the Architect is unable to make representations to the Owner as provided in Subparagraph 9.4.2 and to certify payment in the amount of the Application, he/she will notify the Contractor as provided in Subparagraph 9.4.1. If the Contractor and the Architect cannot agree on a revised amount, the Architect will promptly certify a Certificate for Payment for the amount for which he/she is able to make such representations to the Owner. The Architect may also decline to certify payment or because of subsequently discovered evidence or subsequent observations, he may nullify the whole or any part of any Certificate for Payment

previously certified, to such extent as may be necessary in his/her opinion to protect the Owner from loss because of:

1. defective Work not remedied
2. third party claims filed or reasonable evidence indicating probable filing of such claims,
3. failure of the Contractor to make payments properly to subcontractors or for labor, materials or equipment
4. reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum,
5. damage to the Owner,
6. reasonable evidence that the Work will not be completed within the Contract Time or
7. persistent failure to carry out the Work in accordance with the Contract Documents
8. failure of mechanical trades or electrical trades subcontractors to comply with mandatory requirements for maintaining record drawings. The Contractor shall be required to check record drawings each month. Written conformation that the record drawings are "up-to-date" shall be required by the Architect before approval of the Contractor's monthly payment requisition will be considered.

9.6.2 When the above grounds in Subparagraph 9.6.1 are removed, payment shall be made for amounts withheld because of them.

9.7 FAILURE OF PAYMENT

9.7.1 If the Architect does not certify a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor as required by the Contract Documents any amount certified by the Architect, then the Contractor may, upon seven additional days written notice to the Owner and the Architect, stop the Work until payment of the amount owing has been received.

9.8 SUBSTANTIAL COMPLETION

9.8.1 When the Contractor considers that the Work, or a portion thereof designated in the Contract Documents for separate completion, is substantially complete as defined in subparagraph 8.1.3, the Contractor shall submit to the Architect (1) a list of items to be completed or corrected, and (2) all special

warranties required by the Contract Documents endorsed by the Contractor and in a form reasonably acceptable to the Architect. The failure to include any items on the list mentioned in the preceding sentence does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents. When the Architect on the basis of an inspection determines that the Work or designed portion thereof is substantially complete, and when the Contractor has submitted to the Architect the special warranties, as provided in the first sentence of this subparagraph, the Architect will then certify a Certificate of Substantial Completion which shall establish the Date of Substantial Completion, shall state the responsibilities of the Owner and the Contractor for security, maintenance, heat, utilities, damage to the Work, and insurance, and shall fix the time within which the Contractor shall complete the items listed therein. Warranties required by the Contract Documents shall commence on the Date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion. The Certificate of Substantial Completion shall be submitted to the Owner and the Contractor for their written acceptance of the responsibilities assigned to them in such Certificate.

9.8.2 Upon Substantial Completion of the Work or designated portion thereof and upon application by the Contractor and certification by the Architect, the Owner shall make payment, reflecting adjustment in retainage, if any, for such Work or portion thereof, as provided in the Contract Documents.

9.9 FINAL COMPLETION AND FINAL PAYMENT

9.9.1 Upon receipt of written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection and, when he finds the Work acceptable under the Contract Documents and the Contract fully performed, he will promptly certify a final Certificate of Payment stating that to the best of his knowledge, information and belief, and on the basis of his observations and inspections, the Work has been completed in accordance with the terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor, and noted in said final Certificate, is due and payable. The Architect's certification of the final Certificate for Payment will constitute a further representation that the conditions precedent to the Contractor's being entitled to final payment as set forth in Subparagraph 9.9.2 have been fulfilled.

9.9.2 Unless otherwise required by applicable law, neither the final payment nor the remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that all payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or his property might in any way be responsible, have been paid or otherwise satisfied, (2) consent of surety, if any, to final payment and (3), if required by the Owner, other data establishing payment or satisfaction of all such obligations, such as receipts, releases and waivers of liens, arising out of the Contract, to the extent and in such form as may be designated by the Owner. If the Contractor fails to

furnish such releases or waivers as the Owner reasonably requires to satisfy the Owner that there are not outstanding claims, the Owner may require the Contractor, as a condition of final payment, to furnish a bond satisfactory to the Owner to indemnify the Owner against any such claims.

9.9.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by the issuance of Change Orders affecting final completion, and the Architect so confirms, the Owners shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance for Work not fully completed or corrected is less than the retainage stipulated in the Contract Documents, and if bonds have been furnished as provided in Paragraph 7.5., the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

9.9.4 The making of final payment shall constitute a waiver of all claims by the Owner except those arising from: (1) unsettled claims under the Bonds required elsewhere in the Contract Documents, (2) faulty or defective Work appearing after Substantial Completion, (3) failure of the Work to comply with the requirements of the Contract Documents, or (4) terms of any special warranties required by the Contract Documents.

9.9.5 The acceptance of final payment shall constitute a waiver of all claims by the Contractor except those previously made in writing and identified by the Contractor as unsettled at the time of the final Application for Payment.

SECTION 10

PROTECTION OF PERSONS AND PROPERTY

10.1 SAFETY PRECAUTIONS AND PROGRAMS

10.1.1 The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work.

10.2 SAFETY OF PERSONS AND PROPERTY

10.2.1 The Contractor shall take all reasonable precautions for the safety of, and shall provide all reasonable protection to prevent damage, injury or loss to: (1) all employees on the Work and all other persons who may be affected thereby; (2) all the Work and all materials and equipment to be incorporated therein, whether in storage on or off the site, under the care, custody or control of the Contractor or any of his Subcontractors or Sub-subcontractors; and (3) other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements,

roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

10.2.2 The Contractor shall give all notices and comply with all applicable laws, ordinances, rules, regulations and lawful orders of any public authority bearing on the safety of persons or property or their protection from damage, injury or loss.

10.2.3 The Contractor shall erect and maintain, as required by existing conditions and progress of the Work, all reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent utilities.

10.2.4 When the use or storage of explosives or other hazardous materials or equipment is necessary for the execution of the Work, the Contractor shall exercise the utmost care and shall carry on such activities under the supervision of properly qualified personnel.

10.2.5 The Contractor shall promptly remedy all damage or loss (other than damage or loss insured under Paragraph 11.3) to any property referred to in Clause 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, any Subcontractor, any Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone whose acts any of them may be liable and for which the Contractor is responsible under Clauses 10.2.1.2 and 10.2.1.3, except damage or loss attributable to the acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either by of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to his obligations under Paragraph 4.18.

10.2.6 The Contractor shall designate a responsible member of his organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designed by the Contractor in writing to the Owner and the Architect.

10.2.7 The Contractor shall not load or permit any part of the Work to be loaded so as to endanger its safety.

10.3 EMERGENCIES

10.3.1 In any emergency affecting the safety of persons or property, the Contractor shall act, at his discretion, to prevent threatened damage, injury or loss. Any additional compensation or extension of time claimed by the Contractor on account of emergency work shall be determined as provided in Article 12 for the Changes in the Work.

SECTION 11 INSURANCE

11.1 CONTRACTOR'S LIABILITY INSURANCE

11.1.1 The Contractor shall purchase and maintain in a company or companies to which the Owner has no reasonable objection, such insurance as will protect him from claims set forth below which may arise out of or result from the Contractor's operations under the Contract whether such operations be by himself or by any Subcontractor or anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

- 1) claims under workers' or workmen's compensation, disability benefit and other similar employee benefit acts;
- 2) claims for damages because of bodily injury, occupational sickness or disease, or death of his or her employees
- 3) claims for damages because of bodily injury, sickness or disease, or death of any person other than his or her employees
- 4) claims for damages insured by usual personal injury liability coverage which are sustained (1) by any person as a result of an offense directly or indirectly related to the employment of such person by the contractor or, (2) by any other person;
- 5) claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom; and
- 6) claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle

11.1.2 The insurance required by subparagraph 11.1.1 shall include all major divisions of coverage, and shall be on a comprehensive general basis including Premises and Operations (including X-C-U), Owner's and Contractor's Protective Products and Completed Operations, and Owned, Non-owned, and Hired Motor Vehicles. Such insurance shall be written for not less than any limits of liability required by law or those set forth below, whichever is greater.

1. Workmen's Compensation -Statutory/Employers Liability \$500,000.

2. Commercial General Liability - Per Occurrence / Aggregate
\$1,000,000 / 2,000,000
3. Automobile Liability – Combined Single Limit
4. Bodily Injury & Property Damage combined single limit of \$ 1,000,000 (all owned, hired and non-owned autos).
5. Excess / Umbrella Liability – Per Occurrence / Aggregate \$ 1,000,000 / \$ 1,000,000
6. Independent Contractors -Same limits as above
7. Products and Completed Operations -Same limits as above commencing with issuance of final Certificate of Payment.
8. Contractual Liability - Same limits as above.

11.1.3 The insurance required by Subparagraph 11.1.1 shall include contractual liability insurance applicable to the Contractor's obligations under Paragraph 4.18.

11.1.4 Certificates of Insurance acceptable to the Owner shall be filed with the Owner. These Certificates shall contain a provision that coverages afforded under the policies will not be canceled until at least thirty days prior written notice has been given to the Owner.

11.1.4.1 These certificates shall set forth evidence of all coverage required by 11.1.1, 11.1.2 and 11.1.3. The Contractor shall furnish to the Owner copies of any endorsements that are subsequently issued amending limits of coverage.

11.2 OWNER'S LIABILITY INSURANCE

11.2.1 The Owner shall be responsible for maintaining his own liability insurance and, at his option, may purchase and maintain such insurance as will protect him against claims which may arise from operations under the Contract.

11.3 PROPERTY INSURANCE

11.3.1 The Contractor shall purchase and maintain property insurance upon the entire Work at the site to the full insurable value thereof. This insurance shall include the interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Work and shall insure against the perils of fire and extended coverage and shall include "all risk" insurance for physical loss or damage including, without duplication of coverage, theft, vandalism and malicious mischief.

11.3.2 The Owner shall purchase and maintain such boiler and machinery insurance as may be required by the Contract Documents or by law. This

insurance shall include the interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Work.

11.3.3 Any loss insured under Subparagraph 11.3.1 is to be adjusted with the Contractor and made payable to the Contractor as trustee for the insureds, as their interests may appear, subject to the requirements of any applicable mortgagee clause and of Subparagraph 11.3.8.

11.3.4. The Contractor shall pay each Subcontractor a just share of any insurance moneys received by the Contractor, and by appropriate agreement, written where legally required for validity, shall require each Subcontractor to make payments to his Sub-subcontractors in similar manner.

11.3.5 The Contractor shall file a copy of all policies with the Owner before an exposure to loss may occur.

11.3.6 The Owner and Contractor waive all rights against (1) each other and the Subcontractors, Sub-subcontractors, agents and employees each of the other, and (2) the Architect and separate contractors, if any, and their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other perils to the extent covered by insurance obtained pursuant to this Paragraph 11.3 or any other property insurance applicable to the Work, except such rights as they may have to the proceeds of such insurance held by the Contractor as trustee. The foregoing waiver afforded the Architect, his agents and employees shall not extend to the liability imposed by Subparagraph 4.18.3. The Owner or the Contractor, as appropriate, shall require of the Architect, separate contractors, Subcontractors, and Sub-subcontractors by appropriate agreements, written where legally required for validity, similar waivers each in favor of all other parties enumerated in this Subparagraph 11.3.6.

11.3.7 If required in writing by any party in interest, the Contractor as trustee shall, upon the occurrence of an insured loss, give bond for the proper performance of his duties. He shall deposit in a separate account any money so received, and he shall distribute it in accordance with such agreement as the parties in interest may reach or in accordance with the direction of a court of competent jurisdiction.

11.3.8 The Contractor as trustee shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within five days after the occurrence of loss to the Contractor's exercise of this power. If such objection be made, the Contractor as trustee shall make settlement with the insurers in accordance with the direction of a court of competent jurisdiction.

11.4 LOSS OF USE INSURANCE

11.4.1 The Owner, at his option, may purchase and maintain such insurance as will insure him against loss of use of his property due to fire or other hazards, however caused. The Owner waives all rights of action against the Contractor for loss of use of his property including consequential losses due to fire or other hazards however caused, to the extent covered by insurance under this Paragraph 11.4.

SECTION 12 CHANGES IN THE WORK

12.1 CHANGE ORDERS

12.1.1 The Owner, without invalidating the Contract, may order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and the Contract Time being adjusted accordingly. All such changes in the Work shall be authorized by Change Order, and shall be performed under the applicable conditions of the Contract Documents.

12.1.2 A Change Order is a written order to the Contractor signed by the Owner and the Architect, issued after execution of the Contract, authorizing or directing a change in the Work and/or an adjustment in the Contract Sum or the Contract Time, or both. The Contract Sum and the Contract Time may be changed only by Change Order. A Change Order signed by the Contractor indicates his agreement with the terms thereof, including the adjustment in the Contract Sum and/or the Contract Time.

12.1.3 If the Contractor does not agree with the terms of the Change Order, the Contractor shall return the unsigned Change Order to the Owner. In such event, the Work, Contract Sum and /or Contract Time shall be adjusted as reflected in the Change Order, subject to the Contractor's rights under M.G.L. Chapter 30, Section 39J, but in no event shall the Contractor refuse to perform the Work as modified by the Change Order.

12.2 CLAIMS FOR ADDITIONAL COST

12.2.1 If the Contractor claims that any instructions or orders, whether oral, written, drawings, or otherwise, involve extra cost or time, and such instructions or orders are not accompanied by a written acknowledgment by the Owner that extra payment will be made or time extended, he shall promptly so notify the Owner in writing and shall not proceed with the work until he has received a further written order to proceed; except, as provided in Paragraph 10.3, in the case of an emergency affecting life or property.

12.2.2 Upon receipt from the Contractor of a written notice of claim as provided in Paragraph 12.2.1, the Architect shall review such claim, and if he determines that any work in dispute should proceed, he shall issue to the Contractor a written order, signed by the Owner, (1) to proceed, which shall approve or deny the Contractor's claim, in whole or in part, or (2) to proceed subject to a later determination by the Architect of the Contractor's right to extra payment.

12.2.3 To the extent that the Architect, when issuing the written order to proceed described in 12.2.2, approves the Contractor's claim, the Contract Sum and/or Contract Time shall be adjusted by Change Order. If the Architect, when issuing his written order to proceed denies, in whole or in part, the Contractor's claim, the Contractor shall proceed with the work without delay, subject to the Contractor's rights under M.G.L. Chapter 30, Section 39J. If the Architect, when issuing his written order to proceed, instructs the Contractor to proceed with the work subject to a later determination by the Architect of the Contractor's right to extra payment or time, the Contractor shall proceed with the Work without delay.

12.3 MINOR CHANGES IN THE WORK

12.3.1 The Architect shall have the authority to order minor changes in the Work that do not involve an adjustment in the Contract Sum or an extension of the Contract Time, and are not inconsistent with the intent of the Contract Documents. Such changes shall be effected by written order, and shall be binding on the Owner and the Contractor. The Contractor shall carry out such written orders promptly.

12.4 EQUITABLE ADJUSTMENTS

12.4.1 Equitable adjustments in the Contract Sum shall be determined according to one of the following methods, or a combination thereof; as determined by the Owner:

- 1) fixed price basis, provided that the price shall be inclusive of items 3(a) through 3(d), below, and shall be computed in accordance with those provisions.
- 2) Estimated lump sum basis to be adjusted in accordance with Contract unit prices, or other agreed upon unit prices, provided that the unit prices shall be inclusive of all costs related to such equitable adjustments.
- 3) Time and materials basis, based upon a not to exceed, predetermined upset amount to be subsequently adjusted on the basis of actual costs comprised of items (a) through (d) below:
 - a) the costs at prevailing rates for direct labor, material and use of equipment;

- b) plus, the costs of Worker's Compensation Insurance, Liability Insurance, Federal Social Security and Massachusetts Unemployment Compensation; or as an alternative, the Contractor may elect to add a flat twenty-five (25%) percent to the total labor rate in (a), above;
- c) plus ten (10) percent of (a), above, for overhead, superintendence and profit which will be paid to the Contractor for the work of the Contractor and all subcontractors. The contracting parties referred to in this subparagraph shall agree upon the distribution of the ten (10) percent as a matter of contract between each other;
- d) plus actual direct premium costs of payment and performance bonds required of the Contractor provided there would be an appropriate credit for premiums for a credit change order
- e) if the extra work requires the use of heavy equipment, cranes and hoisting equipment, and special tools not on site and not originally required to be used upon the work, then the cost of transportation to and from the work site, not exceeding 100 miles, shall be included. The cost of extra work shall not include any cost or rental of small tools, buildings, or any portion of the time of the Contractor's management or office personnel, or any allowance for use of capital.

12.4.2 If the net change is an addition to the Contract Sum, it shall include the Contractor's overhead, superintendence and profit. On any change that involves a net credit, no allowance for overhead superintendence and profit shall be figured. For any change that does not include labor performed or materials installed in the Project, there will be no markup for the contractor's overhead, superintendence, and profit, notwithstanding any net increase in the Contract Sum. Charges for small tools known as "tools of the trade" are not to be computed in the amount of an equitable change.

SECTION 13

UNCOVERING AND CORRECTION OF WORK

13.1 UNCOVERING OF WORK

13.1.1 If any portion of the Work should be covered contrary to the request of the Architect or to requirements specifically expressed in the Contract Documents, it must, if required in writing by the Architect, be uncovered for his observation and shall be replaced at the Contractor's expense.

13.1.2 If any other portion of the Work has been covered which the Architect has not specifically requested to observe prior to being covered, the Architect, with the approval of the Owner, may request to see such Work and it shall be uncovered by the Contractor. If such Work be found in accordance with the Contract

Documents, the cost of uncovering and replacement shall, by appropriate Change Order, be charged to the Owner. If such Work be found not in accordance with the Contract Documents, the Contractor shall pay such costs unless it is found that this condition was caused by the Owner or a separate contractor as provided in Article 6, in which event the Owner shall be responsible.

13.2 CORRECTION OF WORK

13.2.1 The Contractor shall promptly correct all Work rejected by the Architect as defective or as failing to conform to the Contract Documents whether observed before or after Substantial Completion and whether or not fabricated, installed or completed. The Contractor shall bear all costs of correcting such rejected Work, including compensation for the Architect's additional services made necessary thereby and any costs, loss, or damages to the Owner resulting from such failure or defect.

13.2.2 If, within one year after the Date of Substantial Completion of the Work or designated portion thereof or within one year after acceptance by the Owner of designated equipment or within such longer period of time as may be prescribed by law or by the terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be defective or not in accordance with the Contract Documents, the Contractor shall correct it promptly after receipt of a written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. This obligation shall survive termination of the Contract. The Owner shall give such notice promptly after discovery of the condition.

13.2.3 The Contractor shall remove from the site all portions of the Work which are defective or non-conforming and which have not been corrected under Subparagraphs 4.5.1, 13.2.1, and 13.2.2, unless removal is waived by the Owner.

13.2.4 If the Contractor fails to correct defective or nonconforming Work as provided in Subparagraphs 4.5.1, 13.2.1, and 13.2.2, the Owner may correct it in accordance with Paragraph 3.4.

13.2.5 If the Contractor does not proceed with the correction of such defective or non-conforming Work within a reasonable time fixed by written notice from the Architect, the Owner may remove it and may store the materials or equipment at the expense of the Contractor. If the Contractor does not pay the cost of such removal and storage within ten days thereafter, the Owner may upon ten additional days written notice, sell such Work at auction or at private sale and shall account for the net proceeds thereof, after deducting all the costs that should have been borne by the Contractor, including compensation for the Architect's additional services made necessary thereby. If such proceeds of sale do not cover all costs which the Contractor should have borne, the difference shall be charged to the Contractor and an appropriate Change Order shall be issued. If the payments then

or thereafter due the Contractor are not sufficient to cover such amount, the Contractor shall pay the difference to the Owner.

13.2.6 The Contractor shall bear the cost of making good all work of the Owner or separate contractors destroyed or damaged by such correction or removal.

13.2.7 Nothing contained in this Paragraph 13.2 shall be construed to establish a period of limitation with respect to any other obligation which the Contractor might have under the Contract Documents, including Paragraph 4.5 hereof. The establishment of the time period of one year after the Date of Substantial Completion or such longer period of time as may be prescribed by law or by the terms of any warranty required by the Contract Documents relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which his obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to his obligations other than specifically to correct the Work.

13.3 ACCEPTANCE OF DEFECTIVE OR NON-CONFORMING WORK

13.3.1 If the Owner prefers to accept defective or non-conforming Work, he may do so instead of requiring its removal and correction, in which case a Change Order will be issued to reflect a reduction in the Contract Sum where appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

SUPPLEMENTARY GENERAL CONDITIONS – PART I

STATUTORY PROVISIONS FOR MASSACHUSETTS PUBLIC CONSTRUCTION CONTRACTS CONTENTS

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SUPPLEMENTARY GENERAL CONDITIONS – PART I
STATUTORY PROVISIONS FOR MASSACHUSETTS
PUBLIC CONSTRUCTION CONTRACTS

The following provisions are required by or are intended to be consistent with requirements of Massachusetts statutes governing public construction contracts in the Commonwealth of Massachusetts (hereinafter referred by statute to be included herein shall be deemed to be so included. In addition, the parties recognize that other rights, duties, and obligations with respect to public construction contracts are provided for in the Contract Documents. In case of conflict between the provisions of these Supplementary General Conditions and other provisions in the Contract Documents, the provisions of these Supplementary General Conditions shall govern. In case of conflict between the provisions of these Supplementary General Conditions and the provisions of any applicable statute, the statutory provisions shall govern. Where the term “awarding authority” appears in the following paragraphs, it shall be taken as meaning the Owner.

ARTICLE 1 – PAYMENT, CONTRACT ADMINISTRATION, etc.

1.1 “Or Equal” Clause: (Statutory reference: M.G.L. Chapter 30, Section 39M(b))

This Paragraph 1.1 applies to every contract subject to M.G.L. Chapter 30, Section 39M(b).

This Paragraph 1.1 applies to every contract for the construction, reconstruction or repair of any public work or for the purchase of any material by the Commonwealth, any political subdivision thereof, or any county, city, town, district or housing authority (above certain dollar limits, as stated in the statute), and to contracts awarded pursuant to M.G.L. Chapter 149, Sections 44A through 44H. The said Sections 44A through 44H apply to every contract for the construction, reconstruction, installation, demolition, maintenance or repair of any building by a department, agency, board, commission, authority, or other instrumentality of the Commonwealth or political subdivision thereof, or two or more subdivisions thereof, but not including the Massachusetts Bay Transportation Authority, estimated to cost more than a dollar amount set forth in M.G.L. Chapter 149, Section 44A.

Every such contract shall provide that an item equal to that named or described in the said specifications may be furnished. Where products or materials are prescribed by manufacturer name, trade name, or catalog reference, the words “or approved equal” shall be understood to follow. An item shall be considered equal to the item so named or described if, in the opinion of the awarding authority:

- a. It is at least equal in quality, durability, appearance, strength, and design;
- b. it will perform at least equally the function imposed by the general design for the public work being contracted for or the material being purchased, and
- c. it conforms substantially, even with deviations, to the detailed requirements for the items as indicated by the specifications. For each item of material the specifications shall provide for either a minimum of three named brands of material or a description of

material which can be met by a minimum of three manufacturers or producers, and for the equal of any one of said name or described materials.

Any structural or mechanical changes made necessary to accommodate substituted equipment under this paragraph shall be at the expense of the Contractor or Subcontractor responsible for the work item. See other paragraphs of General and Supplementary Conditions for procedures to be used in determining compliance with the standards of this paragraph.

1.2 Delays: (Statutory reference: Chapter 30, Section 39O). This Paragraph 1.2 applies to every contract subject to M.G.L. Chapter 30, Section 39M and to every contract subject to Chapter 149, Sections 44A through 44H.

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.

Except as otherwise provided by law and by this Paragraph 1.2, the Contractor shall not be entitled to damages on account of any hindrances or delays, avoidable or unavoidable; but if such delay be occasioned by the awarding authority, the Contractor may be entitled to an extension of time only, in which to complete the work, to be determined by the Architect.

(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.

1.3 Deviations: (Statutory referenced: M.G.L. Chapter 30, section 39I) This Paragraph 1.3 applies to every contract for the construction, alteration, maintenance, repair or demolition of,

or addition to, any public building or public works for the Commonwealth or any political subdivision thereof.

The Contractor shall perform all the work required by this contract in conformity with the plans and specifications contained therein. No willful and substantial deviation from said plans and specifications shall be made unless authorized in writing by the awarding authority or by the Engineer or Architect in charge of the work who is duly authorized by the awarding authority to approve such deviations. In order to avoid delays in the prosecution of the work required by such contract, such deviation from the plans or specifications may be authorized by a written order of the awarding authority or such Engineer or Architect so authorized to approve such deviation. Within thirty days thereafter, such written order shall be confirmed by a certificate of the awarding authority stating: (1) If such deviation involves any substitution or elimination of materials, fixtures or equipment, the reasons why such materials, fixtures or equipment were included in the first instance and the reasons for substitution or elimination, and, if the deviation is of any other nature, the reasons for such deviation, giving justification therefor (2) that the specified deviation does not materially injure the project as a whole; (3) that either the work substituted for the work specified is the same cost and quality, or that an equitable adjustment has been agreed upon between the awarding authority and the Contractor and the amount in dollars of said adjustment; and (4) that the deviation is in the best interest of the awarding authority.

Such certificate shall be signed under the penalties of perjury and shall be a permanent part of the file record of the work contracted for.

Whoever violates any provision of this section willfully and with intent to defraud shall be punished by a fine of not more than five thousand dollars or by imprisonment for not more than six months, or both.

1.4 Finality of Decisions by Awarding Authority or Architect: (Statutory reference: M.G.L. Chapter 30, Section 39J) This Paragraph 1.4 applies to every contract for the construction, reconstruction, alteration, remodeling, repair or demolition of any public building or public works by the Commonwealth or by any county, city, district, board, commission, or other public body, when the amount of the contract exceeds the amount stated in M.G.L. Chapter 30, Section 39J.

Notwithstanding any contrary provision of this contract, a decision by the contracting body or by any administrative board, official or agency, or by any architect or engineer, on a dispute, whether of fact or of law, arising under said contract shall not be final or conclusive if such decision is made in bad faith, fraudulently, capriciously, or arbitrarily, is unsupported by substantial evidence, or is based upon error of law.

1.5 Differing Site Conditions: (Statutory reference: M.G.L. Chapter 30, Section 39N) This Paragraph 1.5 applies to every contract subject to M.G.L. Chapter 30, Section 39M and to every contract subject to M.G.L. Chapter 49, Sections 44A through 44H.

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 awarding 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 such a nature as to cause 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.

1.6 Timely Decision by Awarding Authority: (Statutory reference: M.G.L. Chapter 30, Section 39P) This Paragraph 1.6 applies to every contract subject to M.G.L. Chapter 30, Section 39M, and to every contract subject to M.G.L. Chapter 149, Sections 44A through 44H.

In every case in which this contract requires the awarding authority, any official, its Architect or Engineer to make a decision on interpretation of the specifications, approval of equipment, material or any other approval, or progress of the work, the decision shall be made promptly and, in any event, no later than thirty days after the written submission for decision; but if such decision requires extended investigation and study, the awarding authority, the official, Architect or Engineer shall, within thirty days after the receipt of the submission, give the party making the submission written notice of the reasons why the decision cannot be made within the thirty-day period and the date by which the decision will be made.

1.7 Certificate of Appropriation: (Statutory reference: M.G.L. Chapter 44, Section 31C) This Paragraph 1.7 applies to contracts for construction, reconstruction, alteration, remodeling, repair or demolition of any public building or public work by any city or town costing more than the amount set forth in M.G.L. Chapter 44, Section 31C.

This Contract shall not be deemed to have been made until the auditor or accountant or other officer of the city or town having similar duties has certified thereon that an appropriation in the amount of such contract is available therefor and that an officer or agent of the city, town, or awarding-authority has been authorized to execute said contract and approve all requisitions and change orders. No order to the Contractor for a change in or addition to the work to be performed under a contract subject to this section, whether in the form of a drawing, plan, detail or any other written instruction, unless it is an order which the Contractor is willing to perform without any increase in the contract price, shall be deemed to have been given until the auditor or accountant, or other officer of the awarding authority having similar duties, has certified thereon that an appropriation in the amount of such order is available therefor; but such certificate shall not be construed as an admission by the awarding authority of its liability to pay for such work. The certificate of the auditor or accountant or other officer of the awarding authority having similar duties, that an appropriation in the amount of such contract or order is available shall bar any defense by the awarding authority on the ground of insufficient appropriation; and any law barring payment in excess of appropriations shall not apply to amounts covered by any certificate under this section.

1.8 Method of Payment: (Statutory reference: M.G.L. Chapter 30, Section 39K) This Paragraph 1.8 applies to 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 two thousand dollars, or the amount set forth in M.G.L. Chapter 30, Section 39K.

1.8.1 Within fifteen days 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 Paragraph 1.10 of these Supplementary General Conditions, and less (3) a retention not exceeding five percent 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 percent 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 Paragraph 1.10 of these Supplementary General Conditions, 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 Paragraph 1.10. 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 then 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...after receipt of such 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.

1.8.2 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 change 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.

1.8.3 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 subtrade and each sub-subtrade listed in sub-bid form as required by the 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.

1.8.4 A certificate of the Architect to the effect that the Contractor has fully or substantially completed the work shall, subject to the provisions of Paragraph 1.4 of these Supplementary General Conditions, be conclusive for the purposes of this Paragraph 1.8.

1.8.5 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.

1.9 Method of Payment: (Statutory reference: M.G.L. Chapter 30, section 39G) This Paragraph 1.9 applies to every contract for the construction, reconstruction, alteration, remodeling, repair or improvement of public ways; including bridges and other highway structures, sewers and water mains, airports and other public works entered into with the commonwealth, or any agency or political subdivision thereof.

1.9.1 Upon substantial completion of the work required by a contract with the commonwealth, or any agency or political subdivision thereof, for the construction, reconstruction, alteration, remodeling, repair or improvement of public ways, including bridges and other highway structures, sewers and water mains, airports and other public works, the contractor shall present

in writing to the awarding authority its certification that the work has been substantially completed. Within twenty-one days thereafter, the awarding authority shall present to the contractor either a written declaration that the work has been substantially completed or an itemized list of incomplete or unsatisfactory work items required by the contract sufficient to demonstrate that the work has not been substantially completed. The awarding authority may include with such list a notice setting forth a reasonable time, which shall not in any event be prior to the contract completion date, within which the contractor must achieve substantial completion of the work. In the event that the awarding authority fails to respond, by presentation of a written declaration or itemized list as aforesaid, to the contractor's certification within the twenty-one day period, the contractor's certification shall take effect as the awarding authority's declaration that the work has been substantially completed.

1.9.2 Within sixty-five days after the effective date of a declaration of substantial completion, the awarding authority shall prepare and forthwith send to the contractor for acceptance a substantial completion estimate for the quality and price of the work done and all but one percent retainage on that work, including the quantity, price and all but one percent retainage for the undisputed part of each work item and extra work item in dispute but excluding the disputed part thereof, less the estimated cost of completing all incomplete and unsatisfactory work items and less the total periodic payments made to date for the work. The awarding authority also shall deduct from the substantial completion estimate an amount equal to the sum of all demands for direct payments filed by subcontractors and not yet paid to subcontractors or deposited in joint accounts pursuant to section 1.10, but no contract subject to said section 1.10 shall contain any other provision authorizing the awarding authority to deduct any amount by virtue of claims asserted against the contract by subcontractors, material suppliers or others.

1.9.3 If the awarding authority fails to prepare and send to the contractor any substantial completion estimate required by section 1.9.2, on or before the date herein above set forth, the awarding authority shall pay to the contractor interest on the amount which would have been due to the contractor pursuant to such substantial completion estimate, at the rate of three percentage points above the rediscount rate then charged by the Federal Reserve Bank of Boston from such date to the date on which the awarding authority sends that substantial completion estimate to the contractor for acceptance or to the date of payment therefor, whichever occurs first. The awarding authority shall include the amount of such interest in the substantial completion estimate.

1.9.4 Within fifteen days after the effective date of the declaration of substantial completion, the awarding authority shall send to the contractor by certified mail, return receipt requested, a complete list of all incomplete or unsatisfactory work items, and unless delayed by causes beyond his control, the contractor shall complete all such work items within forty-five days after the receipt of such list or before the then contract completion date, whichever is later. If the contractor fails to complete such work within such time, the awarding authority may, subsequent to seven days' written notice to the contractor by certified mail, return receipt requested, terminate the contract and complete the incomplete or unsatisfactory work items and charge the cost of same to the contractor.

1.9.5 Within thirty days after receipt by the awarding authority of a notice from the contractor stating that all of the work required by the contract has been completed, the awarding authority

shall prepare and forthwith send to the contractor for acceptance, a final estimate for the quantity and price of the work done and all retainage on that work less the payments made to date, unless the awarding authority's inspection shows that work items required by the contract remain incomplete or unsatisfactory, or that documentation required by the contract has not been completed. If the awarding authority fails to prepare and sends to the contractor the final estimate within thirty days after receipt of notice of completion, the awarding authority shall pay to the contractor interest on the amount which would have been due to the contractor pursuant to such final estimate at the rate hereinabove provided from the thirtieth day after such completion until the date on which the awarding authority sends the final estimate to the contractor for acceptance or the date of payment therefor, whichever occurs first, provided that the awarding authority's inspection shows that no work items required by the contract remain incomplete or unsatisfactory. Interest shall not be paid hereunder on amounts for which interest is required to be paid in connection with the substantial completion estimate as hereinabove provided. The awarding authority shall include the amount of the interest required to be paid hereunder in the final estimate.

1.9.6 The awarding authority shall pay the amount due pursuant to any substantial completion or final estimate within thirty-five days after receipt of written acceptance for such estimate from the contractor and shall pay interest on the amount due pursuant to such estimate at the rate hereinabove provided from that thirty-fifth day to the day of payment. Within 15 days after receipt from the contractor, if such place is so designated by the awarding authority, if such place is so designated, of a periodic estimate requesting payment of the amount due for the preceding periodic estimate period, the awarding authority shall make a periodic payment to the contractor for the work performed during the preceding periodic estimate period and for the materials not incorporated in the work but delivered and suitably stored at the site, or at some location agreed upon in writing, to which the contractor has title or to which a subcontractor has title and has authorized the contractor to transfer title to the awarding authority, upon certification by the contractor that he is the lawful owner and that materials are free from all encumbrances. The awarding authority shall include with each such payment interest on the amount due pursuant to such periodic estimate at the rate herein above provided from the due date. In the case of periodic payments, the contracting authority may deduct from its payment a retention based on its estimate of the fair value of its claim against the contractor, a retention for direct payments to subcontractors based on demands for same in accordance with the provisions of section 1.10, and a retention to secure satisfactory performance of the contractual work not exceeding five percent of the approved amount of any periodic payment, and the same right to retention shall apply to bonded subcontractors entitled to direct payment under section 1.10; provided, that a five percent value of all items that are planted in the ground shall be deducted from the periodic payments until final acceptance.

1.9.7 No periodic, substantial completion or final estimate or acceptance or payment thereof shall bar a contractor from reserving all rights to dispute the quantity and amount of, or the failure of the awarding authority to approve a quantity and amount of, all or part of any work item or extra work item.

1.9.8 Substantial completion, for the purpose of this section 1.9, shall mean either that the work required by the contract has been completed except for work having a contract price of less than one percent of the then adjusted total contract price, or substantially all of the work has been

completed and opened to public use except for minor incomplete or unsatisfactory work items that do not materially impair the usefulness of the work required by the contract.

1.10 Direct Payment: (Statutory reference: M.G.L. Chapter 30, Section 39F) This Paragraph 1.10 applies to every contract awarded pursuant to M.G.L. Chapter 149, Sections 44A through 44J, and (with the exception of Subparagraph 1.10.9) to every contract awarded pursuant to M.G.L. Chapter 30, Section 39M.

1.10.1 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.

1.10.2 Not later than the sixty-fifth day after each Subcontractor substantially completes the 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.

1.10.3 Each payment made by the awarding authority to the General Contractor pursuant to Subparagraphs 1.10.1 and 1.10.2 of this Paragraph 1.10 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 for payment to the Subcontractor as provided in Subparagraphs 1.10.1 and 1.10.2, the awarding authority shall act upon the demand as provided in this Paragraph 1.10.

1.10.4 If, within seventy days after the Subcontractor has substantially completed the subcontract work, the Subcontractor has not received from the 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 to 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 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.

1.10.5 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 1.10.4. The awarding authority shall make further direct payments to the Subcontractor forthwith after the removal of the basis for deduction from direct payments made as provided in parts (i) and (ii) of this Subparagraph.

1.10.6 The awarding authority shall forthwith deposit the amounts deducted from a direct payment as provided in part (iii) of the Subparagraph 1.10.5 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 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.

1.10.7 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 1.10.6 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 or receipt of such demands from subcontractors. All direct payments shall discharge the obligation of the awarding authority to the Contractor to the extent of such payment.

1.10.8 The awarding authority shall deduct from payments to a General Contractor amounts which, together with the deposits in interest-bearing accounts pursuant to Subparagraph 1.10.6, are sufficient to satisfy all unpaid balances of demands for direct payments 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.

1.10.9 If the Subcontractor does not receive payment as provided in Subparagraph 1.10.1 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 1.10.1, the Subcontractor may demand direct payment by following the procedure in Subparagraph 1.10.4 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 Subparagraphs 1.10.5, 1.10.6, 1.10.7 and 1.10.8.

1.10.10 Any assignment by a Subcontractor of the rights under this section to a surety company furnishing a bond under the provisions of M.G.L. Chapter 149, Section 29 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 1.10.6 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.

1.10.11 "Subcontractor" as used in this Paragraph 1.10 (i) for contracts awarded as provided in M.G.L. Chapter 149, Sections 44A-44J, inclusive, 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 M.G.L. Chapter 30, Section 39M(a), 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.

1.10.12 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 1.1.6 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 1.10.6 by a petition in equity in the superior court against the awarding authority and the 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. M.G.L. Chapter 231, Sections 59 and 59B 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 59 and 59B 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 Contractor are available for direct payment shall have a right to file a petition in a 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 1.10.5 and in Subparagraph 1.10.6.

1.10.13 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 1.10.5 and in Subparagraph 1.10.6 any amount held under a trustee writ or pursuant to a restraining order or injunction.

1.11 Discharge or Release of Bonds (Statutory reference: M.G.L. c.30, section 40) This Paragraph 1.11 applies to every contract awarded for the construction or repair of public buildings or other public works.

1.11.1 Bonds given to the commonwealth, any county, city, town or political subdivision to secure the performance of contracts for the construction or repair of public buildings or other public works may be discharged or released by the awarding authority, upon such terms as it deems expedient, after the expiration of one year from the time of completion, subject to Section 1.8, of the work contracted to be done; provided that no claim filed under said bond is pending, and provided further, that no such bonds shall be discharged or released prior to the expiration of all special guarantees provided for in the contract unless new bonds in substitution therefor specifically relating to the unexpired guarantees shall be taken.

ARTICLE 2 – WAGES AND EMPLOYMENT PRACTICES

2.1 Preference To Veterans and Citizens In Public Works; Rate of Wages: (Statutory reference: M.G.L. c. 149, Section 26) This Paragraph 2.1 applies to every contract or subcontract for the construction of public works by the Commonwealth or by a county, town or district.

2.1.1 In the employment of mechanics and apprentices, teamsters, chauffeurs and laborers, preference shall first be given to citizens of the Commonwealth who have been residents of the Commonwealth for at least six months at the commencement of their employment, who are veterans as defined in M.G.L. Chapter 4, Section 7, clause 43, and who are qualified to perform the work to which the employment relates and, within such preference, preference shall be given to service-disabled veterans; and secondly, to citizens of the Commonwealth generally who have been residents of the Commonwealth for at least six months at the commencement of their employment, and if they cannot be obtained in sufficient numbers, then to citizens of the United States, and every contract for such work shall contain a provision to this effect. Each county, town or district in the construction of public works, or persons contracting or subcontracting for such works, shall give preference to veterans and citizens who are residents of such county, town, authority or district, and within such preference, preference shall be given to service-disabled veterans.

2.1.2 The rate per hour of the wages paid to said mechanics and apprentices, teamsters, chauffeurs and laborers in the construction of public works shall not be less than the rate or rates of wages to be determined by the Commissioner as hereinafter provided; provided that

the wages paid to laborers employed on said works shall not be less than those paid to laborers in the municipal service of the town or towns where said works are being constructed; provided further, that where the same public work is to be constructed in two or more towns, the wages paid to laborers shall not be less than those paid to laborers in the municipal town paying the highest rate; provided further, that if, in any of the towns where the works are to be constructed, a wage rate or wage rates have been established in certain trades and occupations by collective agreements or understandings in the private construction industry between organized labor and employers, the rate or rates to be paid on said works shall not be less than the rates so established; provided further, that in towns where no such rate or rates have been established, the wages paid to mechanics, teamsters, chauffeurs and laborers on public works, shall not be less than the wages paid to the employees in the same trades and occupations by private employers engaged in the construction industry. This section shall also apply to regular employees of the Commonwealth or a county, town, authority or district, when such employees are employed in the construction, addition to or alteration of public buildings for which special appropriations of more than one thousand dollars are provided. Payments by employers to health and welfare plans, pension plans and supplementary unemployment benefit plans under collective bargaining agreements or understandings between organized labor and employers shall be included for the purpose of establishing minimum wage rates as herein provided.

2.2 List of Jobs; Classifications; Determination of Rate of Wages; Schedule: (Statutory reference: M.G.L. Chapter 149, Section 27) This Paragraph 2.2. applies to every contract or subcontract for the construction of public works by the Commonwealth, or by a county, town or district.

2.2.1 The commissioner shall prepare, for the use of such public officials or public bodies whose duty it shall be to cause public works to be constructed, a list of the several jobs usually performed on various types of public works upon which mechanics and apprentices, teamsters, chauffeurs and laborers are employed, including the transportation of gravel or fill to the site of said public works or the removal of surplus gravel or fill from such site. The commissioner shall classify said jobs, and he may revise such classification from time to time, as he may deem advisable. Prior to awarding a contract for the construction of public works, said public official or public body shall submit to the commissioner a list of the jobs upon which mechanics and apprentices, teamsters, chauffeurs and laborers are to be employed, and shall request the commissioner to determine the rate of wages to be paid on each job. Each year after the awarding of the contract, the public official or public body shall submit to the commissioner a list of the jobs upon which mechanics and apprentices and laborers are to be employed and shall request that the commissioner update the determination of the rate of wages to be paid on each job. The general contractor shall annually obtain updated rates from the public official or public body and no contractor or subcontractor shall pay less than the rates so established. Said rates shall apply to all persons engaged in transporting gravel or fill to the site of said public works or removing gravel or fill from such site, regardless of whether such persons are employed by a contractor or subcontractor or are independent contractors or owner-operators. The commissioner, subject to the provisions of Section 2.1, shall proceed forthwith to determine the same, and shall furnish said official or public body with a schedule of such rate or rates of wages as soon as said determination shall have been made. In advertising or calling for bids for said works, the awarding official or public body shall incorporate said schedule in the advertisement or call for bids by an appropriate reference thereto, and shall furnish a copy of said schedule,

without cost, to any person requesting the same. Said schedule shall be made a part of the contract for said works and shall continue to be the minimum rate or rates of wages for said employees during the life of the contract. Any person engaged in the construction of said works shall cause a legible copy of said schedule and subsequent updates to be kept posted in a conspicuous place at the site of said works during the life of the contract. An apprentice performing work on a project subject to this section shall maintain in his possession an apprentice identification card issued pursuant to section M.G.L. Chapter 23, Section 11W. The aforesaid rates of wages in the schedule of wage rates shall include payments by employers to health and welfare plans, pension plans and supplementary unemployment benefit plans as provided in said Section 2.1, and such payments shall be considered as payments to persons under this section performing work as herein provided. Any employer engaged in the construction of such works who does not make payments to a health and welfare plan, a pension plan and a supplementary unemployment benefit plan, where such payments are included in said rates of wages, shall pay the amount of said payments directly to each employee engaged in said construction. Whoever shall pay less than said rate or rates of wages, including payments to health and welfare funds and pension funds, or the equivalent payment in wages, on said works to any person performing work within classifications as determined by the commissioner, and whoever, for himself, or as representative, agent or officer of another, shall take or receive for his own use or the use of any other person, as a rebate, refund or gratuity, or in any other guise, any part or portion of the wages, including payments to health and welfare funds and pension funds, or the equivalent payment in wages, paid to any such person for work done or service rendered on said public works, shall have violated this section and shall be punished or shall be subject to a civil citation or order as provided in M.G.L. Chapter 149, Section 27C. The president and treasurer of a corporation and any officers or agents having the management of such corporation shall also be deemed to be employers of the employees of any corporation within the meaning of Sections 2.1 to 2.3, inclusive. Offers of restitution or payment of restitution shall not be considered in imposing such punishment.

2.2.2 When an investigation by the attorney general's office reveals that a contractor or subcontractor has violated this section by failing to pay said rate or rates of wages, including payments to health and welfare funds and pension funds, or the equivalent payment in wages, on said works to any person performing work within classifications as determined by the commissioner, or that a contractor or subcontractor has, for himself, or as representative, agent or officer of another, taken or received for his own use or the use of any other person, as a rebate, refund or gratuity, or in any other guise, any portion of the wages, including payments to health and welfare funds and pension funds, or the equivalent payment in wages, paid to any such person for work done or service rendered on said public works, the attorney general may, upon written notice to the contractor or subcontractor and the sureties of the contractor or subcontractor, and after a hearing thereon, order work halted on the part of the contract on which such wage violations occurred, until the defaulting contractor or subcontractor has filed with the attorney general's office a bond in the amount of such penal sum as the attorney general shall determine, conditioned upon payment of said rate or rates of wages, including payments to health and welfare funds and pension funds, or the equivalent payment in wages, on said works to any person performing work within classifications as determined by the commissioner. An employee claiming to be aggrieved by a violation of this section may, 90 days after the filing of a complaint with the attorney general, or sooner if the attorney general assents in writing, and within 3 years after the violation, institute and prosecute in his own name and on his own behalf,

or for himself and for others similarly situated, a civil action for injunctive relief, for any damages incurred, and for any lost wages and other benefits. An employee so aggrieved who prevails in such an action shall be awarded treble damages, as liquidated damages, for any lost wages and other benefits and shall also be awarded the costs of the litigation and reasonable attorneys' fees.

2.3 Employment Records To Be Kept By Contractor, Subcontractors; Statement of Compliance: (Statutory reference: M.G.L. c. 149, Section 27B) This Paragraph 2.3 applies to every contract or subcontract for the construction of public works by the Commonwealth, or by a county, town or district.

Every Contractor, Subcontractor or public body engaged in said public works to which Paragraph 2.3 of these Supplementary General Conditions applies shall keep a true and accurate records of all mechanics and apprentices, teamsters, chauffeurs and laborers employed thereon, showing the name, address and occupational classification of each such employee on said works, and hours worked by, and wages paid to, each such employee, and shall promptly furnish to the Attorney General or his representative, upon his request, a copy of said record, signed by the employer or his authorized agent under the penalties of perjury. For every week in which an apprentice is employed by a contractor, subcontractor or public body subject to this section, a photocopy of the apprentice's apprentice identification card, issued pursuant to M.G.L. Chapter 23, Section 11W, shall be attached to the records submitted under this section. Such records shall be open to inspection by any authorized representative of the department at any reasonable time, and as often as may be necessary. Every contractor and subcontractor required to keep such a record shall submit a copy of said record to the awarding authority directly and on a weekly basis.

Each such Contractor, Subcontractor or public body shall preserve its payroll records for a period of three years from the date of completion of the contract.

Each such Contractor, Subcontractor or public body shall furnish to the awarding authority directly within fifteen days after completion of its portion of the work a statement, executed by the Contractor, Subcontractor, or public body who supervises the payment of wages, in the following form.

STATEMENT OF COMPLIANCE

I, _____
(Name of signatory party) (Title)

do hereby state:

That I pay or supervise the payment of the persons employed by

(Contractor, Subcontractor or public body)

on the _____ and that all mechanics
(building or project)

and apprentices, teamsters, chauffeurs and laborers employed on said project have been paid in accordance with wages determined under the provisions of sections twenty-six and twenty-seven of chapter one hundred and forty-nine of the General Laws.

Signature _____

Title _____

The above-mentioned copies of payroll records and statements of compliance shall be available for inspection by any interested party filing a written request to the awarding authority for such inspection and copying.

2.4 Wages Paid to Operators of Trucks and Other Equipment: (Statutory reference: M.G.L. c. 149, Section 27F) This Paragraph 2.4 applies to every contract for the construction of public works by the Commonwealth, or by a county, city, town or district.

No agreement of lease, rental or other arrangement, and no order or requisition under which a truck or any automotive or other vehicle or equipment is to be engaged in public works by the commonwealth or by a county, city, town or district, shall be entered into or given by any public official or public body unless said agreement, order or requisition contains a stipulation requiring prescribed rates of wages, as determined by the commissioner, to be paid to the operators of said trucks, vehicles or equipment. Any such agreement, order or requisition which does not contain said stipulation shall be invalid, and no payment shall be made thereunder. Said rates of wages shall be requested of said commissioner by said public official or public body, and shall be furnished by the commissioner in a schedule containing the classifications of jobs, and the rate of wages to be paid for each job. Said rates of wages shall include payments to health and welfare plans, or, if no such plan is in effect between employers and employees, the amount of such payments shall be paid directly to said operators. Whoever pays less than said rates of wages, including payments to health and welfare funds, or the equivalent in wages, on said works, and whoever accepts for his own use, or for the use of any other person, as a rebate, gratuity or in any other guise, any part or portion of said wages or health and welfare funds, shall have violated this section and shall be punished or shall be subject to a civil citation or order as

provided in M.G.L. Chapter 149, Section 27C. An employee claiming to be aggrieved by a violation of this section may, 90 days after the filing of a complaint with the attorney general, or sooner if the attorney general assents in writing, and within 3 years after the violation, institute and prosecute in his own name and on his own behalf, or for himself and for others similarly situated, a civil action for injunctive relief, for any damages incurred, and for any lost wages and other benefits. An employee so aggrieved who prevails in such an action shall be awarded treble damages, as liquidated damages, for any lost wages and other benefits and shall also be awarded the costs of the litigation and reasonable attorneys' fees.

2.5 Reserve Police Officers: (Statutory reference: M.G.L. Chapter 149, Section 34B) This Paragraph 2.5 applies to every contract for the construction, alteration, maintenance, repair or demolition of, or addition to, any public works for the Commonwealth or any political subdivision thereof.

The contractor shall pay to any reserve police officer employed by him in any city or town the prevailing rate of wages paid to regular police officers in such city or town.

2.6 Eight-hour Day, etc.: (Statutory reference: M.G.L. Chapter 149, Sections 30, 34, and 34A) This Paragraph 2.6 applies only to contracts which are subject to the provisions of the aforesaid sections of the Massachusetts General Laws.

No laborer, worker, mechanic, foreman or inspector working within this Commonwealth in the employ of the Contractor, Subcontractor or other person doing or contracting to do the whole or part of the work contemplated by the contract, shall be required or permitted to work more than eight hours in any one day or more than forty-eight hours in any one week, or more than six days in any one week, except in cases of extraordinary emergency.

2.7 Lodging, etc.: (Statutory reference: M.G.L. Chapter 149, Section 25) This paragraph 2.7 applies to every contract for the doing of public work with the Commonwealth, a county, city or town, or with a department, board, commission, or officer acting therefor.

Every employee under this contract shall lodge, board and trade where and with whom he elects, and neither the Contractor nor his agents or employees shall, either directly or indirectly, require as a condition of the employment of any person that the employee shall lodge, board or trade at a particular place or with a particular person.

2.8 Access to Contractor's Records: (Executive Order No. 195) This Paragraph 2.8 applies to every contract for the purchase of services or materials by any agency, bureau, board, commission, institution, or department of the Commonwealth or a municipal contract funded, in whole or in part, by the Commonwealth.

The Governor or his designee, the secretary of administration and finance, and the state auditor or his designee shall have the right at reasonable times and upon reasonable notice to examine the books, records and other compilations of data of the Contractor which pertain to the performance and requirements of this contract.

2.9 Worker's Compensation Insurance: (Statutory reference: M.G.L. chapter 149, Section 34) This Paragraph 2.9 applies to every contract for the construction, alteration, maintenance, repair or demolition of, or addition to, any public building or other public works for the Commonwealth or any political subdivision thereof.

The Contractor shall, before commencing performance of the contract, provide by insurance for the payment of and the furnishing of other benefits under M.G.L. Chapter 152 to all persons to be employed under the contract, and the Contractor shall continue such insurance in full force and effect during the term of the contract. Sufficient proof of compliance with this Paragraph 2.9 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. No cancellation of such insurance, whether by the insurer or by the insured, shall be valid unless written notice thereof is given by the party proposing cancellation to other party and to the awarding authority at least fifteen days prior to the intended effective date thereof, which date shall be expressed in said notice.

Notice of cancellation sent by the party proposing cancellation by registered mail, postage prepaid, with a return receipt of the addressee requested, shall be a sufficient notice. An affidavit of any officer, agent or employee of the insurer or of the insured, as the case may be, duly authorized for the purpose, that he has so sent such notice addressed as aforesaid shall be prima facie evidence of the sending thereof as aforesaid. This section shall apply to the legal representative, trustee in bankruptcy, receiver, assignee, trustee and the successor in interest of any such contractor. The superior court shall have jurisdiction in equity to enforce this section. Whoever violates any provision of this section shall be punished by a fine of not more than one hundred dollars or by imprisonment for six 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 years from the date of conviction of said violation.

ARTICLE 3 – CONTRACTOR'S ACCOUNTING METHOD REQUIREMENTS

3.1 (Statutory reference: M.G.L. Chapter 30, Section 39R)

This Article 3 applies to "Contracts" and "Contractors", as defined in Subparagraph 3.1.1 and 3.1.2, below.

3.1.1 "Contractor" means any person, corporation, partnership, joint venture, sole proprietorship, or other entity awarded a contract pursuant to Sections 38A 1/2 to 38O, inclusive, of Chapter 7, Section 39M of Chapter 30, Sections 44A-44J, inclusive, of Chapter 149, or Section 11C of Chapter 25A which is for an amount or estimated amount that exceeds the dollar amount set forth in M.G.L. Chapter 30, Section 39R.

3.1.2 "Contract" means any contract awarded or executed pursuant to Sections 38A 1/2 to 38O, inclusive, of Chapter 7, Section 39M of Chapter 30, Sections 44A-44J, inclusive, of Chapter 149, or Section 11C of Chapter 25A which is for an amount or estimated amount that exceeds the dollar amount set forth in M.G.L. Chapter 30, Section 39R.

3.1.3 “Records” means books of original entry, accounts, checks, bank statements and all other banking documents, correspondence, memoranda, invoices, computer printouts, tapes, discs, papers and other documents or transcribed information of any type, whether expressed in ordinary or machine language.

3.1.4 “Independent Certified Public Accountant” means a person duly registered in good standing and entitled to practice as a certified public accountant under the laws of the place of his residence or principal office who is in fact independent. In determining whether an accountant is independent with respect to a particular person, appropriate consideration should be given to all relationships between the accountant and that person or any affiliate thereof. Determination of an accountant’s independence shall not be confined to the relationships existing in connection with the filing of reports with the awarding authority.

3.1.5 “Audit”, when used in regard to financial statements, means an examination of records by an independent certified public accountant in accordance with generally accepting accounting principles and auditing standards for the purpose of expressing a *certified* opinion thereon, or, in the alternative, a qualified opinion or a declination to express an opinion for stated reasons.

3.1.6 “Accountant’s Report”, when used in regard to financial statements, means a document in which an independent certified public accountant indicates the scope of the audit which he has made and sets his opinion regarding the financial statements taken as a whole with a listing of noted exceptions and qualifications, or an assertion to the effect that an overall opinion cannot be expressed. When an overall opinion cannot be expressed, the reasons therefor shall be stated. An accountant’s report shall include as a part thereof a signed statement by the responsible corporate officer attesting that management has fully disclosed all material facts to the independent certified public accountant, and that the auditing financial statement is a true and complete statement of the financial condition of the Contractor.

3.1.7 “Management”, when used herein, means the chief executive officers, partners, principals or other person or persons primarily responsible for the financial and operational policies and practices of the Contractor.

3.1.8 Accounting terms, unless otherwise defined herein, shall have a meaning in accordance with generally accepted accounting principles and auditing standards.

3.2 Subparagraph 3.1.2 hereof notwithstanding, every agreement or contract awarded or executed pursuant to Sections 38A 1/2 to 38O, inclusive, of Chapter 7, Section 39M of Chapter 30, Sections 44A-44J, inclusive, of Chapter 149, or Section 11C of Chapter 25A, shall provide that:

3.2.1 The Contractor shall make, and keep for at least six years after final payment, books, records, and accounts which in reasonable detail accurately and fairly reflect the transactions and dispositions of the Contractor; and

3.2.2 Until the expiration of six years after final payment, the awarding authority, office of inspector general, and the commissioner of capital asset management and maintenance shall have the right to examine any books, documents, papers or records of the Contractor or his Subcontractors that directly pertain to, and involve transactions relating to, the Contractor or his Subcontractors; and

3.2.3 If the agreement is a contract as defined herein, the Contractor shall describe any change in the method of maintaining records or recording transactions which materially affect any statements filed with the awarding authority, including in his description the date of the change and reasons therefor, and shall accompany said description with a letter from the Contractor's independent certified public accountant approving or otherwise commenting on the changes.

3.2.4 If the agreement is a contract as defined herein, the Contractor has filed a statement of management on internal accounting controls as set forth in Paragraph 3.3 below prior to the execution of the contract.

3.2.5 If the agreement is a contract as defined herein, the Contractor has filed prior to the execution of the contracts and will continue to file annually, an audited financial statement for the most recent completed fiscal year as set forth in Paragraph 3.5 below.

3.3 Every Contractor awarded a contract shall file with the awarding authority a statement of management as to whether the system of internal accounting controls of the Contractor and its subsidiaries reasonably assures that:

3.3.1 transactions are executed in accordance with management's general and specific authorization:

3.3.2 transactions are recorded as necessary

(i) to permit preparation of financial statements in conformity with generally accepted accounting principles, and

(ii) to maintain accountability for assets;

3.3.3 Access to assets is permitted only in accordance with management's general or specific authorization; and

3.3.4 The recorded accountability for assets is compared with the existing assets at reasonable intervals and appropriate action was taken with respect to any difference.

3.4 Every Contractor awarded a contract shall also file with the awarding authority a statement prepared and signed by an independent certified public accountant, stating that he/she has examined the statement of management on internal accounting controls, and expressing an opinion as to:

3.4.1 Whether the representations of management in response to this paragraph and Paragraph 3.2 above are consistent with the result of management's evaluation of the system of internal accounting controls; and

3.4.2 Whether such representations of management are, in addition, reasonable with respect to transactions and assets in amounts which would be material when measured in relation to the applicant's financial statements.

3.5 Every Contractor awarded a contract by the Commonwealth or by any political subdivision thereof shall annually file with the commissioner of capital asset management and maintenance during the term of the contract a financial statement prepared by an independent certified public accountant on the basis of an audit by such accountant. The final statement filed shall include the date of final payment. All statements shall be accompanied by an accountant's report.

ARTICLE 4 – MISCELLANEOUS

4.1 Weather Protection: This Paragraph 4.1 applies to every contract subject to M.G.L. Chapter 149, Section 44A.

4.1.1 The Contractor shall install weather protection and provide adequate heat in the protected area from November 1 to March 31, as required by M.G.L. Chapter 149 Section 44F(1).

4.2 Form for Sub-contract: This Paragraph 4.2 applies to every contract subject to M.G.L. Chapter 149 Section 44A.

4.2.1 The Contractor when sub-contracting with sub-bidders filed pursuant to M.G.L. Chapter 149, Section 44F shall use the form for sub-contract in Chapter 149 Section 44F(4)(c).

4.3 Foreign Corporations: This Paragraph 4.3 applies to every contract with the Commonwealth, a county, city, town, district, board, commission, or other public body for the construction, reconstruction, alteration, remodeling, repair, or demolition of any public building or other public works.

4.3.1 The Contractor, if a foreign corporation, shall comply with M.G.L. Chapter 30, Section 39L.

4.4 Shoring: (Statutory reference: M.G.L. Chapter 149, Section 129A). This Paragraph 4.4 applies to every construction project carried on by any city, town, county, or other subdivision of the Commonwealth in which a trench is to be dug to a depth of five feet or more, except a trench for laying of water pipes dug to a depth of six and one-half feet which will be open less than 48 hours, and except for digging of graves.

4.4.1 Such trenches shall be shored and braced in conformity with rules and regulations for the prevention of accidents in construction operations, as adopted and enforced by the Attorney General.

4.5 Certification of Compliance with Tax Laws: (Statutory reference: M.G.L. Chapter 62C, Section 49A) This Paragraph 4.5 applies to contracts for goods or services furnished by any department, board, commission, division, authority, district or other agency of the Commonwealth or any subdivision of the Commonwealth, including a city, town or district.

4.5.1 By executing this contract, the Contractor certifies, under penalties of perjury, that to the best of his information, knowledge and belief he has complied with all laws of the Commonwealth relating to taxes.

4.6 Verification of Construction Debris Disposal: (Worcester Revised Ordinances Chapter 8, Section 7) This paragraph 4.6 shall apply to every contract entered into by the City of Worcester for the demolition, renovation, rehabilitation, or alteration of a building or structure.

- a. In furtherance of the requirements set forth in G.L. c.40, §54, and §114.1.3 of the State Building Code, the building commissioner shall require any person who obtains a permit for the demolition, renovation, rehabilitation, or alteration of a building or structure to provide verification that the debris resulting from such activities was disposed of at the licensed solid waste facility named in conjunction with the permit application.
- b. The verification required under sub-section (a), above, shall consist of the following:
 - 1) a dated receipt, signed by the owner/operator of the licensed solid waste disposal facility where the debris was deposited.
 - 2) the receipt shall contain a description of the debris disposed of, and its weight, or volume.
 - 3) the permit holder shall also provide the building commissioner with an affidavit that the receipt submitted is true and accurate to the best of the permit holder's knowledge.
 - 4) if the permit holder cannot dispose of the debris at the location indicated, it shall be the permit holder's obligation to obtain an amendment to the permit reflecting the new disposal location. The building commissioner shall be so notified, and the permit amended, prior to the disposal of the debris at the new disposal location.
- c. This section shall not apply to the construction of a new building or structure.

4.7 Responsible Employer Ordinance: (Worcester Revised Ordinances, Chapter 2, Section 35) *This paragraph 4.7 shall apply to every contract entered into by the City of Worcester for the construction, reconstruction, installation, demolition, maintenance or repair of any building, where the contract amount is more than one hundred thousand dollars.*

- a. The city council hereby finds and determines that taxpayer money is most efficiently and productively spent by awarding construction contracts to firms that include and enforce provisions requiring compliance with state laws governing the payment of prevailing wages, the provision of workers compensation coverage, and the proper classification of individuals as employees and not as independent contractors, as well as provisions concerning health insurance coverage and state-certified apprenticeship programs. The city council hereby further finds and determines that it is appropriate for it to exercise its entrepreneurial discretion by requiring firms that are awarded such contracts to comply with this ordinance because failure to comply is injurious to the life, health, and happiness of individuals employed by such firms and is deleterious to the quality of life in the city where most of such individuals reside.
- b. Every contract awarded by the city under G.L. c.149 and G.L. 149A shall be deemed to incorporate by reference the provisions of sub-parts (c)(1) through (8) of together with the provisions of subsections (d) and (e) of this section. Any person, company or corporation shall acknowledge, in writing, receipt of said requirements with their bid or proposal.
- c. All bidders or proposers and all subcontractors and trade contractors, including subcontractors that are not subject to G.L. c.149, Section 44F, under the bidder for projects subject to G.L. c.149, Section 44A(2), and proposers under G.L. c. 149A, shall as a condition for bidding or subcontracting verify under oath and in writing at the time of bidding or subcontracting verify under oath and in writing at the time of budding or submittal in response to and RFP or in any event prior to entering into a subcontract at any tier, that they comply with the following conditions for bidding or subcontracting and, for the duration of the project, shall comply with the following obligations:
 - 1) The bidder or proposer and all trade contractors and subcontractors under the bidder or proposer must comply with the obligations established under G.L. c. 149 to pay the appropriate lawful prevailing wage rates to their employees.
 - 2) The bidder or proposer and all trade contractors and subcontractors under the bidder or proposer must at a the time of bidding maintain or participate in a bona fide apprentice training program as defined by G.L. c.23, Sections 11H and 11I for each apprenticable trade or occupation represented in their workforce that is approved by the Division of Apprentice Standards of the Department of Labor and Workforce Development, regardless of whether or not the program qualifies as an employee welfare benefit plan under ERISA, and must register all apprentices with the Division and abide by the apprentice to journeyman ratio for each trade prescribed therein in the performance of any work on the project. This provision does not require the program to be an ERISA plan; the program need only have been approved by the Division of Apprentice Standards. All general bidders or

proposers and all trade contractors and sub-bidders at every tier must submit with its bid or proposal an original, stamped Sponsor Verification letter from the Commonwealth of Massachusetts, Department of Labor and Workforce Development – Division Apprentice Standards, issued within the past 90 days, evidencing that at the time of submitting a bid or proposal, the bidder or proposer is currently an Approved Sponsor of Apprentices. Any bid or proposal submitted without the above documentation shall be rejected; *(Compliance with the apprentice training provision is currently suspended 7/24/14)*

- 3) The bidder or proposer and all trade contractors and subcontractors under the bidder or proposer must maintain appropriate industrial accident insurance coverage for all the employees on the project in accordance with G.L. c. 152;
- 4) The bidder or proposer and all trade contractors and subcontractors under the bidder must properly classify employees as employees rather than independent contractors and treat them accordingly for purposes of workers' compensation insurance coverage, unemployment taxes, social security taxes and income tax withholding. (G.L. c.149, Section 148B on employee classification);
- 5) The bidder or proposer and all trade contractors and subcontractors under the bidder or proposer must at the time of bidding certify that, at the time employees begin work at the worksite, all employees 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, and shall ensure that all employees working at the worksite possess such qualifications at all times throughout the duration of their work on the project and furnish documentation of successful completion of the course;
- 6) The bidder or proposer and all trade contractors and subcontractors under the bidder or proposer must be in compliance with the health and hospitalization requirements of the Massachusetts Health Care Reform law established by Chapter 58 of the Acts of 2006, as amended, and regulations promulgated under that statute by the Commonwealth Health Insurance Connector Authority.
- 7) The bidder or proposer and all trade contractors and subcontractors under the bidder or proposer must make arrangements to ensure that each employee of every contractor entering or leaving the project individually completes the appropriate entries in a daily sign-in/out log. The sign-in/out log shall include: the location of the project; current date; printed employee name; signed employee name; and the time of each entry or exiting. The log shall contain a prominent

notice that employees are entitled under state law to receive the prevailing wage rate for their work on the project. Such sign-in/out logs shall be provided to the City on a daily basis.

- 8) The bidder or proposer and all trade contractors and subcontractors under the bidder or proposer, prior to bidding or, if not subject to bidding requirements, prior to performing any work on the project, shall sign under oath and provide to the City a certification that they are not debarred or otherwise prevented from bidding for or performing work on a public project in the Commonwealth of Massachusetts or in the City.
- d. A proposal or bid submitted by any general bidder or by any trade contractor or subcontractor under the general bidder or proposer that does not comply with any of the foregoing conditions for bidding shall be rejected, and no subcontract for work outside the scope of G.L. c.149, Section 44F shall be awarded to a subcontractor that does not comply with the foregoing conditions.
 - e. All bidders or proposers and all trade contractors and subcontractors under the bidder or proposer who are awarded or who otherwise obtain contracts on the projects subject to G.L. c.149, Section 44A(2) or c.149A, shall comply with each of the obligations set forth in this Section 4.7 for the entire duration of their work on the project, and an officer of each bidder or subcontractor under the bidder shall certify under oath and in writing on a weekly basis that they are in compliance with such obligations.
 - f. Any proposer, bidder, trade contractor or subcontractor under the bidder or proposer who fails to comply with any one of the obligations set forth in this Section 4.7 for any period of time shall be, at the sole discretion of the City, subject to one or more of the following sanctions:
 - 1) cessation of work on the project until compliance is obtained;
 - 2) withholding of payment due under any contract or subcontract until compliance is obtained;
 - 3) permanent removal from any further work on the project;
 - 4) liquidated damages payable to the City in the amount of 5% of the dollar value of the contract.
 - g. In addition to the sanctions outlined in subsection (h) above, a proposer, general bidder or contractor shall be equally liable for the violations of its subcontractor with the exception of violations arising from work performed pursuant to subcontracts that are subject to G.L. c.149, Section 44F. Any contractor or subcontractor that has been determined by the City or by any court or agency to have violated any of the obligations set forth in this Section 4.7 shall be barred from performing any work on any future projects for six months for a first violation, three years for a second violation and permanently for a third violation.

4.8 Regulation of Construction Noise: (Worcester Revised Ordinances, Chapter 8, Section 34) This paragraph 4.8 shall apply to anyone operating powered construction equipment delivering construction equipment and/or supplies at any construction site or project within the city of Worcester.

- a. It shall be unlawful for any person, firm, corporation, partnership, or other entity to operate powered construction equipment or to build, erect, construct, demolish, alter, repair, excavate or engage in hoisting, grading, site work, including tree and brush removal, dredging or pneumatic hammering, or to deliver construction equipment and/or supplies to the site on any building, road, tower, parking lot, machine, pipe, sewer, sidewalk, or any other construction project (hereafter collectively the "construction project"), except between the hours of 7:00 a.m. and 9:00 p.m. on weekdays and Saturday, except for "emergency work" which is performed in the interest of public safety or welfare and for which a permit has been issued by the commissioner of public works and parks or the commissioner of inspectional services.

It shall be unlawful for any person, firm, corporation, partnership, or other entity to engage in a construction project activity on Sundays or legal holidays without a permit from the police chief issued pursuant to G.L. c. 136, Section 7 or 15 and a permit issued by the commissioner of inspectional services hereunder.

- b. Emergency work permits may be issued in:
 - 1) cases of urgent necessity and for the interests of health, safety and convenience of the public. The commissioner of inspectional services shall whether the reasons given for the urgent necessity are valid and reasonable, and whether the health, safety and convenience of the public will be protected or better served by granting the permit requested and whether the manner and amount of loss or inconvenience to the party in interest imposes a significant hardship; or,
 - 2) cases where, because the location and nature of the work, the noise caused by said work will not be heard by anyone not working on the project. The commissioner of inspectional services shall consider whether supplying machinery and/or materials to the construction project site will cause unreasonable noise along the routes to the construction project site, and whether such activity will impact residential neighborhoods, and shall not grant any emergency work permit unless unreasonable noise in residential areas will be prevented.
- c. Emergency work permits may be issued to the general contractor on a blanket basis that applies to all of the contractors working on the job, or may be issued to specific contractors on the construction project, at the discretion of the Commissioner.

Emergency work permits may be issued for not more than one week at a time, and may be renewed for additional one week periods at the discretion of the Commissioner.

- d. Prior to issuing or reissuing said emergency work permit, the commissioner of inspectional services shall review the work being conducted and all attendant circumstances, and shall prescribe whatever limitations possible to minimize the generation of noise, and to minimize the impact of noise on the neighbors to the construction project.
- e. Emergency repair work performed by the Department of Public Works and/or any public utility is exempt from this section.
- f. The fee for each such Emergency work permits issued under this section shall be set in accordance with Chapter 2, § 24 of the City of Worcester Revised Ordinances of 2008.
- g. On any project for the construction, reconstruction, installation, demolition, maintenance or repair of any building, or public work, to be funded in whole or in part by city funds, or funds which, in accordance with a federal or state grant, program, or otherwise, the city expends or administers, or any such project to which the city is a signatory to the contract therefor, the provisions of this section shall apply and the same shall be referred in every invitation to bid for such project and, the following paragraphs shall be contained in every resulting contract therefrom:

“It shall be a material breach of this contract if the contractor and each subcontractor shall not at all times adhere to the provisions of § 34 of chapter eight of the Revised Ordinances of the city, by limiting their on-site, noise producing construction and related work to the hours specified by the Ordinance.

A waiver from the above requirements may, in certain circumstances, be granted in accordance with subsections (b), (c) and (d) of § 34 of chapter eight of the Revised Ordinances of the city.”

- h. The commissioner of inspectional services shall have the authority to adopt any rules and regulations he or she deems necessary to implement this section.
- i. Nothing in this section shall be deemed to prevent an individual from performing work on his or her own property, so long as the work is being done by the owner of the property or by direct relative(s) of the owner, and said work is not being done for profit.
- j. This section may be enforced by the commissioner of inspectional services, the building commissioner, the chief of police or their subordinates.

Any violation of this section by any person, firm, corporation, partnership, or other entity, shall be individually punished with a fine of \$100.00. Each day upon which a violation of this section occurs shall be considered a separate violation. Employers shall be deemed the violator for violations committed by their employees.

4.9 Regulation of Excessive and Unreasonable Noise: (Worcester Revised Ordinances, Chapter 9, Section 1A(e)(9) This paragraph 4.9 shall apply to anyone operating powered construction equipment delivering construction equipment and/or supplies at any construction site or project within the city of Worcester.

- a. No person shall operate any powered construction equipment or build, erect, construct, demolish, alter, repair, excavate or engage in hoisting, grading, site work, including tree and brush removal, dredging or pneumatic hammering, or deliver construction equipment and/or supplies to the site on any building, road, tower, parking lot, machine, pipe, sewer, sidewalk, or any other construction project, except between the hours of 7:00 a.m. and 9:00 p.m. on weekdays and Saturday, and between the hours of 9:00 a.m. and 7:00 p.m. on Sundays, except for work performed by a public service or municipal utility department or "emergency work" performed with the express written permission of the commissioner of inspectional services or the commissioner of public works and parks. Emergency work shall be limited to such work that is clearly essential to respond to a sudden and unexpected threat to public health or public safety. Emergency work permission may be granted to a general or sub-contractor on a blanket basis governing all persons working on a specified portion of a particular job. Emergency work permission may be granted for not more than one week at a time, and may be renewed for additional one week periods at the discretion of the commissioner who granted the initial permission.

ARTICLE 104: GENERAL BID FORM

for

Sewer Rehabilitation – Cambridge Street Area (S23-1) / DPW & P **BID #: 7869-W3**

BIDDER

Print Name of the Firm or Proprietorship Submitting this Bid

This bid must be accompanied by a deposit in the form of cash, or bid bond, or a certified check, treasurer's check, or cashier's check, payable to the City of Worcester (hereinafter referred to as the "Owner", or the "Awarding Authority") in the amount of five percent (5%) of the total value of the bid. No other form of bid security will be accepted.

By submitting this bid the Bidder represents that it has carefully examined the site of work described herein; has become thoroughly familiar with local conditions and the character and extent of the work; has carefully examined the Drawings, Project Manual and Contract Documents including all Addenda which are a part of this proposal, the General Bid Form, and thoroughly understands their stipulations, requirements, and provisions, and that the Bidder will contract, in the form of contract required, to provide all necessary and proper machinery, equipment, facilities, and means to do all the work and furnish all the materials necessary and proper to carry out such contract in the manner and on the conditions set forth therein in accordance with the Contract Documents, and to perform or observe all other contract requirements thereby. By submitting this bid, the Bidder further represents that it agrees to be subject to the jurisdiction of the courts of the Commonwealth of Massachusetts with respect to any actions arising out of or related to this bid or any contract that may be entered into based upon this bid, and that any such actions commenced by the Bidder shall be commenced in the courts of the Commonwealth of Massachusetts.

A bidder wishing to amend this bid after transmittal to the Owner may do so only by withdrawing this bid and resubmitting another bid prior to the time for opening bids.

TO THE AWARDING AUTHORITY:

- A. The undersigned Bidder proposes to furnish all labor, materials, and equipment necessary and required for the project described herein in Worcester, MA, in accordance with the accompanying plans and specifications for the contract price specified below, subject to additions or deductions according to the terms of the Contract Documents.

B. This Bid includes Addenda numbered: _____

C. The proposed total base Bid price is:

\$ _____

(TOTAL BASE BID WRITTEN IN WORDS)

D. BID ALTERNATES: See below and specifications for further detail

The owner may select at its option, any Alternate or combination of Alternates, or none of the Alternates. The Bidder is required to provide a bid for each Alternate listed below. If selected by the Owner, the Alternate(s) will be added to the total Base Bid price to determine the low bidder.

Alternate # 1: State additional cost for additional sewer rehabilitation services per attached plans and specifications:

(Add): \$ _____

Alternate # 2: State additional cost for additional sewer rehabilitation services per attached plans and specifications:

(Add): \$ _____

E. UNIT PRICES: See Unit Pricing / Proposal Pages

In addition to stating the Total Base Bid Price, the Bidder shall state prices for the various items of work as may be listed herein. The Unit Prices listed below, if accepted by the Owner in the award of the contract, may be used for computing adjustments during the course of construction, based upon extra work ordered by the Owner, or for work countermanded, reduced, or omitted by the Owner.

F. TIME FOR COMPLETION

Work shall be completed within one hundred fifty (150) calendar days from date of contract execution for base bid, and one hundred eighty (180) calendar days from date of contract execution for alternates 1 & 2.

- G.** The Bidder agrees that if it is selected as the lowest responsible and eligible bidder, the Bidder will within five (5) days, Saturdays, Sundays and legal holidays excluded, after presentation thereof by the awarding authority, execute a contract in accordance with the terms of this bid and furnish a performance bond and also a labor and materials (a.k.a., payment) bond, each of a surety company qualified to do business under the laws of the Commonwealth of Massachusetts and satisfactory to the awarding authority and each in the sum of the contract price, the premiums for which are to be paid by the Bidder and are included in the bid price(s) contained herein.

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

The undersigned further certifies under penalties of perjury that this bid is in all respects bona-fide, fair and made without collusion or fraud with any other person. As used herein the word "person" shall mean any natural person, joint venture, partnership, corporation or other business or legal entity. The undersigned further certifies under penalty of perjury that the said undersigned is not presently debarred from doing public construction work in the Commonwealth under the provisions of section 29F of Chapter 29 or any other applicable debarment provisions of any other chapter of the General Laws or any rule or regulation promulgated thereunder.

Date: _____

(Print Name of Bidder)

Signature: _____

By: _____
(Name of Person Signing Bid and Title)

(Business Address)

(City, State and Zip Code)

Fax: (_____) _____

Phone: (_____) _____

Social Security Number or
Federal Identification Number: _____

E-Mail Address: _____

NOTE: If Bidder is a corporation, indicate state of incorporation; if a partnership, give full names and addresses of all partners; and if a sole proprietorship, give residential address if different from business address. Use the following spaces:

If a Corporation:

Incorporated in what state: _____

President: _____

Treasurer: _____

Secretary: _____

If a foreign corporation (incorporated or organized under laws other than laws of the Commonwealth of Massachusetts), is the corporation registered with the Massachusetts Secretary of State's office? Yes _____ No _____

If the Bidder is a foreign corporation, it is required under M.G.L. c. 30, section 39L to furnish to the awarding authority a certificate of the Secretary of State stating that the corporation has complied with M.G.L. c. 156D, Part 15, subdivision A, s. 15.03, and Part 16, subdivision B, s. 16.22.

If a Partnership: (Name all Partners)

Name of Partner: _____

Residence: _____

Name of Partner: _____

Residence: _____

Name of Partner: _____

Residence: _____

If an Individual:

Name: _____

Residence: _____

If an Individual doing business under a firm name:

Name of Firm: _____

Name of Individual: _____

Business Address: _____

Residential Address _____
(if different from above)

Other form of business organization:

SURETY INFORMATION:

The bidder will give below the name and address and State of Incorporation of the surety company who will sign the bonds. Performance and Payment Bonds in the amount of 100% of the dollar value of the contract will be required at time of contract execution.

It is contractor's responsibility to submit the required bond documentation in a form satisfactory to the City.

STATEMENT OF BIDDER'S QUALIFICATIONS

The bidder is requested to state below what work of a similar character to that included in the proposed contract he/she has done and to give references that will enable the Owner to judge his/her experience, skill, business standing and overall responsibility. Supplemental forms may be used by the bidder.

END OF GENERAL BID FORM

ARTICLE 105: OWNER-CONTRACTOR AGREEMENT

THIS AGREEMENT made on _____ at Worcester, in the County of Worcester and Commonwealth of Massachusetts, by and between _____ (hereinafter called the Contractor), and the City of Worcester, a municipal corporation within said County of Worcester, (hereinafter called the City).

WITNESSETH:

That the Contractor, in consideration of the payments hereinafter mentioned, and of the fulfillment of the agreements herein mutually entered into, agrees with the City as follows:

SCOPE OF WORK:

(1) The Contractor shall, pursuant to the terms of this AGREEMENT, provide all the supplies, materials, and equipment, and perform all the labor, services and supervision necessary and proper for _____ (hereinafter called the "Project") in the City of Worcester, Massachusetts, and to accomplish any and all work incidental thereto.

BONDS:

(2) The Contractor shall obtain and deposit with the City the following bond(s) in the amount of:

PERFORMANCE BOND: _____ (\$ _____)

PAYMENT BOND: _____ (\$ _____)

with sureties satisfactory to the Contracting Officer to (a) guarantee the faithful performance by the Contractor of all its obligations under this AGREEMENT and (b) constitute the security required by Massachusetts General Laws Chapter 149, Section 29, and Chapter 30, Section 39A, as amended, for the payment by the Contractor and its subcontractors for all labor performed or furnished and for all materials used or employed in connection with this AGREEMENT.

CONTRACTING OFFICER:

(3) Wherever used in this AGREEMENT, the term "Contracting Officer" shall mean the City Official(s) so designated below, or the individual duly appointed by him/her for the performance of any of his/her functions or responsibilities under this AGREEMENT. The work performed hereunder shall be carried out under the direction and subject to the approval and acceptance of _____ (hereinafter called the Contracting Officer).

INCORPORATED DOCUMENTS:

(4) The performance of this AGREEMENT is subject to the provisions of the following documents, all of which are attached hereto and intended to be an integral part of this AGREEMENT (hereinafter collectively referred to as "the Contract Documents").

- a. Information to Bidders
- b. Bid Proposal
- c. Specifications, Drawings and Addenda

The Contract Documents are to be read collectively and complementary to one another; any requirement under one shall be as binding as if required by all. In the event of any conflict or inconsistency between the provisions of this AGREEMENT and any of the other Contract Documents, the provisions of this AGREEMENT shall prevail. In the event of any conflict or inconsistency between this AGREEMENT, the Contract Documents and any applicable state law, the applicable statutory provisions shall prevail.

TIME FOR PERFORMANCE:

(5) Time is of the essence for this AGREEMENT. The work of this AGREEMENT must be substantially completed _____.

PRICE:

(6) The City will pay the Contractor for all materials delivered or furnished and for all the work performed pursuant to Article (1) hereof a sum of money as follows:

_____ (\$ _____).

PAYMENT:

(7) Payment shall be made by the City in accordance with General Laws Chapter 30, Section 39G (1988 ed.), as amended, which is included in the Supplementary General Conditions to the Contract.

(a) In addition to the retainage provided for in the above statutory provisions, the City may also, with the written consent of the Contractor, use any of the sums payable under this contract to pay for labor, materials, and for the rental of equipment that has been furnished to the Contractor or any of its subcontractors in connection with work under this contract, regardless of whether claims for such obligations have been filed with the City under General Laws Chapter 149, Section 29 or Chapter 30, Section 39A.

(b) The payment shall be in full for furnishing all materials, supplies, labor services, supervision, tools and equipment and the use thereof as embraced under the AGREEMENT and shall also constitute the payment for all loss or damage to the Contractor arising out of the nature of the work or from the action of the elements or from any unforeseen difficulties or obstructions which may arise or be encountered during the prosecution of the work until its final approval by the Contracting Officer, and for all risks to the Contractor of every description

connected with the prosecution of the work or infringement of patents, trademarks, or copyrights and for completing the work in an acceptable manner.

(c) The payment of any periodic estimate or of any retained percentage shall in no way constitute an acceptance of the work or in no way prejudice or affect the obligation of the Contractor at his own cost or expense to repair, correct, renew, or replace any defects or imperfections in the construction as well as all damages due or attributable to such defects, nor shall any such payment for any current estimate or of any retained percentages prejudice or affect the rights of the City to hold the Contractor liable for breach of contract or to avail itself of the remedies under Article 15, hereof.

(d) If at any time there shall be evidence of any lien or other claim for which, if established, the City may become liable, directly or indirectly, and which is chargeable to the Contractor, the City may retain out of any payment then due or thereafter to become due an amount sufficient to completely indemnify it against any such claim. If there prove to be any such claim after all the payments are made, the Contractor shall refund to the City all moneys that the City pays in discharging such claim in consequence of the Contractor's default.

(e) The Contractor, and each subcontractor, at every tier, represents, warrants and certifies that it has complied with all laws of the Commonwealth of Massachusetts relating to taxes and all Ordinances and Orders of the City of Worcester relating to taxes, fees and charges, or is lawfully contesting the validity of the same. The Contractor, and each subcontractor, at every tier, further represents, warrants and certifies that it will remain in such compliance during the term of this Agreement, including any amendments or extensions hereto. Breach of any of these provisions shall be deemed a material breach which shall entitle the City to immediately terminate this Agreement and take any other action authorized by law to collect any amounts due the City.

PAYMENT OF SUBCONTRACTORS

(8) Payment to subcontractors shall be made in accordance with General Laws Chapter 30, Section 39F (1988 ed.), as amended, which is included in the Supplementary General Conditions.

NOTICE:

(9) Wherever in this AGREEMENT the City is to give or receive a notice, the Contracting Officer as defined in Article (3) shall be the City's agent for such purpose.

PERFORMANCE:

(10) (a) The Contractor shall give his personal attention constantly to the faithful prosecution of the work and shall keep the same under his personal control. He shall not assign by power of attorney or otherwise the work or any part thereof without the previous written consent of the Contracting Officer. He shall not either legally or equitably assign any of the moneys payable under this contract or any claim thereto unless by and with like consent on the part of the Contracting Officer and the City Treasurer. He shall be responsible for all the acts and omissions

of his employees and of all persons directly or indirectly employed by him in connection with the prosecution of this work.

(b) The Contractor shall provide sufficient and proper facilities at all times for the inspection of the work by the City. He shall, after receiving written notice that certain work or construction is improper, unsafe or defective or that such construction in any way fails to conform to the contract documents, forthwith remove such unsafe or defective construction and reconstruct the same in a manner satisfactory to the Contracting Officer. Upon failure of the Contractor to remedy the construction after being so notified, the Contracting Officer may cause such defective work to be remedied or replaced and the City may deduct the cost thereof from any moneys due or to become due the Contractor.

(c) The City, acting through the Contracting Officer, shall have the authority to suspend the work wholly, or in part thereof, for such period as he shall deem necessary, due to failure of the Contractor to carry out orders given or to perform any provision of the contract. Upon receipt of written order from the Contracting Officer, the Contractor shall immediately suspend the work or such part thereof in accordance with the order. No work shall be suspended without the written permission of the Contracting Officer. The work shall be resumed when conditions so warrant, or deficiencies have been corrected and the condition of the contract satisfied as ordered or approved in writing by the Contracting Officer. No allowance of any kind will be made for suspension of work by order of the Contracting Officer pursuant to this paragraph.

(d) If, during the process of the work, the Contractor or the City 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 City may request an equitable adjustment in the price of the AGREEMENT 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 the Contractor, or upon its own initiative, the City 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 work, the City shall make an equitable adjustment in the contract price and the AGREEMENT shall be modified in writing accordingly. (G. L. c. 30, s.39N, as amended, which is included in the Supplementary General Conditions).

(e) The Contractor agrees that it will have no claim for damages of any kind on account of any delay in commencement of the Work, or any delay or suspension of any portion thereof, except as hereinafter provided. Post commencement, the Contractor shall have no claim for damages of any kind on account of any delay or suspension of any portion of the work except as hereinafter provided. Adjustments, if any, in the contract price due to a suspension, delay, interruption or failure to act by the City shall be governed by the provisions of General Laws Chapter 30, section 39(O), as amended, which is included in the Supplementary Conditions. Provided, however, the provisions of this paragraph shall not apply to any suspension pursuant

to paragraph 10(c), or for any suspension, delay, interruption or failure to act to the extent that such is due to any cause for which this AGREEMENT provides for an equitable adjustment of the contract price, or time under any other AGREEMENT provision. Provided further, that no adjustment shall be made if the performance of the Contractor would have been prevented by other causes, even if the work had not been so suspended, delayed or interrupted by the City. Provided further, that a subcontractor shall have the same rights against the Contractor for payment for an increase in the cost of his performance as the provisions of this paragraph gives the Contractor against the City, but nothing herein shall in any way change, modify or alter any other rights which the Contractor and subcontractor may have against each other.

(f) The Contractor must submit the amount of a claim under provision (e) to the City in writing as soon as practicable after the end of the suspension, delay or interruption or failure to act and, in any event, not later than the date of final payment under this AGREEMENT and, except for costs due to a suspension order, the City shall not approve any costs in the claim incurred more than twenty days before the Contractor notified the City in writing of the act or failure to act involved in the claim.

(g) The City may award other contracts for additional work. The Contractor shall cooperate fully with other contractors and carefully fit his own work to that of other contracts as may be directed by the Contracting Officer. The Contractor shall not commit or permit any act that will interfere with the performance of work by any other contractor.

(h) The Contractor shall comply with all the laws, state and federal, applicable to the work and construction herein provided for. This AGREEMENT is made subject to all laws, state and federal; and if any clause hereof does not conform to such law, then such clause shall be void and the operative state or federal law shall be inserted in lieu thereof. Any violation by the Contractor of state or federal laws relating to the employment of labor upon the work or the construction contemplated by this AGREEMENT shall be a sufficient cause for the City to cancel the AGREEMENT without in any way being liable in damages therefor. Should the City cancel the AGREEMENT because of the failure on the part of the Contractor to observe the state or federal laws, or the rules and regulations relating to employment and labor upon the work herein contemplated, then upon cancellation the City reserves all rights and benefits herein or by law provided against the Contractor for the breach of the conditions of this AGREEMENT.

(i) When the use of explosives is necessary for the prosecution of the work, the Contractor shall take the utmost care not to endanger life and property. Whenever directed, the number and size of the charges shall be reduced. All explosives shall be stored in a secure manner. All such storage places shall be marked clearly "DANGEROUS - EXPLOSIVES", and shall be in the care of competent watchmen at all times. The method of storage and handling explosives and highly inflammable materials shall conform to all the State laws and regulations, as well as any local requirements.

(j) Upon the completion of the work, the Contractor shall at his own expense remove all equipment, temporary Contractor's buildings and sheds, fencing, rubbish and waste material in and about the area that has been worked and he shall leave the premises and the work performed all in a neat and proper condition.

(k) Before commencing the work, the Contractor shall, if required, submit a schedule of operations for approval by the Contracting Officer. The schedule shall show the methods and order of operations that the Contractor proposes to use. The approval of the schedule by the Contracting Officer shall not be construed as relieving the Contractor from any responsibility.

(l) Should the Contractor be obstructed or delayed in the prosecution of the work by any act or neglect on the part of the City, or as a result of damage which may be caused by lightning, earthquake, rain, storm, or cyclone, then the time fixed for completion may be extended for a period equivalent to the time lost by reason of any of the foregoing causes. No such extension shall be made unless a claim therefor is presented in writing to the Contracting Officer within forty-eight hours of the occurrence of such delay. The Contractor shall have no claim against the City for damages on account of such delay. The duration of the extension itself must be certified to by the Contracting Officer.

ADDITIONAL WORK:

(11) (a) The Contractor agrees to perform any work related to the subject matter of the AGREEMENT, but not within the scope of the AGREEMENT and its specifications, upon the written order of the Contracting Officer, the payment for such extra work to be made in accordance with one of the methods set forth in Article 12 of the General Conditions of the Contract for Construction.

(b) The Contracting Officer may make alterations in the line, grade, plan, form, dimensions, or materials of the subject matter of the contract, or any part thereof either before or after commencement of construction. Where such alterations increase the quantity or standard of the work to be done, payment for such increase shall be made in the same way that payment is made for such extra work under (a), above. Where such alterations diminish the quantity or standard of the work to be done, an adjustment shall be made to the benefit of the City based upon the unit prices where used, or where unit prices are not used, as the Contracting Officer shall determine.

EMPLOYMENT:

(12) (a) The Contractor shall employ competent workers, and if notified by the Contracting Officer in writing that any person engaged upon the work is incompetent, unfaithful, disorderly or otherwise unsatisfactory, then such worker shall be discharged from the work.

(b) In the employment of persons, including mechanics, teamsters, chauffeurs and laborers, under this contract, preference shall be given

First: To citizens of the Commonwealth who are residents of the City of Worcester and who have served in the Army or Navy of the United States in time of war and have been honorably discharged therefrom or released from active duty therein, and who are qualified to perform the work to which the employment relates.

Second: To citizens of the Commonwealth who are residents of Worcester and are qualified to perform the work to which the employment relates.

Third: To citizens of the Commonwealth who have served in the Army or Navy of the United States in time of war and have been honorably discharged therefrom or released from active duty therein and who are qualified to perform the work to which the employment relates.

Fourth: To citizens of the Commonwealth generally.

Fifth: To citizens of the United States.

The foregoing provisions shall not apply to those persons employed in a supervisory capacity. In so far as practicable preference is to be given Worcester Truckers in hauling materials.

(c) No laborer, worker, mechanic, foreman, or inspector working within the Commonwealth of Massachusetts in the employ of the Contractor, sub-contractors, or other persons doing or contracting to do the whole or part of the work contemplated by this AGREEMENT, shall be required or permitted to work more than eight hours in any one calendar day; or more than 48 hours in one week, or more than 6 days in any one week in full compliance with provisions of G. L. c. 149, sec. 34, except in cases of emergency.

(d) Every employee in the work covered by this AGREEMENT shall lodge, board and trade where and with whom he elects and neither the Contractor nor his agents or employees shall directly or indirectly require as a condition of employment therein that an employee shall lodge, board or trade at a particular place or with a particular person.

(e) The Contractor shall provide and maintain in a neat and sanitary condition such accommodations for the use of his employees as may be necessary to comply with the requirements of the Department of Public Health, local health officials or of other appropriate authorities. The maintenance of all sanitary facilities shall be subject to the laws of the Commonwealth and to the rules and regulations of the State Board of Health and of the Commissioner of Public Health for the City of Worcester.

(f) The Contractor shall, before commencing the work, provide by insurance for the payment of compensation and the furnishing of other benefits under Chapter 152 of the General Laws (Ter. Ed.) to all persons employed under the AGREEMENT, and he shall continue such insurance in force and effect during the term thereof. The City may require the Contractor to deliver certificates of insurance as sufficient proof of compliance with the foregoing. Failure to provide and continue in force such insurance as aforesaid shall be deemed a material breach of the AGREEMENT and shall entitle the City to terminate the AGREEMENT without in any way being liable in damages therefor.

(g) The Contractor shall keep a true and accurate register of all mechanics, teamsters, chauffeurs and laborers employed upon the work contemplated by this AGREEMENT, showing the name, address and occupational classification of each such employee, the hours worked by and the wages paid to each such employee, and shall furnish the Massachusetts Attorney General's office, or such other appropriate state official upon request a true statement thereof.

(h) Minimum wage rates under the provisions of General Laws c. 149, section 27, as amended, have been determined by the state Department of Labor and Workforce Development, and the Contractor shall in the payment of wages be bound by them during the life of the AGREEMENT. The applicable schedule of minimum wage rates, as so determined, is incorporated elsewhere within the Contract Documents.

TERMINATION:

(13) (a) If the Contractor shall be adjudged a bankrupt, or if he shall make a general assignment for the benefit of his creditors, or if a receiver of his property shall be appointed, or if the work to be done under the AGREEMENT shall be abandoned, or if the AGREEMENT or any part thereof shall be sublet without the previous written consent of the Contracting Officer, or if the AGREEMENT or any claim thereunder shall be assigned by the Contractor otherwise than as herein specified, or if at any time the Contracting Officer shall be of the opinion that the work, or any part thereof, is unnecessarily or unreasonably delayed, or that the Contractor has violated any of the provisions of the AGREEMENT, the Contracting Officer, for and in behalf of the City, may notify the Contractor to discontinue all work, or any part thereof; and thereupon the Contractor shall discontinue such work or such part thereof as the Contracting Officer may designate, remove his equipment, tools, supplies and materials as the Contracting Officer directs, and the City may thereupon, by contract or otherwise, as it may determine, complete the work, or such part thereof, and charge the entire expense of so completing the work or any part thereof to the Contractor.

(b) If the Contracting Officer shall certify by written notice to the Contractor that the rate of progress is not satisfactory, the City may, instead of notifying the Contractor to discontinue all of the work or any part thereof, notify him from time to time to increase the force, equipment and plant, or any of them, employed on the whole or any part of the work, stating the amount of increase required. Unless the Contractor shall, within five days after such notice, increase his force, equipment and plant to the extent required therein, and maintain and employ the same from day to day until the completion of the work or such part thereof, or until the conditions of the work or such part thereof, or until the conditions as to the rate of progress shall, in the opinion of the Contracting Officer, be fulfilled, the City may employ and direct the labors of such additional force, equipment and plant as may, in the opinion of the Contracting Officer, be necessary to insure the completion of the work or such part thereof within the time specified or at the earliest possible date thereafter, and charge the expense thereof to the Contractor. Neither the notice from the Contracting Officer to the Contractor to increase his force, equipment or plant nor the employment of additional force, equipment or plant by the City shall be held to prevent a subsequent notice to the Contractor from the City to discontinue the work under the provisions of the preceding portion of this Article.

(c) All expenses charged under this Article shall be deducted by the City out of moneys then due or to become due the Contractor under this AGREEMENT, or any part thereof. In such accounting, the City shall not be obligated to obtain the lowest figures for the work of completing the AGREEMENT or any part thereof, or for insuring its proper completion, and all sums actually paid by the City shall be charged to the Contractor. If the expense so charged is greater than the sum which would have been payable under the AGREEMENT, if the same had been

completed by the Contractor, then the Contractor shall pay the amount of the excess to the City upon completion of the work and without further demand being made therefor.

(d) The Contractor shall not be relieved of liability to the City by virtue of any termination of this AGREEMENT and any claim for damages against the Contractor relating to the Contractor's performance under this AGREEMENT shall survive any termination hereunder.

GUARANTEES:

(14) (a) The Contractor guarantees the work under this AGREEMENT and the materials furnished by him for use in connection therewith to be free from defects or flaws for one year after the completion of the AGREEMENT. It is expressly understood, however, that this guarantee provision shall not absolve the Contractor from any liability to the City arising out of a failure to substantially comply with the terms of the AGREEMENT.

(b) If at any time within said guaranty period, any part of the work constructed under the terms of this AGREEMENT shall in the opinion of the Contracting Officer require repairing due to defective work or materials furnished by the Contractor he may notify the Contractor in writing to make the required repairs. If the Contractor shall neglect to start such repairs within ten days of the date of giving him notice thereof and to complete the same to the satisfaction of the Contracting Officer with reasonable dispatch, then the latter may employ other persons to make such repairs. The City shall charge the expense thereof to the Contractor and may use any moneys still retained to pay for the same, and if such sum is insufficient, the Contractor shall be obligated to pay the balance thereof.

INDEMNIFICATION:

(15) (a) The Contractor shall indemnify and save harmless the City of Worcester and all of its officers, agents and employees against all suits, claims or liability of every name, nature, and description arising out of or in consequence of the acts or omissions of this AGREEMENT in the performance of the work covered by the contract and/or his failure to comply with the terms and conditions hereof; and will at his own cost and expense defend any and all such suits and actions.

(b) The Contractor shall bear all losses resulting from the use or storage of explosives and highly inflammable materials and shall save the City harmless from all claims for bodily injuries or death to any person and from all claims for property damage or destruction arising out of the use or storage of explosives and highly inflammable materials.

(c) The Contractor further covenants to hold and save the City, its officers, servants and employees harmless from and against all and every demand or demands, of any nature or kind for or on account of the use of any patented invention, article or appliance included in the materials and equipment agreed to be furnished, supplied or used under this AGREEMENT.

INSURANCE:

(16) (a) The Contractor shall carry public liability insurance so as to save the City harmless from any and all claims for damages arising out of bodily injury to, or death of, any person or persons and for all claims for damages arising out of injury to or destruction of property caused by accidents resulting from the use of implements, equipment or labor used in the performance of the AGREEMENT or from any neglect, default, omission or want of proper care or misconduct on the part of the Contractor or of any one in his employ during the execution of the work. Such insurance shall include coverage for blasting and explosion if explosives are to be used.

(b) The Contractor shall carry any other types of insurance as may be required elsewhere in the Contract Documents. All insurance policies required in the Contract Document shall be provided by companies satisfactory to the City.

(c) Prior to starting work under this AGREEMENT the Contractor shall deposit with the City's Purchasing Division certificates from the insurers to the effect that the insurance policies required in the above paragraphs have been issued to the Contractor. The certificates must be on a form satisfactory to the City.

(d) Unless greater amounts of insurance coverage are required elsewhere in the Contract Documents, the amounts of such public liability insurance shall not be less than the minimum amounts set forth below:

(i) Commercial General Liability \$1,000,000.00 per occurrence / \$ 2,000,000.00 aggregate.

(ii) Automotive Liability, for bodily injury & property damage combined single limit of, \$ 1,000,000.00 (all owned, hired and non-owned autos).

(iii) Excess / Umbrella Liability – Per Occurrence / Aggregate \$ 1,000,000 / \$ 1,000,000

(e) Unless greater amounts of insurance coverage are required elsewhere in the Contract Documents, the Contractor shall also carry bodily injury and property damage insurance in amounts not less than those set forth above covering the operation of all motor vehicles owned by the Contractor and engaged in this work.

(f) No cancellation of any insurance whether by the insurer or by insured shall be effective unless written notice thereof is given to the City at least fifteen days prior to the intended effective date thereof, which date has been expressed in the notice. Prior to the effective date of any such cancellation the Contractor shall take out new insurance to cover the policies so canceled. The Insurance Companies shall remain liable, however, until new and satisfactory insurance policies have been delivered to and accepted by the City.

CONFLICT OF INTEREST

(17) (a) The Contractor warrants that he has complied with all provisions of law regarding the award of this AGREEMENT and that he, or his employees, agents, officers, directors or trustees

have not offered or attempted to offer anything of value to any employee of the City in connection with this AGREEMENT.

(b) The Contractor further warrants that no elected official or employee of the City of Worcester, including unpaid members of the City boards and commissions, serves as an officer, director, trustee or employee of Contractor, and that no elected officials or employees of the City of Worcester have or will have a direct or indirect financial interest in this AGREEMENT.

(c) Violation of this Article shall be material breach of this AGREEMENT and shall be grounds for immediate termination of this AGREEMENT by the City without regard to any enforcement activities undertaken or completed by any enforcement agency.

(d) Termination of this AGREEMENT pursuant to this Article shall not waive any claims for damages that the City may have against the Contractor resulting from Contractor's violation of the terms of this Article.

SEVERABILITY:

(18) If any provision of this AGREEMENT is held invalid by any court or body of competent jurisdiction, the remainder of this AGREEMENT shall remain in full force and effect.

HEADINGS:

(19) The section headings in this AGREEMENT are for convenience and reference only and in no way define or limit the scope or content of this AGREEMENT or in any way affect its provisions.

AMENDMENTS:

(20) This AGREEMENT may be amended or modified only by written instrument duly executed by the parties.

ENTIRE AGREEMENT:

(21) This AGREEMENT contains the entire understanding of the parties and supersedes all prior agreements, representations, proposals and undertakings of the parties.

IN WITNESS WHEREOF, the Contractor has hereunto set his hand and seal, and the City has caused its corporate seal to be hereto affixed and this AGREEMENT to be executed in its name and behalf the day and year first above written.

CITY OF WORCESTER

(CONTRACTOR)

By: _____
Christopher J. Gagliastro
Purchasing Director

By: _____
(Seal)

APPROVED AS TO LEGAL FORM:

By: _____

CERTIFICATION OF FUNDING:

I certify that an appropriation of funds in the amount of this Agreement is contained in account number _____.

By: _____
Robert V. Stearns
City Auditor

APPROVED:

By: _____
Edward M. Augustus, Jr.
City Manager

ARTICLE 106: PAYMENT BOND

KNOW ALL BY THESE PRESENTS, that _____ a corporation duly established by law and having a usual place of business at _____ as PRINCIPAL, and, _____ a corporation organized under the laws of the (State/Commonwealth) of _____ and duly authorized and admitted, under the provisions of Chapter 175 of the Massachusetts General Laws as amended, to transact the business of a fidelity and surety company in Massachusetts, as SURETY, are held and firmly bound unto the City of Worcester, a municipal corporation within the Commonwealth of Massachusetts, in the sum of _____ lawful money of the United States of America, to be paid to the City of Worcester, its successors and assigns, to the payment of which, well and truly to be made, the PRINCIPAL and the SURETY bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the said PRINCIPAL has entered into an Agreement of even date herewith with the City of Worcester, said Agreement being for the _____ in the city of Worcester, Massachusetts;

NOW THEREFORE, the condition of this obligation is such that if the PRINCIPAL shall pay for all labor performed or furnished and for all materials used or employed or any appliance and equipment used or employed or rented or hired out in the execution of said Agreement and in any and all duly authorized modifications, alterations, extensions of time, changes or additions to said Agreement that may hereafter be made, notice to the SURETY of such modifications, alterations, extensions of time, changes or additions being hereby waived, the foregoing to include any other purposes or items set out in, and to be subject to, the provisions of Massachusetts General Laws, Chapter 149, Section 29 and Chapter 30, Section 39A as amended, then this obligation shall become null and void; otherwise it shall remain in full force and virtue.

IN TESTIMONY WHEREOF, the PRINCIPAL has hereunto caused its name and seal to be affixed, and the SURETY has caused its corporate seal to be hereunto affixed by a duly authorized officer thereof and this instrument to be executed and delivered in its name and behalf by its attorney-in-fact, duly authorized by its by-laws and votes, powers of attorney, and letters of appointment and authorization, certificated copies of which documents are annexed to this bond and may be introduced in evidence as if a part hereof.

(Principal)

(Seal)

By: _____

(Surety)

(Seal)

BY: _____
Attorney-in-Fact

ARTICLE 107: PERFORMANCE BOND

KNOW ALL BY THESE PRESENTS, that _____ a corporation duly established by law and having a usual place of business at as PRINCIPAL, and _____, a corporation duly established under the laws of the (**Commonwealth/State**) of _____ and duly authorized and admitted, under the provisions of Chapter 175 of the Massachusetts General Laws as amended, to transact the business of a fidelity and surety company in Massachusetts, as SURETY, are held and firmly bound unto the City of Worcester, a municipal corporation within the Commonwealth of Massachusetts, in the sum of _____ lawful money of the United States of America, to be paid to said City of Worcester, its successors and assigns, to the payment of which, well and truly to be made, the PRINCIPAL and said SURETY bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

Whereas the said PRINCIPAL has entered into an Agreement of even date hereof with the City of Worcester, said Agreement being for the _____ in the city of Worcester, Massachusetts;

NOW THEREFORE, the condition of this obligation is such that if the said PRINCIPAL shall well and faithfully perform all the terms and conditions of said Agreement on its part to be kept and performed as therein stipulated, including guarantee and maintenance provisions therein, and shall pay for all materials furnished and for all labor performed in the execution of said Agreement, and shall indemnify and save harmless the said City of Worcester as therein stipulated, then this obligation shall be of no effect; otherwise it shall remain in full force and virtue.

And the said SURETY, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of said Agreement, or to the work to be performed thereunder, or to the specifications accompanying the same, shall in any way effect its obligation on this bond; and it does hereby waive notice of any change, extension of time, alterations or additions to the terms of said Agreement, or to the work, or to the specifications.

In the event that the Agreement is abandoned by the Contractor, or is terminated by the City under the provisions thereof, said SURETY hereby further agrees that it shall, if requested in writing by the City, take such action as is necessary to complete said Agreement.

IN TESTIMONY WHEREOF, the PRINCIPAL has hereunto caused its name and seal to be affixed, and the said SURETY has caused its corporate seal to be hereunto affixed by a duly authorized officer thereof and this instrument to be executed and delivered in its name and behalf by its attorney-in-fact, duly authorized by its by-laws and votes, powers of attorney, and letters of appointment and authorization, certificated copies of which documents are annexed to this bond and may be introduced in evidence as if a part hereof.

(PRINCIPAL)

(SEAL)

By: _____

(SURETY)

(SEAL)

By: _____
Attorney-in-fact

ARTICLE 108 - APPLICATIONS FOR PAYMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, are hereby made a part of this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements governing the Contractor's Applications for Payment.

1. Coordinate the Schedule of Values and Applications for Payment with the Contractor's Construction Schedule, List of Subcontracts, and Submittal Schedule.

B. The Contractor's Construction Schedule and Submittal Schedule are included in Section "Submittals".

1.3 SCHEDULE OF VALUES

A. Coordinate preparation of the Schedule of Values with preparation of the Contractor's Construction Schedule.

1. Correlate line items in the Schedule of Values with other required administrative schedules and forms, including:

- a. Contractor's construction schedule.
- b. Application for Payment form.
- c. List of subcontractors.
- d. Schedule of allowances, if any.
- e. Schedule of alternates, if any.
- f. List products.
- g. List of principal suppliers and fabricators.
- h. Schedule of submittals.

2. Submit the Schedule of Values to the Architect at the earliest feasible date, but in no case later than seven (7) days before the date scheduled for submittal of the initial Application for Payment.

3. Sub-Schedules: Where the Work is separated into phases that require separately phased payments, provide sub-schedules showing values correlated with each phase of payment.

B. Format and Content: Use the Project Manual Table of Contents as a guide to establish the format for the Schedule of Values. Coordinate with the Clerk of the Works for exact breakdown of major categories of work.

1. Identification: Include the following Project identification on the Schedule of Values:

- a. Project name and location.
- b. Name of the Architect.
- c. Project number.
- d. Contractor's name and address.
- e. Date of submittal.

2. Arrange the Schedule of Values in a tabular form with separate columns to indicate the following for each item listed:

- a. Generic name.
- b. Related Specification Section.
- c. Name of subcontractor.
- d. Name of manufacturer or fabricator.
- e. Name of supplier.
- f. Change Orders (numbers) that have affected value.
- g. Dollar value to nearest dollar.
- h. Percentage of Contract Sum to the nearest percent, adjusted to total 100 percent

3. Provide a breakdown of the Contract Sum in sufficient detail to facilitate continued evaluation of Applications for Payment and progress reports. Break principal subcontract amounts down into several line items.

4. Round amounts off to the nearest whole dollar; the total shall equal the Contract Sum.

5. For each part of the Work where an Application for Payment may include materials or equipment, purchased or fabricated and stored, but not yet installed, provide separate line items on the Schedule of Values for initial cost of the materials, for each subsequent stage of completion, and for total installed value of that part of the Work.

6. Margins of Cost: Show line items for indirect costs, and margins on actual costs, only to the extent that such items will be listed individually in Applications for Payment. Each item in the Schedule of Values and Applications for Payment shall be complete including its total cost and proportionate share of general overhead and profit margin.

a. At the Contractor's option, temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown as separate line items in the Schedule of Values or distributed as general overhead expense.

7. Schedule Updating: Update and resubmit the Schedule of Values when Change Orders result in a change in the Contract Sum.

1.4 APPLICATIONS FOR PAYMENT:

A. Each Application for Payment shall be consistent with previous applications and payments as certified by the Architect and paid for by the Owner.

1. The initial Application for Payment, the Application for Payment at time of Substantial Completion, and the final Application for Payment involve additional requirements.

B. Payment Application Times: Each progress payment date is as indicated in the Agreement. The period of construction Work covered by each Application or Payment is the period indicated in the Agreement.

C. Payment Application Forms: Use AIA Document G 702 and Continuation Sheets G 703 as the form for Application for Payment. No exceptions will be made.

D. Application Preparation: Complete every entry on the form, including notarization and execution by person authorized to sign legal documents on behalf of the Contractor. Incomplete applications will be returned without action.

1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions have been made.

2. Include amounts of Change Orders issued prior to the last day of the construction period covered by the application.

E. Transmittal: Submit six (6) executed copies of each Application for Payment to the Architect by means ensuring receipt within twenty-four (24) hours; one (1) copy shall be complete, including proof of payments (see, 1.4F) and similar attachments, when required.

1. Transmit each copy with a transmittal form listing attachments, and recording appropriate information related to the application in a manner acceptable to the Architect.

2. With each requisition, after the first requisition, submit one (1) copy of up-dated as-built drawings for all underground and concealed work, showing locations, depths, or elevations.

F. Proof of Payments: With each Application for Payment, submit proof of payment to every subcontractor and supplier, at each tier, entitled to payment under the previous requisition and periodic payment made by the Owner to the Contractor on behalf of all such entities.

1. Submit partial waivers on each item for the amount requested, prior to deduction for retainage, on each item.

2. When an application shows completion of an item, submit final or full waivers or proof of payments.

3. Proof of Payment Delays: Submit each Application for Payment with the Contractor's proof of payment for the period of construction covered by the Application or it may be returned as incomplete.

- a. Submit final Application for Payment with or preceded by final proof of payment for every entity involved with performance of Work covered by the application who could lawfully be entitled to file for direct payment under M.G.L. c. 30, s. 39F, and/or against the Contractor's Labor and Materials Payment Bond.

4. Submit proof of payment in a manner acceptable to Owner.

G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of the first Application for Payment include the following:

1. List of subcontractors.
2. List of principal suppliers and fabricators.
3. Schedule of Values.
4. Contractor's Construction Schedule (preliminary, if not final).
5. Schedule of principal products.
6. Submittal Schedule (preliminary, if not final).
7. List of Contractor's staff assignments.
8. List of Contractor's principal consultants.
9. Copies of building permits.
10. Copies of authorizations and licenses from governing authorities for performance of the Work.
11. Initial progress report.
12. Report of pre-construction meeting.
13. Certificates of insurance and insurance policies.
14. Performance and payment bonds (if required).
15. Data needed to acquire Owner's insurance.
16. Initial settlement survey and damage report, if required.

H. Application for Payment at Substantial Completion: Following issuance of the Certificate of Substantial Completion, submit an Application for Payment; this application shall reflect any Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

I. Administrative actions and submittals that shall proceed or coincide with Application for Payment at Substantial Completion include:

1. Occupancy permits and similar approvals.
2. Warranties (guarantees) and maintenance agreements.
3. Test/adjust/balance records.
4. Maintenance instructions.
5. Meter readings.
6. Start-up performance reports.
7. Change over information related to Owner's occupancy, use, operation and maintenance.
8. Final cleaning.
9. Application for reduction of retainage, and consent of surety.
10. Advice on shifting insurance coverages.
11. Final progress photographs.
12. List of incomplete Work, recognized as exceptions to Architect's Certificate of Substantial Completion.

J. Final Payment Application: Administrative actions and submittals that must precede or coincide with submittal of the final payment Application for Payment include the following:

1. Completion of Project closeout requirements.
2. Completion of items specified for completion after Substantial Completion.
3. Assurance that unsettled claims will be settled.
4. Assurance that Work not complete and accepted will be completed without undue delay.
5. Transmittal of required Project construction records to Owner.
6. Certified property survey.
7. Proof that taxes, fees and similar obligations have been paid.
8. Removal of temporary facilities and services.
9. Removal of surplus materials, rubbish and similar elements.
10. Change of door locks to Owner's access.

ARTICLE 109 - MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, are hereby made a part of this Section.

1.2 SUMMARY

A. This section specifies administrative and procedural requirements for handling and processing Contract modifications.

B. Related Sections: The following sections contain requirements that relate to this section:

1. Division 1 Section "Submittals" for requirements for the Contractor's Construction Schedule.

2. Division 1 Section "Application for Payment" for administrative procedures governing applications for payment.

3. Division 1 Section "Product Substitutions" for administrative procedures for handling requests for substitutions made after award of the Contract.

1.3 MINOR CHANGES IN THE WORK

A. Supplemental instructions authorizing minor changes in the Work, not involving an adjustment to the Contract Sum or Contract Time, will be issued by the Architect.

1.4 CHANGE ORDER PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Proposed changes in the Work that will require adjustment to the Contract Sum or Contract Time will be issued by the Architect, with a detailed description of the proposed change and supplemental or revised Drawings and Specifications, if necessary.

1. Proposal requests issued by the Architect are for information only. Do not consider them an instruction either to stop work in progress, or to execute the proposed change.

2. Unless otherwise indicated in the proposal request, within twenty (20) days of receipt of the proposal request, submit to the Architect for the Owner's review an estimate of cost necessary to execute the proposed change.

a. Include a list of quantities of products to be purchased and unit costs, along with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities.

b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.

c. Include a statement indicating the effect the proposed change in the Work will have on the Contract Time.

B. Contractor-Initiated Change Order Proposal Requests: When latent or other unforeseen conditions require modifications to the Contract, the Contractor may propose changes by submitting a request for a change to the Architect.

1. Include a statement outlining the reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and/or the Contract Time.

2. Include a list of quantities of products to be purchased and unit costs along with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities.

3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.

4. Comply with requirements in Section "Product Substitutions" if the proposed change in the Work requires the substitution of one product or system for a product or system specified.

1.5 ALLOWANCES

A. Allowance Adjustment: Base each Change Order Proposal Request for an allowance cost adjustment solely on the difference between the actual purchase amount and the allowance, multiplied by the final measurement of work-in-place, with reasonable allowances, where applicable, for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.

1. Include installation costs in the purchase amount only where indicated as part of the allowance.
2. When requested, prepare explanations and documentation to substantiate the margins claimed.
3. The Owner reserves the right to establish the actual quantity of work-in-place by independent quantity survey, measure, or count.

B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit, within twenty (20) days of receipt of the change order authorizing work to proceed. Claims submitted later than twenty (20) days will be rejected.

1. The Change Order cost amount shall not include the Contractor's or Subcontractor's indirect expense except when it is clearly demonstrated that either the nature or scope of work required was changed from that which could have been foreseen from information in Contract Documents.
2. No change to the Contractor's indirect expense is permitted for selection of higher or lower priced materials or systems of the same scope and nature as originally indicated.

1.6 CHANGE ORDER PROCEDURES

A. Upon the Owner's approval of a Change Order Proposal Request, the Architect will issue a Change Order for signatures of the Owner and Contractor.

1.7 OVERHEAD AND PROFIT

- A. Overhead and Profit will be as noted elsewhere in these specifications.
- B. In reviewing change orders, the Architect will exercise his right to request a complete breakdown from the Contractor showing exact costs for labor and material, as well as delivery slips and invoices from suppliers and other subcontractors.

ARTICLE 110 - PRODUCT SUBSTITUTIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, are hereby made a part of this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for handling requests for substitutions made after award of the Contract.

B. The Contractor's Construction Schedule and the Schedule of Submittals are included under Section "Submittals".

C. Standards: Refer to Section "Reference Standards and Definitions" for applicability of industry standards to products specified.

D. Procedural requirements governing the Contractor's selection of products and product options are included under Section "Materials and Equipment".

1.3 DEFINITIONS

A. Definitions used in this Article are not intended to change or modify the meaning of other terms used in the Contract Documents.

B. Substitutions: Requests for changes in products, materials, equipment, and methods of construction required by Contract Documents proposed by the Contractor after award of the Contract are considered requests for "substitutions". The following are not considered substitutions:

1. Specified options of products and construction methods included in Contract Documents.

2. The Contractor's determination of and compliance with governing regulations and orders issued by governing authorities.

1.4 SUBMITTALS

A. Substitution Request Submittal: Requests for substitution will be considered if received within sixty (60) days after commencement of the Work. Requests received more than sixty (60) days after commencement of the Work may be considered or rejected at the discretion of the Architect.

1. Submit three (3) copies of each request for substitution for consideration. Submit requests in the form and in accordance with procedures required for Change Order proposals.
2. Identify the product, or the fabrication or installation method to be replaced in each request. Include related Specification Section and Drawing numbers. Provide complete documentation showing compliance with the requirements for substitutions, and the following information, as appropriate.
 - a. Product Data, including Drawings and descriptions of products, fabrication and installation procedures.
 - b. Samples, where applicable or requested.
 - c. A detailed comparison of significant qualities of the proposed substitution with those of the Work specified. Significant qualities may include elements such as size, weight, durability, performance and visual effect, i.e. color, texture, pattern, etc.
 - d. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by the Owner and separate Contractors, that will become necessary to accommodate the proposed substitution.
 - e. A statement indicating the substitution's effect on the Contractor's Construction Schedule compared to the schedule without approval of the substitution. Indicate the effect of the proposed substitution on overall Contract Time.

- f. Cost information, including a proposal of the net change, if any, in the Contract Sum.
 - g. Certification by the Contractor that the substitution proposed is equal to or better in every significant respect to that required by the Contract Documents, and that it will perform adequately in the application indicated. Include the Contractor's waiver of rights to additional payment or time, that may subsequently become necessary because of the failure of the substitution to perform adequately.
3. Architects' Action: Within one (1) week of receipt of the request for substitution, the Architect will request additional information or documentation necessary for evaluation of the request. Within two (2) weeks of receipt of the request, or one (1) week of receipt of the additional information or documentation, whichever is later, the Architect will notify the Contractor of acceptance or rejection of the proposed substitution. If a decision on use of a proposed substitute cannot be made or obtained within the time allocated, use the product specified by name. Acceptance will be in the form of a Change Order, when a change in contract cost or time is required; or in the form of Architect's supplemental instructions when no change to contract cost or time is required.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Conditions: The Contractor's substitution request will be received and considered by the Architect when one or more of the following conditions are satisfied, as determined by the Architect; otherwise requests will be returned without action except to record non-compliance with these requirements.

1. Extensive revisions to Contract Documents are not required.
2. Proposed changes are in keeping with the intent of Contract Documents.
3. The request is timely, fully documented and properly submitted.
4. The request is directly related to an "or equal" clause or similar language in the Contract Documents.
5. The specified product or method of construction cannot receive necessary approval by a governing authority, and the requested substitution can be approved.
6. The specified product or method of construction cannot be provided in a manner that is compatible with other materials, and where the Contractor certifies that the substitution will overcome the incompatibility.

7. The specified product or method of construction cannot be coordinated with other materials, and where the Contractor certifies that the proposed substitution can be coordinated.
 8. The specified product or method of construction cannot provide a warranty required by the Contract Documents and where the Contractor certifies that the proposed substitution provide the required warranty.
 9. Where a proposed substitution involves more than one prime Contractor, each Contractor shall cooperate with the other Contractors involved to coordinate the Work, provide uniformity and consistency, and to assure compatibility of products.
- B. The Contractor's submittal and Architect's acceptance of Shop Drawings, Product Data or Samples that relate to construction activities not complying with the Contract Documents does not constitute an acceptable or valid request for substitution, nor does it constitute approval.
-

PREVAILING WAGE RATES

&

CERTIFIED PAYROLL REPORTING

FORMS

NOTE: Successful bidder/contractor shall submit the required certified payroll reporting forms on a weekly basis *via email* to:

certifiedpayrollrecords@worcesterma.gov

**City of Worcester – Purchasing Division
City Hall – Room 201
455 Main Street
Worcester, MA 01608**

MASSACHUSETTS WEEKLY CERTIFIED PAYROLL REPORT FORM



Company's Name:		Address:				Phone No.:				Payroll No.:									
Employer's Signature:		Title:				Contract No:		Tax Payer ID Number		Work Week Ending:									
Awarding Authority's Name:		Public Works Project Name:				Public Works Project Location:				Min. Wage Rate Sheet Number									
General / Prime Contractor's Name:		Subcontractor's Name:						"Employer" Hourly Fringe Benefit Contributions											
				(B+C+D+E) (A x F)															
Employee Name & Complete Address	Work Classification:	Employee is OSHA 10 certified (?)	Appr. Rate (%)	Hours Worked								Project Hours (A) All Other Hours	Hourly Base Wage (B)	Health & Welfare Insurance (C)	ERISA Pension Plan (D)	Supp. Unemp. (E)	Total Hourly Prev. Wage (F)	Project Gross Wages	Check No. (H)
				Su.	Mo.	Tu.	We.	Th.	Fr.	Sa.	Total Gross Wages								

Are all apprentice employees identified above currently registered with the MA DLS's Division of Apprentice Standards? YES ☐ NO ☐

For all apprentices performing work during the reporting period, attach a copy of the apprentice identification card issued by the Massachusetts Department of Labor Standards / Division of Apprentice Standards. No apprentices are identified above ☐

NOTE: Pursuant to MGL c. 149, s. 27B, every contractor and subcontractor is required to submit a true and accurate copy of their certified weekly payroll records to the awarding authority by first-class mail or e-mail. In addition, each weekly payroll must be accompanied by a statement of compliance signed by the employer. Failure to comply may result in the commencement of a criminal action or the issuance of a civil citation.

Page _____ of _____

Date Received by Awarding Authority
/ /

CITY OF WORCESTER

Monthly Workforce Report

PROJECT NAME _____

Construction Manager: _____

Project: _____ Contract #: _____

Period Covered: _____ through _____

		GOAL - 38%		GOAL - 10%			
PROJECT-TO-DATE:		PEOPLE OF COLOR		FEMALE		MINORITY OWNED	WOMEN OWNED
Contractor/Sub-Contractor	Total Hours	PTD Hours	PTD Percentage	PTD Hours	PTD Percentage		
XX	600		0.0%		0.0%	YES / NO	YES / NO
						YES / NO	YES / NO
						YES / NO	YES / NO
						YES / NO	YES / NO
MONTHLY TOTAL:	600.0	0.00	0.0%	0.0	0.0%		

PROJECT NAME _____

Construction Manager: _____

Project: _____ Contract #: _____

Period Covered: _____ through _____

		GOAL - 38%		GOAL - 10%			
PROJECT-TO-DATE:		PEOPLE OF COLOR		FEMALE			
Trade	Total Hours	PTD Hours	PTD Percentage	PTD Hours	PTD Percentage		
Carpenter	600.0	0.0	0.0%	0.0	0.0%		
X							
X							
X							
X							
X							
MONTHLY TOTALS	600.0	0.0	0.0%	0.0	0.0%		

WEEKLY PAYROLL RECORDS REPORT & STATEMENT OF COMPLIANCE

In accordance with Massachusetts General Law c. 149, §27B, a true and accurate record must be kept of all persons employed on the public works project for which the enclosed rates have been provided. A Payroll Form has been printed on the reverse of this page and includes all the information required to be kept by law. Every contractor or subcontractor is required to keep these records and preserve them for a period of three years from the date of completion of the contract.

In addition, every contractor and subcontractor is required to submit a copy of their weekly payroll records to the awarding authority. For every week in which an apprentice is employed, a photocopy of the apprentice's identification card must be attached to the payroll report. Once collected, the awarding authority is also required to preserve those records for three years.

In addition, each such contractor, subcontractor, or public body shall furnish to the awarding authority directly, within fifteen days after completion of its portion of the work a statement, executed by the contractor, subcontractor or public body who supervises the payment of wages, in the following form:

STATEMENT OF COMPLIANCE

_____, 20____

I, _____, _____
(Name of signatory party) (Title)

do hereby state:

That I pay or supervise the payment of the persons employed by
_____ on the _____
(Contractor, subcontractor or public body) (Building or project)

and that all mechanics and apprentices, teamsters, chauffeurs and laborers employed on said project have been paid in accordance with wages determined under the provisions of sections twenty-six and twenty-seven of chapter one hundred and forty nine of the General Laws.

Signature _____

Title _____



CHARLES D. BAKER
Governor

KARYN E. POLITO
Lt. Governor

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF LABOR AND WORKFORCE DEVELOPMENT
DEPARTMENT OF LABOR STANDARDS

Prevailing Wage Rates

**As determined by the Director under the provisions of the
Massachusetts General Laws, Chapter 149, Sections 26 to 27H**

ROSALIN ACOSTA
Secretary

MICHAEL FLANAGAN
Director

Awarding Authority: City of Worcester Purchasing Division
Contract Number: 7869-W3 **City/Town:** WORCESTER
Description of Work: rehabilitation of sewer interceptor system in Cambridge street area including pipe lining, and structural cured in place pipe per plans and specifications
Job Location: Cambridge, Camp, McKeon Road

Information about Prevailing Wage Schedules for Awarding Authorities and Contractors

- **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 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, the 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. The annual update requirement is not applicable to 27F "rental of equipment" contracts. **The updated wage schedule must be provided to all contractors, including general and sub-contractors, working on the construction project.**
- 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 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 a sub-contractor.
- Apprentices working on the project are required to be registered with the Massachusetts Division of Apprentice Standards (DAS). Apprentices must keep their apprentice identification card on their persons 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 DAS regardless of whether they are registered with another federal, state, local, or private agency must be paid the journeyworker's rate.**
- Every contractor or subcontractor working on the construction project must 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. For a sample payroll reporting form go to <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.
- Contractors must obtain the wage schedules from awarding authorities. 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.
- Employees not receiving the prevailing wage rate set forth on the wage schedule may file a complaint with the Fair Labor Division of the office of the Attorney General at (617) 727-3465.

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Construction						
(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 2)</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>	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 & 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 WORKER (PIPES & TANKS) <i>HEAT & FROST INSULATORS LOCAL 6 (WORCESTER)</i>	12/01/2020	\$38.10	\$12.80	\$9.45	\$0.00	\$60.35
ASPHALT RAKER <i>LABORERS - ZONE 2</i>	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 & 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>	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>	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"						
BLOCK PAVER, RAMMER / CURB SETTER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	12/01/2021	\$36.16	\$9.10	\$16.64	\$0.00	\$61.90
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
BOILER MAKER <i>BOILERMAKERS LOCAL 29</i>	01/01/2020	\$46.10	\$7.07	\$17.98	\$0.00	\$71.15

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

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 (WORCESTER)</i>	02/01/2022	\$55.01	\$11.39	\$21.65	\$0.00	\$88.05

Apprentice - BRICK/PLASTER/CEMENT MASON - Local 3 Worcester

Effective Date - 02/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$27.51	\$11.39	\$21.65	\$0.00	\$60.55
2	60	\$33.01	\$11.39	\$21.65	\$0.00	\$66.05
3	70	\$38.51	\$11.39	\$21.65	\$0.00	\$71.55
4	80	\$44.01	\$11.39	\$21.65	\$0.00	\$77.05
5	90	\$49.51	\$11.39	\$21.65	\$0.00	\$82.55

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

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

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

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"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CARBIDE CORE DRILL OPERATOR <i>LABORERS - ZONE 2</i>	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						

Classification

Effective Date

Base Wage

Health

Pension

Supplemental
Unemployment

Total Rate

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

01/01/2020

\$47.14

\$12.75

\$22.41

\$0.62

\$82.92

BRICKLAYERS LOCAL 3 (WORCESTER)

Apprentice - CEMENT MASONRY/PLASTERING - Worcester**Effective Date - 01/01/2020**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.57	\$12.75	\$15.41	\$0.00	\$51.73
2	60	\$28.28	\$12.75	\$17.41	\$0.62	\$59.06
3	65	\$30.64	\$12.75	\$18.41	\$0.62	\$62.42
4	70	\$33.00	\$12.75	\$19.41	\$0.62	\$65.78
5	75	\$35.36	\$12.75	\$20.41	\$0.62	\$69.14
6	80	\$37.71	\$12.75	\$21.41	\$0.62	\$72.49
7	90	\$42.43	\$12.75	\$22.41	\$0.62	\$78.21

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>	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>	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

Apprentice - PAINTER Local 35 - BRIDGES/TANKS

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

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$28.03	\$8.65	\$0.00	\$0.00	\$36.68
2	55	\$30.83	\$8.65	\$6.27	\$0.00	\$45.75
3	60	\$33.64	\$8.65	\$6.84	\$0.00	\$49.13
4	65	\$36.44	\$8.65	\$7.41	\$0.00	\$52.50
5	70	\$39.24	\$8.65	\$19.63	\$0.00	\$67.52
6	75	\$42.05	\$8.65	\$20.20	\$0.00	\$70.90
7	80	\$44.85	\$8.65	\$20.77	\$0.00	\$74.27
8	90	\$50.45	\$8.65	\$21.91	\$0.00	\$81.01

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
DEMO: ADZEMAN <i>LABORERS - ZONE 2</i>	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 <i>LABORERS - ZONE 2</i>	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 <i>LABORERS - ZONE 2</i>	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: CONCRETE CUTTER/SAWYER <i>LABORERS - ZONE 2</i>	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>	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>	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 2)</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 2)</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 2)</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 2)</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 96</i>	09/05/2021	\$45.01	\$11.57	\$17.42	\$0.00	\$74.00
	09/04/2022	\$45.59	\$12.20	\$17.50	\$0.00	\$75.29

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - ELECTRICIAN - Local 96

Effective Date - 09/05/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$18.00	\$11.57	\$0.54	\$0.00	\$30.11
2	43	\$19.35	\$11.57	\$0.58	\$0.00	\$31.50
3	48	\$21.60	\$11.57	\$14.15	\$0.00	\$47.32
4	55	\$24.76	\$11.57	\$14.58	\$0.00	\$50.91
5	65	\$29.26	\$11.57	\$15.22	\$0.00	\$56.05
6	80	\$36.01	\$11.57	\$16.16	\$0.00	\$63.74

Effective Date - 09/04/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$18.24	\$12.20	\$0.55	\$0.00	\$30.99
2	43	\$19.60	\$12.20	\$0.59	\$0.00	\$32.39
3	48	\$21.88	\$12.20	\$14.18	\$0.00	\$48.26
4	55	\$25.07	\$12.20	\$14.63	\$0.00	\$51.90
5	65	\$29.63	\$12.20	\$15.27	\$0.00	\$57.10
6	80	\$36.47	\$12.20	\$16.22	\$0.00	\$64.89

Notes:

Steps 1-2 are 1000 hrs; Steps 3-6 are 1500 hrs.

Apprentice to Journeyworker Ratio:2:3***

ELEVATOR CONSTRUCTOR	01/01/2022	\$58.62	\$16.03	\$20.21	\$0.00	\$94.86
ELEVATOR CONSTRUCTORS LOCAL 41						

Apprentice - ELEVATOR CONSTRUCTOR - Local 41

Effective Date - 01/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$29.31	\$16.03	\$0.00	\$0.00	\$45.34
2	55	\$32.24	\$16.03	\$20.21	\$0.00	\$68.48
3	65	\$38.10	\$16.03	\$20.21	\$0.00	\$74.34
4	70	\$41.03	\$16.03	\$20.21	\$0.00	\$77.27
5	80	\$46.90	\$16.03	\$20.21	\$0.00	\$83.14

Notes:

Steps 1-2 are 6 mos.; Steps 3-5 are 1 year

Apprentice to Journeyworker Ratio:1:1

ELEVATOR CONSTRUCTOR HELPER	01/01/2022	\$41.03	\$16.03	\$20.21	\$0.00	\$77.27
ELEVATOR CONSTRUCTORS LOCAL 41						

For apprentice rates see "Apprentice - ELEVATOR CONSTRUCTOR"

FENCE & GUARD RAIL ERECTOR (HEAVY & HIGHWAY)	12/01/2021	\$35.66	\$9.10	\$16.64	\$0.00	\$61.40
LABORERS - ZONE 2 (HEAVY & HIGHWAY)						

For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
FIELD ENG.INST.PERSON-BLDG,SITE,HVY/HWY <i>OPERATING ENGINEERS LOCAL 4</i>	05/01/2022	\$47.18	\$14.00	\$16.05	\$0.00	\$77.23
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIELD ENG.PARTY CHIEF-BLDG,SITE,HVY/HWY <i>OPERATING ENGINEERS LOCAL 4</i>	05/01/2022	\$48.72	\$14.00	\$16.05	\$0.00	\$78.77
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIELD ENG.ROD PERSON-BLDG,SITE,HVY/HWY <i>OPERATING ENGINEERS LOCAL 4</i>	05/01/2022	\$23.33	\$14.00	\$16.05	\$0.00	\$53.38
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIRE ALARM INSTALLER <i>ELECTRICIANS LOCAL 96</i>	09/05/2021	\$45.01	\$11.57	\$17.42	\$0.00	\$74.00
For apprentice rates see "Apprentice- ELECTRICIAN"						
FIRE ALARM REPAIR / MAINT/COMMISSIONING <i>ELECTRICIANS LOCAL 96</i>	09/05/2021	\$45.01	\$11.57	\$17.42	\$0.00	\$74.00
For apprentice rates see "Apprentice- ELECTRICIAN"						
FIREMAN (ASST. ENGINEER) <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2021	\$41.76	\$14.00	\$16.05	\$0.00	\$71.81
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FLAGGER & SIGNALER (HEAVY & HIGHWAY) <i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>	12/01/2021	\$24.50	\$9.10	\$16.64	\$0.00	\$50.24
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
FLOORCOVERER <i>FLOORCOVERERS LOCAL 2168 ZONE II</i>	03/01/2022	\$47.62	\$8.68	\$20.27	\$0.00	\$76.57

Apprentice - FLOORCOVERER - Local 2168 Zone II

Effective Date - 03/01/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.81	\$8.68	\$1.79	\$0.00	\$34.28
2	55	\$26.19	\$8.68	\$1.79	\$0.00	\$36.66
3	60	\$28.57	\$8.68	\$14.90	\$0.00	\$52.15
4	65	\$30.95	\$8.68	\$14.90	\$0.00	\$54.53
5	70	\$33.33	\$8.68	\$16.69	\$0.00	\$58.70
6	75	\$35.72	\$8.68	\$16.69	\$0.00	\$61.09
7	80	\$38.10	\$8.68	\$18.48	\$0.00	\$65.26
8	85	\$40.48	\$8.68	\$18.48	\$0.00	\$67.64

Notes: Steps are 750 hrs.
% After 10/1/17; 45/45/55/55/70/70/80/80 (1500hr Steps)
Step 1&2 \$31.90/ 3&4 \$38.39/ 5&6 \$58.70/ 7&8 \$65.26

Apprentice to Journeyworker Ratio:1:1

FORK LIFT/CHERRY PICKER <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"						
GENERATOR/LIGHTING PLANT/HEATERS <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"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS) <i>GLAZIERS LOCAL 35 (ZONE 2)</i>	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 - 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

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$22.78	\$8.65	\$0.00	\$0.00	\$31.43
2	55	\$25.06	\$8.65	\$6.27	\$0.00	\$39.98
3	60	\$27.34	\$8.65	\$6.84	\$0.00	\$42.83
4	65	\$29.61	\$8.65	\$7.41	\$0.00	\$45.67
5	70	\$31.89	\$8.65	\$19.63	\$0.00	\$60.17
6	75	\$34.17	\$8.65	\$20.20	\$0.00	\$63.02
7	80	\$36.45	\$8.65	\$20.77	\$0.00	\$65.87
8	90	\$41.00	\$8.65	\$21.91	\$0.00	\$71.56

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

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:							
Apprentice to Journeyworker Ratio:1:6							
HVAC (DUCTWORK)		01/01/2022	\$39.29	\$10.64	\$17.33	\$2.02	\$69.28
SHEETMETAL WORKERS LOCAL 63							
For apprentice rates see "Apprentice- SHEET METAL WORKER"							
HVAC (ELECTRICAL CONTROLS)		09/05/2021	\$45.01	\$11.57	\$17.42	\$0.00	\$74.00
ELECTRICIANS LOCAL 96		09/04/2022	\$45.59	\$12.20	\$17.50	\$0.00	\$75.29
For apprentice rates see "Apprentice- ELECTRICIAN"							
HVAC (TESTING AND BALANCING - AIR)		01/01/2022	\$39.29	\$10.64	\$17.33	\$2.02	\$69.28
SHEETMETAL WORKERS LOCAL 63							
For apprentice rates see "Apprentice- SHEET METAL WORKER"							
HVAC (TESTING AND BALANCING -WATER)		03/01/2022	\$49.50	\$9.80	\$16.12	\$0.00	\$75.42
PLUMBERS LOCAL 4							
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"							
HVAC MECHANIC		03/01/2022	\$49.50	\$9.80	\$16.12	\$0.00	\$75.42
PLUMBERS LOCAL 4							
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"							
HYDRAULIC DRILLS		06/01/2022	\$37.06	\$9.10	\$16.64	\$0.00	\$62.80
LABORERS - ZONE 2		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)		12/01/2021	\$36.16	\$9.10	\$16.64	\$0.00	\$61.90
LABORERS - ZONE 2 (HEAVY & HIGHWAY)							
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"							
INSULATOR (PIPES & TANKS)		09/01/2021	\$46.50	\$13.80	\$17.14	\$0.00	\$77.44
HEAT & FROST INSULATORS LOCAL 6 (WORCESTER)		09/01/2022	\$48.95	\$13.80	\$17.14	\$0.00	\$79.89

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate	
Apprentice - ASBESTOS INSULATOR (Pipes & Tanks) - Local 6 Worcester							
Effective Date - 09/01/2021							
Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate	
1	50	\$23.25	\$13.80	\$12.42	\$0.00	\$49.47	
2	60	\$27.90	\$13.80	\$13.36	\$0.00	\$55.06	
3	70	\$32.55	\$13.80	\$14.31	\$0.00	\$60.66	
4	80	\$37.20	\$13.80	\$15.25	\$0.00	\$66.25	
Effective Date - 09/01/2022							
Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate	
1	50	\$24.48	\$13.80	\$12.42	\$0.00	\$50.70	
2	60	\$29.37	\$13.80	\$13.36	\$0.00	\$56.53	
3	70	\$34.27	\$13.80	\$14.31	\$0.00	\$62.38	
4	80	\$39.16	\$13.80	\$15.25	\$0.00	\$68.21	
Notes:							
Steps are 1 year							
Apprentice to Journeyworker Ratio:1:4							
IRONWORKER/WELDER		03/16/2022	\$50.30	\$8.20	\$26.50	\$0.00	\$85.00
IRONWORKERS LOCAL 7 (WORCESTER AREA)							
Apprentice - IRONWORKER - Local 7 Worcester							
Effective Date - 03/16/2022							
Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate	
1	60	\$30.18	\$8.20	\$26.50	\$0.00	\$64.88	
2	70	\$35.21	\$8.20	\$26.50	\$0.00	\$69.91	
3	75	\$37.73	\$8.20	\$26.50	\$0.00	\$72.43	
4	80	\$40.24	\$8.20	\$26.50	\$0.00	\$74.94	
5	85	\$42.76	\$8.20	\$26.50	\$0.00	\$77.46	
6	90	\$45.27	\$8.20	\$26.50	\$0.00	\$79.97	
Notes:							
Structural 1:6; Ornamental 1:4							
Apprentice to Journeyworker Ratio:							
JACKHAMMER & PAVING BREAKER OPERATOR		06/01/2022	\$36.56	\$9.10	\$16.64	\$0.00	\$62.30
LABORERS - ZONE 2		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		06/01/2022	\$36.31	\$9.10	\$16.64	\$0.00	\$62.05
LABORERS - ZONE 2		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
Issue Date: 08/04/2022							
Wage Request Number:		20220803-053		Page 12 of 28			

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Apprentice - LABORER - Zone 2						
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
Effective Date - 12/01/2022						
Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$22.30	\$9.10	\$16.64	\$0.00	\$48.04
2	70	\$26.01	\$9.10	\$16.64	\$0.00	\$51.75
3	80	\$29.73	\$9.10	\$16.64	\$0.00	\$55.47
4	90	\$33.44	\$9.10	\$16.64	\$0.00	\$59.18
Notes:						
Apprentice to Journeyworker Ratio:1:5						
LABORER (HEAVY & HIGHWAY)	12/01/2021	\$35.41	\$9.10	\$16.64	\$0.00	\$61.15
LABORERS - ZONE 2 (HEAVY & HIGHWAY)						

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	06/01/2022	\$36.31	\$9.10	\$16.64	\$0.00	\$62.05
LABORERS - ZONE 2						
	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: CEMENT FINISHER TENDER	06/01/2022	\$36.31	\$9.10	\$16.64	\$0.00	\$62.05
LABORERS - ZONE 2						
	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: HAZARDOUS WASTE/ASBESTOS REMOVER <i>LABORERS - ZONE 2</i>	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>	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 & 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>	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>	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>	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 & 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 & TILE</i>	02/01/2022	\$43.69	\$11.39	\$20.37	\$0.00	\$75.45

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

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
MARBLE MASONS,TILELAYERS & TERRAZZO MECH <i>BRICKLAYERS LOCAL 3 - MARBLE & TILE</i>	02/01/2022	\$57.17	\$11.39	\$22.31	\$0.00	\$90.87

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) <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"

MECHANICS MAINTENANCE <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"

MILLWRIGHT (Zone 3) <i>MILLWRIGHTS LOCAL 1121 - Zone 3</i>	01/03/2022	\$38.91	\$8.58	\$21.57	\$0.00	\$69.06
	01/02/2023	\$40.16	\$8.58	\$21.57	\$0.00	\$70.31

Apprentice - MILLWRIGHT - Local 1121 Zone 3

Effective Date - 01/03/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$21.40	\$8.58	\$5.72	\$0.00	\$35.70
2	65	\$25.29	\$8.58	\$17.93	\$0.00	\$51.80
3	75	\$29.18	\$8.58	\$18.98	\$0.00	\$56.74
4	85	\$33.07	\$8.58	\$20.01	\$0.00	\$61.66

Effective Date - 01/02/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$22.09	\$8.58	\$5.72	\$0.00	\$36.39
2	65	\$26.10	\$8.58	\$17.93	\$0.00	\$52.61
3	75	\$30.12	\$8.58	\$18.98	\$0.00	\$57.68
4	85	\$34.14	\$8.58	\$20.01	\$0.00	\$62.73

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

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
MORTAR MIXER <i>LABORERS - ZONE 2</i>	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) <i>OPERATING ENGINEERS LOCAL 4</i>	12/01/2021	\$23.48	\$14.00	\$16.05	\$0.00	\$53.53
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
OILER (TRUCK CRANES, GRADALLS) <i>OPERATING ENGINEERS LOCAL 4</i>	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 <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"						
PAINTER (BRIDGES/TANKS) <i>PAINTERS LOCAL 35 - ZONE 2</i>	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

Apprentice - PAINTER Local 35 - BRIDGES/TANKS**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

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$28.03	\$8.65	\$0.00	\$0.00	\$36.68
2	55	\$30.83	\$8.65	\$6.27	\$0.00	\$45.75
3	60	\$33.64	\$8.65	\$6.84	\$0.00	\$49.13
4	65	\$36.44	\$8.65	\$7.41	\$0.00	\$52.50
5	70	\$39.24	\$8.65	\$19.63	\$0.00	\$67.52
6	75	\$42.05	\$8.65	\$20.20	\$0.00	\$70.90
7	80	\$44.85	\$8.65	\$20.77	\$0.00	\$74.27
8	90	\$50.45	\$8.65	\$21.91	\$0.00	\$81.01

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, NEW) *

* If 30% or more of surfaces to be painted are new construction,
NEW paint rate shall be used. PAINTERS LOCAL 35 - ZONE 2

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

Classification

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

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

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

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.48	\$8.65	\$0.00	\$0.00	\$32.13
2	55	\$25.83	\$8.65	\$6.27	\$0.00	\$40.75
3	60	\$28.18	\$8.65	\$6.84	\$0.00	\$43.67
4	65	\$30.52	\$8.65	\$7.41	\$0.00	\$46.58
5	70	\$32.87	\$8.65	\$19.63	\$0.00	\$61.15
6	75	\$35.22	\$8.65	\$20.20	\$0.00	\$64.07
7	80	\$37.57	\$8.65	\$20.77	\$0.00	\$66.99
8	90	\$42.26	\$8.65	\$21.91	\$0.00	\$72.82

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, REPAINT)	07/01/2022	\$43.82	\$8.65	\$23.05	\$0.00	\$75.52
PAINTERS LOCAL 35 - ZONE 2	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

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

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

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

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$22.51	\$8.65	\$0.00	\$0.00	\$31.16
2	55	\$24.76	\$8.65	\$6.27	\$0.00	\$39.68
3	60	\$27.01	\$8.65	\$6.84	\$0.00	\$42.50
4	65	\$29.26	\$8.65	\$7.41	\$0.00	\$45.32
5	70	\$31.51	\$8.65	\$19.63	\$0.00	\$59.79
6	75	\$33.77	\$8.65	\$20.20	\$0.00	\$62.62
7	80	\$36.02	\$8.65	\$20.77	\$0.00	\$65.44
8	90	\$40.52	\$8.65	\$21.91	\$0.00	\$71.08

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, NEW) *	07/01/2022	\$44.36	\$8.65	\$23.05	\$0.00	\$76.06
* If 30% or more of surfaces to be painted are new construction, NEW paint rate shall be used. <i>PAINTERS LOCAL 35 - ZONE 2</i>	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 - PAINTER - Local 35 Zone 2 - BRUSH NEW**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

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$22.78	\$8.65	\$0.00	\$0.00	\$31.43
2	55	\$25.06	\$8.65	\$6.27	\$0.00	\$39.98
3	60	\$27.34	\$8.65	\$6.84	\$0.00	\$42.83
4	65	\$29.61	\$8.65	\$7.41	\$0.00	\$45.67
5	70	\$31.89	\$8.65	\$19.63	\$0.00	\$60.17
6	75	\$34.17	\$8.65	\$20.20	\$0.00	\$63.02
7	80	\$36.45	\$8.65	\$20.77	\$0.00	\$65.87
8	90	\$41.00	\$8.65	\$21.91	\$0.00	\$71.56

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, REPAINT)

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 - 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

Effective Date - 01/01/2023

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$21.81	\$8.65	\$0.00	\$0.00	\$30.46
2	55	\$23.99	\$8.65	\$6.27	\$0.00	\$38.91
3	60	\$26.17	\$8.65	\$6.84	\$0.00	\$41.66
4	65	\$28.35	\$8.65	\$7.41	\$0.00	\$44.41
5	70	\$30.53	\$8.65	\$19.63	\$0.00	\$58.81
6	75	\$32.72	\$8.65	\$20.20	\$0.00	\$61.57
7	80	\$34.90	\$8.65	\$20.77	\$0.00	\$64.32
8	90	\$39.26	\$8.65	\$21.91	\$0.00	\$69.82

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
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
PIER AND DOCK CONSTRUCTOR (UNDERPINNING AND DECK) PILE DRIVER LOCAL 56 (ZONE 2)	08/01/2020	\$46.11	\$9.40	\$23.12	\$0.00	\$78.63
For apprentice rates see "Apprentice- PILE DRIVER"						
PILE DRIVER PILE DRIVER LOCAL 56 (ZONE 2)	08/01/2020	\$46.11	\$9.40	\$23.12	\$0.00	\$78.63

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Apprentice - PILE DRIVER - Local 56 Zone 2						
Effective Date - 08/01/2020						
Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	0	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Notes: Apprentice wages shall be no less than the following Steps; (Same as set in Zone 1) 1\$57.06/2\$61.96/3\$66.87/4\$69.32/5\$71.78/6\$71.78/7\$76.68/8\$76.68						
Apprentice to Journeyworker Ratio:1:5						
PIPELAYER						
<i>LABORERS - ZONE 2</i>						
		06/01/2022	\$36.56	\$9.10	\$16.64	\$62.30
		12/01/2022	\$37.41	\$9.10	\$16.64	\$63.15
		06/01/2023	\$38.31	\$9.10	\$16.64	\$64.05
		12/01/2023	\$39.21	\$9.10	\$16.64	\$64.95
For apprentice rates see "Apprentice- LABORER"						
PIPELAYER (HEAVY & HIGHWAY)						
<i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>						
		12/01/2021	\$35.66	\$9.10	\$16.64	\$61.40
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						
PLUMBER & PIPEFITTER						
<i>PLUMBERS LOCAL 4</i>						
		03/01/2022	\$49.50	\$9.80	\$16.62	\$75.92
Apprentice - PLUMBER/PIPEFITTER - Local 4						
Effective Date - 03/01/2022						
Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$19.80	\$9.80	\$0.00	\$0.00	\$29.60
2	50	\$24.75	\$9.80	\$0.00	\$0.00	\$34.55
3	60	\$29.70	\$9.80	\$0.00	\$0.00	\$39.50
4	70	\$34.65	\$9.80	\$6.41	\$0.00	\$50.86
5	80	\$39.60	\$9.80	\$6.41	\$0.00	\$55.81
Notes: Steps - 2000 hrs; Step 4 w/lic 75%, Step 5 w/lic 85% Step 4 w/lic \$52.59, Step 5 w/lic \$57.44						
Apprentice to Journeyworker Ratio:1:3						
PNEUMATIC CONTROLS (TEMP.)						
<i>PLUMBERS LOCAL 4</i>						
		03/01/2022	\$49.50	\$9.80	\$16.12	\$75.42
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
PNEUMATIC DRILL/TOOL OPERATOR						
<i>LABORERS - ZONE 2</i>						
		06/01/2022	\$36.56	\$9.10	\$16.64	\$62.30
		12/01/2022	\$37.41	\$9.10	\$16.64	\$63.15
		06/01/2023	\$38.31	\$9.10	\$16.64	\$64.05
		12/01/2023	\$39.21	\$9.10	\$16.64	\$64.95
For apprentice rates see "Apprentice- LABORER"						
PNEUMATIC DRILL/TOOL OPERATOR (HEAVY & HIGHWAY)						
<i>LABORERS - ZONE 2 (HEAVY & HIGHWAY)</i>						
		12/01/2021	\$35.66	\$9.10	\$16.64	\$61.40
For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
POWDERMAN & BLASTER <i>LABORERS - ZONE 2</i>	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 & 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 170 - Dauphinis (Bellingham)</i>	01/01/2022	\$25.75	\$9.76	\$4.00	\$0.00	\$39.51
	12/01/2022	\$26.40	\$10.26	\$4.75	\$0.00	\$41.41
	01/01/2023	\$26.40	\$10.26	\$4.75	\$0.00	\$41.41
	12/01/2023	\$27.00	\$10.76	\$5.45	\$0.00	\$43.21
	01/01/2024	\$27.00	\$10.76	\$5.45	\$0.00	\$43.21
	12/01/2024	\$27.60	\$11.26	\$6.15	\$0.00	\$45.01
	01/01/2025	\$27.60	\$11.26	\$6.15	\$0.00	\$45.01
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>	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.Roofer Waterproofing &Roofer 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
For apprentice rates see "Apprentice- ROOFER"						
SHEETMETAL WORKER SHEETMETAL WORKERS LOCAL 63	01/01/2022	\$39.29	\$10.64	\$17.33	\$2.02	\$69.28
Apprentice - SHEET METAL WORKER - Local 63						
Effective Date - 01/01/2022						
Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	\$17.68	\$4.79	\$4.67	\$0.81	\$27.95
2	50	\$19.65	\$5.32	\$5.19	\$0.90	\$31.06
3	55	\$21.61	\$5.85	\$9.33	\$1.10	\$37.89
4	60	\$23.57	\$6.38	\$9.33	\$1.18	\$40.46
5	65	\$25.54	\$6.92	\$9.33	\$1.25	\$43.04
6	70	\$27.50	\$7.45	\$9.33	\$1.33	\$45.61
7	75	\$29.47	\$7.98	\$9.33	\$1.40	\$48.18
8	80	\$31.43	\$8.51	\$16.29	\$1.69	\$57.92
9	85	\$33.40	\$9.04	\$16.29	\$1.76	\$60.49
10	90	\$35.36	\$9.58	\$16.29	\$1.84	\$63.07
Notes:						
Apprentice to Journeyworker Ratio:1:3						
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
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
SPRINKLER FITTER SPRINKLER FITTERS LOCAL 669	04/01/2021	\$43.14	\$10.55	\$16.41	\$0.00	\$70.10

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Apprentice - SPRINKLER FITTER - Local 669

Effective Date - 04/01/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	45	\$19.41	\$7.75	\$0.00	\$0.00	\$27.16
2	50	\$21.57	\$7.75	\$0.00	\$0.00	\$29.32
3	55	\$23.73	\$10.55	\$8.15	\$0.00	\$42.43
4	60	\$25.88	\$10.55	\$8.15	\$0.00	\$44.58
5	65	\$28.04	\$10.55	\$8.40	\$0.00	\$46.99
6	70	\$30.20	\$10.55	\$8.40	\$0.00	\$49.15
7	75	\$32.36	\$10.55	\$8.40	\$0.00	\$51.31
8	80	\$34.51	\$10.55	\$8.40	\$0.00	\$53.46
9	85	\$36.67	\$10.55	\$8.40	\$0.00	\$55.62
10	90	\$38.83	\$10.55	\$8.40	\$0.00	\$57.78

Notes:

Apprentice to Journeyworker Ratio:1:1

STEAM BOILER 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"						
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
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
TERRAZZO FINISHERS <i>BRICKLAYERS LOCAL 3 - MARBLE & TILE</i>	02/01/2022	\$56.09	\$11.39	\$22.34	\$0.00	\$89.82

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
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
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TEST BORING LABORER <i>LABORERS - FOUNDATION AND MARINE</i> For apprentice rates see "Apprentice- LABORER"	12/01/2021	\$41.18	\$9.10	\$17.72	\$0.00	\$68.00
TRACTORS/PORTABLE STEAM GENERATORS <i>OPERATING ENGINEERS LOCAL 4</i> For apprentice rates see "Apprentice- OPERATING ENGINEERS"	12/01/2021	\$50.83	\$14.00	\$16.05	\$0.00	\$80.88
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
TUNNEL WORK - COMPRESSED AIR <i>LABORERS (COMPRESSED AIR)</i> For apprentice rates see "Apprentice- LABORER"	12/01/2021	\$53.41	\$9.10	\$18.17	\$0.00	\$80.68
TUNNEL WORK - COMPRESSED AIR (HAZ. WASTE) <i>LABORERS (COMPRESSED AIR)</i> For apprentice rates see "Apprentice- LABORER"	12/01/2021	\$55.41	\$9.10	\$18.17	\$0.00	\$82.68
TUNNEL WORK - FREE AIR <i>LABORERS (FREE AIR TUNNEL)</i> For apprentice rates see "Apprentice- LABORER"	12/01/2021	\$45.48	\$9.10	\$18.17	\$0.00	\$72.75
TUNNEL WORK - FREE AIR (HAZ. WASTE) <i>LABORERS (FREE AIR TUNNEL)</i> For apprentice rates see "Apprentice- LABORER"	12/01/2021	\$47.48	\$9.10	\$18.17	\$0.00	\$74.75
VAC-HAUL <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	12/01/2021	\$36.24	\$13.41	\$16.01	\$0.00	\$65.66
VOICE-DATA-VIDEO TECHNICIAN <i>ELECTRICIANS LOCAL 96</i>	09/05/2021	\$32.86	\$11.57	\$15.72	\$0.00	\$60.15
	09/04/2022	\$34.19	\$12.20	\$15.91	\$0.00	\$62.30

Apprentice - VOICE-DATA-VIDEO TECHNICIAN - Local 96

Effective Date - 09/05/2021

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$16.43	\$11.57	\$4.10	\$0.00	\$32.10
2	55	\$18.07	\$11.57	\$4.15	\$0.00	\$33.79
3	60	\$19.72	\$11.57	\$15.32	\$0.00	\$46.61
4	65	\$21.36	\$11.57	\$15.37	\$0.00	\$48.30
5	70	\$23.00	\$11.57	\$15.42	\$0.00	\$49.99
6	75	\$24.65	\$11.57	\$15.47	\$0.00	\$51.69
7	80	\$26.29	\$11.57	\$15.52	\$0.00	\$53.38
8	85	\$27.93	\$11.57	\$15.57	\$0.00	\$55.07

Effective Date - 09/04/2022

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$17.10	\$12.20	\$4.27	\$0.00	\$33.57
2	55	\$18.80	\$12.20	\$4.32	\$0.00	\$35.32
3	60	\$20.51	\$12.20	\$15.50	\$0.00	\$48.21
4	65	\$22.22	\$12.20	\$15.55	\$0.00	\$49.97
5	70	\$23.93	\$12.20	\$15.60	\$0.00	\$51.73
6	75	\$25.64	\$12.20	\$15.65	\$0.00	\$53.49
7	80	\$27.35	\$12.20	\$15.70	\$0.00	\$55.25
8	85	\$29.06	\$12.20	\$15.75	\$0.00	\$57.01

Notes:

Apprentice to Journeyworker Ratio:1:1

WAGON DRILL OPERATOR	06/01/2022	\$36.56	\$9.10	\$16.64	\$0.00	\$62.30
LABORERS - ZONE 2	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)	12/01/2021	\$35.66	\$9.10	\$16.64	\$0.00	\$61.40
LABORERS - ZONE 2 (HEAVY & HIGHWAY)						

For apprentice rates see "Apprentice- LABORER (Heavy and Highway)"

WASTE WATER PUMP OPERATOR	12/01/2021	\$51.38	\$14.00	\$16.05	\$0.00	\$81.43
OPERATING ENGINEERS LOCAL 4						

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

WATER METER INSTALLER	03/01/2022	\$49.50	\$9.80	\$16.12	\$0.00	\$75.42
PLUMBERS LOCAL 4						

For apprentice rates see "Apprentice- PLUMBER/PIPEFITTER" or "PLUMBER/GASFITTER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate

Additional Apprentices 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.

**MINORITY/WOMEN BUSINESS ENTERPRISE and WORKER UTILIZATION
PROGRAM**

**BIDDERS MUST COMPLETE AND SUBMIT FORM E00-101
WHICH IS PART OF THE BID SUBMISSION**

INCLUDED IN THIS SECTION ARE COPIES OF THE AGREEMENT BETWEEN THE CITY AND THE MASSACHUSETTS COMMISSION AGAINST DISCRIMINATION WHICH GOVERN THE ACTIVITIES ADDRESSED BY THE E00-101 FORM.

Direct any questions about these forms and procedures to:

**Purchasing Division
City Hall – Room 201
455 Main Street
Worcester, MA 01608
(508) 799-1220
purchasing@worcesterma.gov**

CITY OF WORCESTER

**MINORITY/WOMEN BUSINESS ENTERPRISE AND WORKER UTILIZATION
PROGRAM**

AFFIDAVIT OF ACKNOWLEDGEMENT and CERTIFICATE OF COMPLIANCE

Form E00-101

TO ALL CONTRACTORS:

General Bidders and Filed Subbidders shall complete and submit this form as part of their bid. Non-Filed Subcontractors shall complete and submit this form to the General Contractor before beginning work.

I. THE MINORITY AND WOMEN BUSINESS AND UTILIZATION PROGRAMS

Pursuant to an agreement between the City of Worcester and the Commonwealth of Massachusetts, during the performance of any contract with the City of Worcester, all Contractors, Filed Subcontractors, and Subcontractors are bound by the obligations of the Supplemental Equal Employment Opportunity Anti-Discrimination and Affirmative Action Program. **All contractors and subcontractors if subcontracting any portion of the work are obligated to make a good faith effort to engage 10% minority and 5% women owned businesses. Further, each contractor shall make a good faith effort to maintain a workforce that is 38% people of color and 10% women.**

The undersigned hereby certifies that he/she is familiar with the provisions of The Supplemental Equal Employment Opportunity Anti-Discrimination and Affirmative Action Programs and agrees to adhere to the provisions therein.

II. This contractor **IS** ☐ **or IS NOT** ☐ certified by the State Office of Minority and Women Business Assistance to be a minority or women owned and operated business; and

III. **WILL** ☐ **or WILL NOT** ☐ subcontract any portion of this contract.

Project Name: _____ Bid Number: _____

Authorized Signature

Business Name

Title

Address

Date

**MINORITY/WOMEN BUSINESS ENTERPRISE AND WORKER UTILIZATION
PROGRAM**

FORM EOO-D/102

BIDDERS INFORMATION ON PROCEDURES AND FORMS

To make all contractors aware of their obligation to follow certain procedures and file appropriate reports pertaining to those procedures, the following is an outline of Minority/Women Business Enterprise and Worker Utilization Program. Also included here is the Affidavit of Acknowledgement and Certification of Compliance, Form E00-101. This form is to be completed and filed as part of your bid.

The following documents are included in this bid:

1. **AFFIDAVIT OF ACKNOWLEDGEMENT AND CERTIFICATION OF COMPLIANCE**, E00-101

This form is to be completed by all General Contractors and Filed Subcontractors and submitted as part of their bid on all City of Worcester construction projects.

2. **SUPPLEMENTAL EQUAL EMPLOYMENT OPPORTUNITY ANTI-DISCRIMINATION AND AFFIRMATIVE ACTION PROGRAM** E00-D/3

The agreement between the City of Worcester and the Massachusetts Commission Against Discrimination establishing the goals and procedures for the utilization of minority and women owned businesses and minority and women workers on City Construction projects.

3. **SUCCESSFUL BIDDER'S OBLIGATION TO PROCEDURES AND FORMS**, EE0-D/103

This is a listing of the procedures and forms that will be provided to the successful bidder for use prior to beginning work and at various times throughout the life of the project.

THE CITY OF WORCESTER

SUPPLEMENTAL EQUAL EMPLOYMENT OPPORTUNITY ANTI-DISCRIMINATION AND AFFIRMATIVE ACTION PROGRAM

I. AGREEMENT

During the performance of this contract, the Contractor or Filed Subcontractor and all subcontractors (herein collectively referred to as the Contractor), for himself/herself, his/her assignees, and successors in interest, agree as follows:

1. In conjunction with the performance of work under this contract, the contractor shall not discriminate against any employee or applicant for employment because of race, color, religious creed, national origin, age, sex, or handicap. The aforesaid provision shall include, but not be limited to, the following: employment upgrading, demotion, or transfer; recruitment advertising; layoff; termination, rates of pay or other forms of compensation; conditions or privileges of employment; and selection for apprenticeship. The contractor shall post hereafter in a conspicuous place, available to employees and applicants for employment, notices to be provided by the Commission setting forth the provisions of the Fair Employment Practices Law of the Commonwealth (M.G.L. Chapter 151 B).
2. In connection with the performance of work under this contract, the Contractor shall undertake in good faith affirmative action measures designed to eliminate any discriminatory barriers in the terms and conditions of employment on the grounds of race, color, religious creed, national origin, age, sex, or handicap, and to eliminate and remedy any effects of such discrimination in the past. Such affirmative action shall entail positive and aggressive measures to ensure equal opportunity in the areas of apprenticeship training programs. This affirmative action shall include all action required to guarantee equal employment opportunity for all persons, regardless of race, color, religious creed, national origin, age, sex, or handicap. The purpose of this provision is to ensure to the fullest extent possible an adequate supply of skilled tradesmen for this and future City public construction project.

II. OBLIGATION

1. As part of the obligation of remedial action under the foregoing section, the Contractor shall maintain goals on this project no less than 38 percent (38%) people of color employee and 10 percent (10%) women employee hours of the total work hours in each job category including but not limited to, bricklayers, carpenters, cement masons, electricians, iron workers, operating engineers, and those “classes of work” enumerated in section 44C of chapter 149 of the Massachusetts General Laws.

In the hiring of minority and women journeymen, apprentices, trainees and advanced trainees, the Contractor shall rely on referrals from a multi-employer affirmative action program approved by the City, traditional referral methods utilized by the construction industry, and referrals from agencies, not more than three in number at any one time, designated by the City.

III. REPORTS

1. Contractor shall prepare projected manning tables on a quarterly basis, **Quarterly Projected Workforce Table, E00-105**. These shall be broken down into projections by week, for workers required in each trade. Copies shall be furnished to the City one week in advance of the commencement of the period covered, and at such time as there is a need to be updated during the period.
2. Records of employment referral orders, prepared by the Contractor, shall be made available to the City on request.
3. The Contractor shall prepare the **Certified Payroll Report on a weekly basis**, which lists the hours worked in each trade by each employee identified as minority, non-minority, male and female. Copies of these shall be provided to the City at the end of each week.

IV. SUBCONTRACTING WORK

If the Contractor shall use any Subcontractor on any work performed under this contract, affirmative action shall be taken to negotiate with qualified minority and women contractors. This affirmative action shall cover both pre-bid and post-bid periods.

V. EMPLOYMENT

In the employment of journeymen, apprentices, trainees, and advanced trainees, the Contractor shall give preference, first to citizens of the Commonwealth who have served in the armed forces of the United States in time of war and have been honorably discharged therefrom or released from active duty therein, and who are qualified to perform the work to which the employment relates, and , secondly, to citizens of the Commonwealth generally, and, if such cannot be obtained in sufficient numbers, then to citizens of the United States.

VI. RIGHT OF ACCESS

A designee of the City shall have the right of access to the construction site.

VII. COMPLIANCE WITH REQUIREMENTS

The contractor shall comply with the provisions of Executive Order No. 227 amending and revising Executive Order No. 74, as amended by executive Order No. 16 dated May 1, 1975 and of Chapter 151B as amended, of the Massachusetts General Laws, both of which are herein incorporated by reference and made part of this contract.

VIII. NON-DISCRIMINATION

The Contractor, in the performance of all work after the award, and prior to completion of the contract work, will not discriminate on the grounds of race, color, religious creed, national origin, age, sex, or handicap in employment practices, in the selection or retention of other contractors or in the procurement of materials and rentals of equipment.

IX. SOLICITATIONS FOR SUBCONTRACTORS, AND FOR THE PROCUREMENT OF MATERIALS AND EQUIPMENT

In all solicitations either by competitive bidding or negotiation made by the Contractor either for work to be performed under a subcontract or for the procurement of materials or supplies, each entity solicited shall be notified in writing by the contractor of the

Contractor's obligation under this contract relative to non-discrimination and affirmative action.

X. CONTRACTOR'S CERTIFICATION

Contractors bidding as General Contractors or Filed Sub-contractors shall certify that they will comply with the minority and women manpower and business enterprise goals and specific affirmative action steps contained in this Supplemental Equal Employment Opportunity Anti-Discrimination and Affirmative Action Program by signing and submitting with the bid the **Affidavit of Acknowledgement and Certification of Compliance, Form E00-101**.

If any Contractor subcontracts any portion of the work, the Contractor is required to obtain from each Subcontractor, regardless of tier, an Affidavit of Acknowledgement and Certification of Compliance, Form E00-101 stating that it will comply with the minority and women subcontracting and manpower ratios and specific affirmative action steps contained in this Supplemental Equal Employment Opportunity Anti-Discrimination and Affirmative Action Program by signing this form and submitting it to the Contractor for submission to the awarding authority not later than five working days following the opening of the bids.

XI. COMPLIANCE – INFORMATION, REPORTS, AND SANCTIONS

1. The Contractor will provide all information and reports required by the City on instructions issued and will permit access to its facilities and any books, records, accounts and other sources of information which may be determined by the City to affect the employment of personnel. This provision shall apply only to information pertinent to the City's supplementary affirmative action contract requirements. Where information required is in the exclusive possession of another who fails or refuses to furnish this information, the Contractor shall so certify to the City and shall set forth what efforts have been made to obtain the information.
2. Whenever the City believes the Contractor may not be operating in compliance with the terms of this Section, the City directly, or through its designated agent, shall conduct an appropriate investigation, and confer with the parties, to determine if such Contractor is operating in compliance with the terms of this Section. If the City or its agent finds the Contractor not in compliance, it shall make a preliminary report of non-compliance and notify such Contractor in writing of such steps as will in the judgment of the City or its agent bring such Contractor into compliance. In the event that such Contractor fails or refuses to fully perform such steps, the City shall make a final report of non-compliance, and recommend the imposition of one or more of the sanctions listed below. If, however, the City believes the Contractor has taken or is taking every possible measure to achieve compliance, it shall not make final a report on non-compliance. Within fourteen (14) days of the receipt of the recommendations of the City, the administering agency shall move to impose one or more of the following sanctions, as it may deem appropriate to attain full and effective enforcement.
 - a. The recovery by the administering agency from the Contractor of 1/10 of 1% of the contract award price or \$1000.00, whichever sum is greater, in the nature of liquidated damages or, if a Subcontractor is in non-compliance, the recovery by the administering agency from the Contractor as a back charge against the Subcontractor of 1/10 of 1% of the subcontract price, or \$400.00, whichever sum

is greater, in the nature of liquidated damages, for each week that such party fails or refuses to comply;

- b. The suspension of any payment or part thereof due under the contract until such time as the Contractor or any Subcontractor is able to demonstrate compliance with the terms of the contract;
 - c. The termination, or cancellation, of the contract, in whole or in part, unless the Contractor is able to demonstrate within a specified time his compliance with the terms of the contract;
 - d. The denial to the Contractor of the right to participate in any further contracts awarded by the administering agency for a period of up to three years.
3. If at any time after the imposition of one or more of the above sanctions a Contractor is able to demonstrate that he/she is in compliance with this section, he/she may request the administering agency in consultation with the City, to suspend the sanctions conditionally, pending a final determination by the City as to whether the contractor is in compliance. Upon final determination, based on the recommendations of the adjudicatory body, the City shall either lift the sanctions or reimpose them.
4. Sanctions enumerated under Section XII-2 shall not be imposed except after an adjudicatory proceeding, as that term is used in M.G.L. Chapter 30, has been conducted. No investigation by the City or its agent shall be initiated without prior notice to the Contractor.

XII. SEVERABILITY

The provisions of this Section are severable, and if any of these provisions shall be held unconstitutional by any court of competent jurisdiction, the decisions of such court shall not affect or impair any of the remaining provisions.

XIII. WAIVER

The City of Worcester reserves the right to waive any stipulation in the M/WBE Program when deemed necessary or appropriate for the general good of the City and its programs.

DEFINITIONS

Contractor	Except where otherwise specifically stated the term "Contractor" shall mean any General Contractor, Filed Subcontractor or Non-Filed Subcontractor.
City	is the City of Worcester , Massachusetts
M/WBE	is Minority and Women Business Enterprise as certified by the State Office of Minority and Women Business Assistance to be 51% or more minority or women owned and operated.

**MINORITY/WOMEN BUSINESS ENTERPRISE AND WORKER UTILIZATION
PROGRAMS**

FORM E00-D/103

SUCCESSFUL BIDDER'S OBLIGATION TO PROCEDURES AND FORMS

All successful bidders on City of Worcester construction projects will receive a package of procedures and forms that are to be used at specific times throughout the life of the project.

The following is a list of the documents that will be sent to successful bidders when this office is notified that a contract has been, or is about to be, executed.

I. BUILDING TRADES – CONTACT LIST, E00-D/6

When a contractor cannot fulfill the worker utilization percentages, the appropriate building trades locals may be contacted to request assistance in locating and engaging qualified workers.

II. AFFIDAVIT OF ACKNOWLEDGEMENT and CERTIFICATION OF COMPLIANCE, (FOR SUBCONTRACTORS), E00-101

If any portion of a project is to be subcontracted at any tier, each additional subcontractor shall complete this form and send it to the Contract Compliance Office within two business days of contract execution and PRIOR to beginning work on the project.

III. TABLE OF PROJECTED SUBCONTRACTORS, E00-103

The use of subcontractors at any tier shall be reported to the Contract Compliance Office on this form prior to the subcontractor beginning work on the project.

IV. SUBCONTRACTOR'S CERTIFICATE OF INTENT TO PARTICIPATE, E00-104

Each Non-Filed subcontractor engaged to work on a project shall complete and forward this form to the Contract Compliance Office prior to beginning work on the project.

V. QUARTERLY PROJECTED WORKFORCE TABLE, E00-105

Each General Contractor, Filed Subcontractor and Non-Filed Subcontractor, regardless of tier, shall complete and forward this form to the Contract Compliance Office prior to beginning work and again for each additional three month period throughout the life of the project.

VI. REQUEST FOR MODIFICATION

E00-106B, MINORITY AND WOMEN BUSINESS UTILIZATION E00-106C, MINORITY AND WOMEN UTILIZATION IN THE WORK FORCE

Any General Contractor, Filed Subcontractor or Non-Filed Subcontractor, regardless of tier, not meeting the minority and women goals, may file a request for modification after having exhausted all possible sources. Requests for modification are considered **ONLY** after attempts to fulfill these mandates have been documented and submitted to the Contract Compliance Office with the appropriate sections of this form.

A modification or waiver will not be granted because a contractor wishes to use an existing workforce that does not achieve the goals of 38% of total work hours to be worked by people of color and 10% of total work hours to be worked by women; and,

If subcontracting, does not meet the goals of 10% of the contract value for Minority Business Enterprises and 5% of the contract value to Women Business Enterprises.

VII. WEEKLY PAYROLL REPORT FORM & STATEMENT OF COMPLIANCE

At the end of each week of work, all Contractors, Filed Subcontractors, and Non-Filed Subcontractors, regardless of tier, shall complete and submit these forms to the Contract Compliance Office.

The Contract Compliance Office will also accept computer generated payroll reports. However, if the computer payroll does not reflect the prevailing wage, the Contractor must provide a breakdown of the benefits paid to each employee which, when added to the base wage, equals the prevailing wage.

The City of Worcester regards the monitoring of weekly certified payroll reports to be a most important function. Therefore, all certified payroll reports shall be scrutinized by the Contract Compliance Office and any violations of the Commonwealth's prevailing wage law will be vigorously enforced.

CORI COMPLIANCE / GENDER IDENTITY & EXPRESSION

Vendors entering into contracts with the City of Worcester must affirm that their policies regarding CORI information are consistent with the CORI hiring standards set by the City of Worcester. The City's CORI hiring policy may be downloaded from City of Worcester website www.worcesterma.gov. Questions pertaining to the City's CORI hiring policy are to be directed to the Equal Employment Opportunity Officer, Executive Office of Human Resources at hr@worcesterma.gov

CERTIFICATION

All Vendors must check one of the three lines below.

1. _____ CORI checks are not performed on any Applicants.
2. _____ CORI checks are performed on some or all Applicants. The Vendor, by affixing a signature below, affirms under penalties of perjury that its CORI policy is consistent with the standards set forth with the CORI hiring standards set by the City of Worcester.
3. _____ CORI checks are performed on some or all Applicants. The Vendor's CORI policy is not consistent with the standards set forth with the CORI hiring standards set by the City of Worcester. (a copy of the Vendor's written CORI policy must accompany this form).

(Typed or printed name of person
signing quotation, bid or proposal)

Signature

Name of Business

A Vendor with a CORI policy that does NOT conform to the City standards must check Line 3. Vendors who check Line 3 will not be permitted to enter into contracts with the City, absent a waiver granted by the City. For any waiver to be granted, a written request should accompany bid submission explaining in detail why the vendor fails or refuses to comply with the City's CORI hiring standards.

Gender Identity Standards Applicable to Vendors

The city will do business only with vendors that have adopted and employ Gender Identity policies, practices and standards that are consistent with city standards.

The city may review all vendors' Gender Identity policies and practices for consistency with city standards.

By signing this bid, vendor confirms that their Gender Identity policies, practices and standards are consistent with those of the City of Worcester. For further information please refer to the Ordinance Relative to Gender Identity and Expression found at www.worcesterma.gov or call the LGBTQ Liaison/Director of Human Rights & Disabilities at 508-799-8486.

VENDOR/SERVICE PROVIDER CERTIFICATION

TO BE AWARDED A VENDOR/SERVICE CONTRACT, ALL PARTS OF THIS FORM THAT APPLY TO YOUR BID MUST BE COMPLETED AND SUBMITTED WITH YOUR BID.

Bidder is a Minority Business Enterprise (MBE) - see reverse for definition Yes_____ No_____

Bidder is a Woman Business Enterprise (WBE) - see reverse for definition Yes_____ No_____

IF SUBCONTRACTING any portion of the service covered by this bid, the successful bidder shall demonstrate a good faith effort to seek and use TEN PERCENT (10%) Minority and FIVE PERCENT (5%) Women-owned Businesses.

A. YOUR INTENT TO SUBCONTRACT. CHECK (✓) THE APPROPRIATE BOX:

☐

No work will be subcontracted. Complete Section "C" only.

☐

Some work will be subcontracted. Complete Section "B" and "C"

B. LIST SUBCONTRACTORS Engaged to do any portion of this Bid.

Check (✓) the appropriate box and give complete information.

☐

MBE

☐

WBE

☐

OTHER _____

Firm Name: _____

Street Address: _____

City/State/Zip _____

Work subcontracted: _____ Dollar Value \$ _____

Check (✓) the appropriate box and give complete information.

☐

MBE

☐

WBE

☐

OTHER _____

Firm Name: _____

Street Address: _____

City/State/Zip _____

Work subcontracted: _____ Dollar Value \$ _____

C. ITEM/SERVICE BID ON: _____ BID NO.: _____

Firm Name: _____

Street Address: _____

City/State/Zip _____

For purposes of the City’s classification and reporting program, the following definitions apply:

Minority Business Enterprise (MBE) – a for profit enterprise, regardless of size, physically located in the United States or its trust territories, which is owned, operated and controlled by minority group members. “Minority group members” are U.S. citizens who are African-American, Latin American, Native American, Asian-Pacific American and Asian-Indian American. “Ownership” by minority individuals means the business is at least 51% owned by such individuals or, in the case of a publicly owned business, at least 51% of the stock is owned by one or more such individuals. Further, those minority group members control the management and daily business operations.

Women Business Enterprise (WBE) – a for profit enterprise, regardless of size, physically located in the United States or its trust territories, which is owned, operated and controlled by women group members. “Ownership” by women means the business is at least 51% owned by women or, in the case of a publicly owned business, at least 51% of the stock is owned by one or more women. Further, those women group members control the management and daily business operations.

STATE LAW MANDATES THAT TO DO BUSINESS WITH THE CITY OF WORCESTER the Massachusetts Revenue Enforcement and Protection Program of 1983 requires that the following be supplied with your bid:

DATE: _____

Pursuant to Mass. G.L. Ch. 62C, Section 49A, I certify under the penalties of perjury that I, to my best knowledge and belief, have filed all Massachusetts State Tax Returns and paid all Massachusetts State and City Taxes required under law.

COMPANY NAME: _____

STREET ADDRESS: _____

CITY OR TOWN: _____

STATE: _____

ZIP CODE: _____

TELEPHONE NO.: _____

FAX NO. _____

SOCIAL SECURITY OR FEDERAL IDENTIFICATION NO.: _____

AUTHORIZED SIGNATURE: _____

FAILURE TO COMPLETE THIS FORM MAY RESULT IN REJECTION OF BID AND/OR REMOVAL FROM CITY BID LIST.

RIGHT TO KNOW

Any vendor who receives an order or orders resulting from this invitation agrees to submit a Material Safety Data Sheet (MSDS) for each toxic or hazardous substance or mixture containing such substance, pursuant to M.G.L. C111f 228, 9 and 10 and the regulations contained in 441 CMR SS21.06 when deliveries are made. The vendor agrees to deliver all containers properly labeled pursuant to M.G.L. C111F S7 and the regulation contained in 441 CMR S21-05. Failure to submit a MSDS and/or labels on each container will place the vendor in noncompliance with the purchase order and/or contract. Failure to furnish MSDS's and/or labels on each container may result in Civil or Criminal penalties, including bid debarment and action to prevent the vendor from selling said substances, or mixtures containing said substances within the Commonwealth. All vendors furnishing substances or mixtures subject to Chapter 1.1F or M.G.L. are cautioned to obtain and read the law and rules and Regulations referenced above. Copies can be obtained from the State House Book Store, Secretary of State, State House, Room 117, Boston, MA (617) 727-2834 for \$2.00 plus \$.65 postage. In addition, copy of "Right to Know" law is available in Purchasing Department for review.

WAGE THEFT PREVENTION CERTIFICATION

By the Revised Ordinances, Chapter 2, Section 39, the city of Worcester has established requirements for certain contracts in an effort to prevent wage theft. Prospective contractors must provide the following certification and disclosures with their bids/proposals. The City will not award a contract without receipt of this completed certification.

INSTRUCTIONS: A prospective contractor shall **(a)** check Box 1 OR Box 2, as applicable, **(b)** check Boxes 3-5, **(c)** sign this form certifying compliance with the Wage Theft Prevention Ordinance, and **(d)** submit the completed form with its bid/proposal. For multi-year contracts, the successful bidder/proposer shall submit the completed form annually to the Purchasing Director.

Pursuant to the Wage Theft Prevention Ordinance, successful bidders/proposals shall post in conspicuous places the Mass. Wage and Hour Laws notice informing employees of the protections of G.L. c. 149, Sec. 151, and the Fair Labor Standards Act (FLSA). The notice may be found at <http://www.mass.gov/ago/docs/workplace/wage/wagehourposter.pdf>

ALL BIDDERS/PROPOSERS MUST CERTIFY THAT [check either Box 1 or Box 2, as applicable]

1. ☐ Neither this vendor/contractor nor any prospective subcontractor has been subject to a federal or state criminal or civil judgment, administrative citation, final administrative determination, order or debarment resulting from a violation of G.L. c. 149, G.L. c. 151, or FLSA, within three (3) years prior to the date of this bid/proposal submission.

OR

2. ☐ This vendor/contractor, or a prospective subcontractor, has been subject to a federal or state criminal or civil judgment, administrative citation, final administrative determination, or debarment resulting from a violation of G.L. c. 149, G.L. c. 151, or FLSA, within three (3) years prior to the date of this bid/proposal submission. The firm shall provide a copy of the same with the bid/proposal.

ALL BIDDERS/PROPOSERS MUST CERTIFY EACH OF THE FOLLOWING

3. ☐ Within five (5) days of receiving notice, the vendor/contractor shall report and provide a copy of any federal or state criminal or civil judgment, administrative citation, final administrative determination, order or debarment resulting from a violation of G.L. c. 149, G.L. c. 151, or FLSA imposed on this firm or on any prospective subcontractor while any bid/proposal to the City is pending and, if awarded a contract, during the term of the contract provide the same to the Purchasing Director.

4. ☐ A vendor/contractor awarded a contract that has disclosed under paragraph 3 above shall, upon request, furnish monthly certified payrolls for the City contract as the Purchasing Director instructs and shall, at the discretion of the Purchasing Director, obtain a wage/payment bond or other suitable insurance as required by the Wage Theft Prevention Ordinance. Vendors/contractors subject to a state or federal debarment for violation of the above laws or prohibited from contracting with the Commonwealth are prohibited from contracting with the City, and upon a finding or order of debarment or prohibition, the City may terminate the contract.

5. ☐ The contractor shall post notices provided by the City in conspicuous places informing employees of the protections of the Wage Theft Prevention Ordinance, and applicable local, state and federal law.

The undersigned certifies under the pains and penalties of perjury that the contractor is in compliance and agrees to remain in compliance with the provisions of the Wage Theft Prevention Ordinance for the term of its contract with the City.

Signed: _____

Print Name & Title	Company Name	Date

PROPOSAL

**BID ITEMS
for
Bid No. 7869-W3
Contract No. S23-1**

ITEM NUMBER	DESCRIPTION	ESTIMATE OF QUANTITIES	COMPUTED TOTALS

THE BIDDER MUST FILL IN THESE UNIT OR LUMP SUM PRICES. The BIDDER should also carry out all extensions and fill in "Computed Totals"

(In case of error or discrepancies, UNIT OR LUMP SUM PRICES govern and written words take precedence over figures)

**BASE BID
(ITEMS 236, 270, and 700 THROUGH 706, and Item 900)
TRENCH PIPE WORK**

Item
236

Manhole Frame and Cover Set, each

	Dollars		
and	Cents	10 EA	\$
(\$	)		

Item
270

Rodent Control, lump sum

	Dollars		
and	Cents	1 LS	\$
(\$	)		

GЕOPOLYMER LINING

Item
700

Geopolymer lining of 48-inch x 72-inch with 24-inch x 18-inch invert sanitary sewers, per linear foot

	Dollars		
and	Cents	393 LF	\$
(\$	)		

PROPOSAL

**BID ITEMS
for
Bid No. 7869-W3
Contract No. S23-1**

ITEM NUMBER	DESCRIPTION	ESTIMATE OF QUANTITIES	COMPUTED TOTALS
THE BIDDER MUST FILL IN THESE UNIT OR LUMP SUM PRICES. The BIDDER should also carry out all extensions and fill in "Computed Totals"			
(In case of error or discrepancies, UNIT OR LUMP SUM PRICES govern and written words take precedence over figures)			
Item 701	Geopolymer lining of 60-inch by 84-inch with 24-inch x 18-inch invert sanitary sewers, per linear foot		
	Dollars and Cents (\$)	378 LF	\$
Item 702	Handling of existing flows (temporary bypass pumping), lump sum		
	Dollars and Cents (\$)	1 LS	\$
STRUCTURAL CURED-IN-PLACE PIPE			
Item 703	Structural cured-in-place pipe for 12-inch sanitary sewers, per linear foot		
	Dollars and Cents (\$)	619 LF	\$

PROPOSAL

**BID ITEMS
for
Bid No. 7869-W3
Contract No. S23-1**

ITEM NUMBER	DESCRIPTION	ESTIMATE OF QUANTITIES	COMPUTED TOTALS

THE BIDDER MUST FILL IN THESE UNIT OR LUMP SUM PRICES. The BIDDER should also carry out all extensions and fill in "Computed Totals"

(In case of error or discrepancies, UNIT OR LUMP SUM PRICES govern and written words take precedence over figures)

SERVICE CONNECTION REHABILITATION

Item 704	Grouting of service and lateral connection in large diameter sewers (greater than 12-inch in diameter), per lateral		
		Dollars	
	and	Cents	69 LATERALS
	(\$	)	\$

MANHOLE REHABILITATION

Item 705	Geopolymer lining of manholes, per vertical foot		
		Dollars	
	and	Cents	172 VF
	(\$	)	\$

PROPOSAL

**BID ITEMS
for
Bid No. 7869-W3
Contract No. S23-1**

ITEM NUMBER	DESCRIPTION	ESTIMATE OF QUANTITIES	COMPUTED TOTALS

THE BIDDER MUST FILL IN THESE UNIT OR LUMP SUM PRICES. The BIDDER should also carry out all extensions and fill in "Computed Totals"

(In case of error or discrepancies, UNIT OR LUMP SUM PRICES govern and written words take precedence over figures)

MOBILIZATION

Item 706 Mobilization, lump sum (not more than 5% of total of items 236, 270, and 700 through 705)

	Dollars		
and	Cents	1 LS	\$
(\$	)		

CITY USE

Item 900 Lump sum reserved for City use, lump sum

Four Hundred and Fifty Thousand	Dollars		
and Zero	Cents	1 LS	\$ 450,000
(\$ 450,000	)		

PROPOSAL

**BID ITEMS
for
Bid No. 7869-W3
Contract No. S23-1**

ITEM NUMBER	DESCRIPTION	ESTIMATE OF QUANTITIES	COMPUTED TOTALS

THE BIDDER MUST FILL IN THESE UNIT OR LUMP SUM PRICES. The BIDDER should also carry out all extensions and fill in "Computed Totals"

(In case of error or discrepancies, UNIT OR LUMP SUM PRICES govern and written words take precedence over figures)

**ALTERNATE NO. 1
(ITEMS 707 THROUGH 709)**

GEOPOLYMER LINING

Item 707	Geopolymer lining of 48-inch x 72-inch sanitary sewers, per linear foot		
		Dollars	
		and Cents	1,069 LF \$
		(\$)	

Item 708	Handling of existing flows (temporary bypass pumping), lump sum		
		Dollars	
		and Cents	1 LS \$
		(\$)	

SERVICE CONNECTION REHABILITATION

Item 709	Grouting of service and lateral connections in 48-inch x 72-inch sanitary sewers, per lateral		
		Dollars	
		and Cents	29 LATERALS \$
		(\$)	

PROPOSAL

**BID ITEMS
for
Bid No. 7869-W3
Contract No. S23-1**

ITEM NUMBER	DESCRIPTION	ESTIMATE OF QUANTITIES	COMPUTED TOTALS

THE BIDDER MUST FILL IN THESE UNIT OR LUMP SUM PRICES. The BIDDER should also carry out all extensions and fill in "Computed Totals"

(In case of error or discrepancies, UNIT OR LUMP SUM PRICES govern and written words take precedence over figures)

**ALTERNATE NO. 2
(ITEMS 710 THROUGH 712)**

STRUCTURAL CURED-IN-PLACE PIPE

Item
710

Structural cured-in-place pipe for 48-inch x 72-inch
sanitary sewers, per linear foot

	Dollars		
and	Cents	1,069 LF	\$
(\$	)		

Item
711

Handling existing flows (temporary bypass pumping),
lump sum

	Dollars		
and	Cents	1 LS	\$
(\$	)		

SERVICE CONNECTION REHABILITATION

Item
712

Grouting of service and lateral connections in 48-inch
x 72-inch sanitary sewers, per lateral

	Dollars		
and	Cents	29 LATERALS	\$
(\$	)		

TOTAL BID PRICE FOR BASE PROJECT WORK INCLUDING CONTINGENCY

The computed contract price for all Items 236, 270, 700 through 706, and Item 900 inclusive is:

_____ DOLLARS
(AMOUNT IN WORDS)

AND _____ CENTS \$ _____
(AMOUNT IN FIGURES)

For Alternate No. 1, which adds Items 707 through 709 for geopolymer cement lining of 48-inch x 72-inch sewer,

Add _____ DOLLARS
(AMOUNT IN WORDS)

AND _____ CENTS \$ _____
(AMOUNT IN FIGURES)

For Alternate No. 2, which adds Items 710 through 712 for structural cured-in-place pipe for 48-inch x 72-inch sewer,

Add _____ DOLLARS
(AMOUNT IN WORDS)

AND _____ CENTS \$ _____
(AMOUNT IN FIGURES)

NUMBER OF CALENDAR DAYS TO COMPLETE BASE PROJECT 150

NUMBER OF CALENDAR DAYS TO COMPLETE BASE PROJECT PLUS ALTERNATE NO. 1 180

NUMBER OF CALENDAR DAYS TO COMPLETE BASE PROJECT PLUS ALTERNATE NO. 2 180

THIS PROPOSAL IS BASED ON PROVISIONS OF THE FOLLOWING ADDENDA:

No. _____ No. _____

No. _____ No. _____

\\wse03.local\WSE\Projects\MA\Worcester MA\2191051 Cambridge Street Design\Specifications\Worcester Front End\004 - P-1 to P-8 - Bid Items.doc

All amounts and totals given above will be subject to verification by the City. In case of variation between Unit Bid Price and Totals shown by the Bidder, the Unit Price written in words will be considered to be the bid.

The City reserves the right to reject any and all bids, wholly or in part, and to make awards in a manner deemed in the best interests of the City.

The estimated quantities in these specifications form an approximate statement of the extent of the work to be done, based upon the estimate of the Design ENGINEER. The City does not expressly or by implication agree that the actual quantity of work will correspond therewith but reserves the right to increase or decrease the quantity of any class or portion of the work, as may be deemed necessary by the Contracting Officer.

TIME OF COMPLETION

The bidder shall complete the Base work of this contract, exclusive of re-test inspection, within 150 consecutive calendar days (Saturdays, Sundays and Holidays included) from the date of the signing of the contract if he is awarded the contract.

The bidder shall complete the Base work plus Alternative No. 1 of this contract, exclusive of re-test inspection, within 180 consecutive calendar days (Saturdays, Sundays and Holidays included) from the date of the signing of the contract if he is awarded the contract.

The bidder shall complete the Base work plus Alternative No. 2 of this contract, exclusive of re-test inspection, within 180 consecutive calendar days (Saturdays, Sundays and Holidays included) from the date of the signing of the contract if he is awarded the contract.

The bidder shall complete re-test inspection for the work within 30 consecutive calendar days (Saturdays, Sundays and Holidays included) of commencement of re-test inspection.

LIQUIDATED DAMAGES (Contracts of \$100,000 or more)

It is expressly understood and agreed, by and between the Contractor and the City, 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 climate range and usual industrial and/or residential 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 proper extension thereof requested in writing by the Contractor and granted in writing by the Contracting Officer, then the Contractor does hereby agree, as a part consideration for the awarding of this contract, to pay to the City the amount of \$2,800.00 per day, not as a penalty, but as liquidated damages for such breach of contract for each and every calendar day that the Contractor shall be in default after the time stipulated for completing the work. The said amount of

\$2,800.00 per day is fixed and agreed upon by and between the Contractor and the City because of impracticability and extreme difficulty of fixing and ascertaining the actual damages the City would in such event sustain and said amount is agreed to be the amount of damages which the City would sustain and the said amount shall be deducted by the City for periodic payments.

Liquidated Damages shall apply to both the 150 consecutive calendar day construction duration for the Base contract and the 30 consecutive calendar day re-test duration.

Liquidated Damages shall apply to both the 180 consecutive calendar day construction duration for the Base contract plus Alternative No. 1 and the 30 consecutive calendar day re-test duration.

Liquidated Damages shall apply to both the 180 consecutive calendar day construction duration for the Base contract plus Alternative No. 2 and the 30 consecutive calendar day re-test duration.

LUMP SUM RESERVE FOR CITY USE

1. Lump Sum Reserve for Contingency Work

The Contractor is advised that the lump sum reserve for contingency work shall be utilized, as required by the City of Worcester, for additional work that may be required by the City and agreed to by the Contractor. Any reserve balance remaining at the end of the contract will return to the City of Worcester.

2. Lump Sum Reserve for Testing

The Contractor is advised that, where indicated by the City of Worcester, independent laboratory tests may be required of materials incorporated into the project. The tests will be performed by an independent laboratory selected by the City and compensated for directly by the City under the Lump Sum Reserve for Testing items. The Contractor is to cooperate fully with the City to make available any material and samples necessary to perform the independent tests. Upon completion of the contract all amount not utilized will return to the City of Worcester.

3. Lump Sum Reserve for Traffic Police

The Contractor is advised that the City of Worcester will designate the number and need for Traffic Police throughout the duration of the contract. The City will compensate directly for Traffic Police, as ordered, under the Lump Sum Reserve for Traffic Police. Upon completion of the contract all amount not utilized will return to the City of Worcester.

INFORMATION TO BIDDERS

GENERAL DESCRIPTION

This bid consists of work in approximate quantities as listed in the Proposal Forms, which state the location and description of the work to be done and the materials to be furnished.

The plans and specifications, proposal and addenda shall form part of this contract.

QUANTITIES

All bids will be compared on the total estimate of quantities of work to be done, as shown in the proposal.

These quantities are approximate only, being given as a basis for the comparison of bids to determine the approximate amount of the consideration of the contract. The bidder will be required to complete the work specified and/or as shown on the drawings, within the required time period, whether the required quantities are more or less than the amounts herein estimated without any change in the contract unit price. The final payment will not be made until the work is so completed.

The unit price bid for each item must allow for all collateral or indirect costs connected with it.

INVESTIGATION OF CONDITIONS

Bidders are expected to visit the locality of the work and acquaint themselves with all available information concerning local conditions. They are also expected to make their own estimates of the facilities needed and difficulties attending the execution of the proposed contract, including local conditions, availability of labor, uncertainties of weather and other contingencies. In no event will the City assume any responsibility whatever for an interpretation, deduction or conclusion drawn from the inspection of the site. Failure to acquaint himself with all available information concerning these conditions will not relieve the successful bidder from responsibility for estimating the difference and costs of successfully performing the complete work.

At the bidder's request, a representative of the City will point out the site of the proposed operations.

ADDENDA

The bidder is required to acknowledge receipt of any Addenda issued to this contract by inserting the addendum number in the space provided on the proposal form.

EXPERIENCE

Each bidder shall state in his bid whether he is now or ever has been engaged on any other contract or other work similar to that proposed, giving the year in which it was done and the manner of its execution and shall submit such other information as will tend to show his ability to prosecute vigorously the work required to these specifications. A successful bidder will be required to employ an organization thoroughly experienced and skilled in the type of work to be done. After the opening of bids any bidder may be required to submit satisfactory evidence that the specific organization which he proposes to employ on this contract has successfully executed work of the nature and quality indicated herein.

EQUIPMENT

Each bidder shall state in his bid the character, make, and amount of equipment that he proposes to employ on the work. After bids are opened any bidder may be required to show that he owns, controls by firm option, or can procure the equipment necessary for commencing, prosecuting, and completing the work as required by the specifications.

CONTRACTOR RESPONSIBILITY

The Contractor must care for, replace and restore to good condition to the satisfaction of the Commissioner of Public Works any utilities, fences, sidewalks, posts, poles or other structures damaged by or interfered with by the Contractor outside the scope of work. The Contractor shall perform any necessary replacement, reparation or restoration at no additional compensation.

Damage resulting from the operation of the Contractor to any structure in the street or ground near or within the scope of work (and not required to be changed under the contract) shall be replaced, repaired or restored by the Contractor at no additional compensation. Contractor shall perform a pre-construction survey of all areas that may be disturbed by construction using photography and/or video prior to the commencement of work.

The Contractor shall have no grounds for additional compensation because of expenses due to encountering existing pipes, conduits or structures.

The Contractor must perform construction work without damage to shade trees.

The Contractor shall cooperate with all other Contractors or other forces within the

limits of the work specified. The Contractor shall allow the necessary access to the site to other Contractors and utility companies and their agents. The Contractor shall be responsible for preventing damage by others to the work performed under this contract or for having damage repaired, either by the party responsible or at his own expense.

PUBLIC CONVENIENCE

The Contractor shall so conduct his operation as to offer the least possible obstruction and inconvenience to the public.

Vehicular and pedestrian traffic will be maintained on all streets located within the project unless permission is received in writing from the commissioner of Public Works or his representatives to close the street.

Where construction operations are such that a hazard exists to the public, all safety precautions shall be maintained.

POLICE PROTECTION

The City of Worcester will furnish and pay for police when and where the City decides police protection is necessary. The Contractor shall notify the Engineer of the anticipated requirements as the work progresses, so that each day's protection can be scheduled not later than the preceding day.

REHABILITATION OF SANITARY SEWERS AND MANHOLES IN OTHER STREETS

Similar work for rehabilitation of sanitary, surface, or and/or combined sewers and manholes may be needed in other streets and may be included in this contract by agreement between the City and the Contractor.

Any such work is to be paid for on a unit price basis at the prices bid under the contract. Extra work orders will be given the Contractor for any such work on a unit price basis at the prices bid in the contract. The purpose of this provision is to permit the inclusion of any emergency or rush project that may arise.

ADDITIONAL WORK

- (a) The Contractor agrees to perform any work related to the Subject Matter of the contract, but not within the scope of the contract and its specifications, upon written order of the Contracting Officer. The payment for such extra work to be made in accordance with whichever of the following plans the Contracting Officer elects: (i) a price agreed upon between the parties and stipulated in the order for the extra work; (ii) a price based on the unit prices of the contract; (iii) a price determined by adding 15% to the reasonable cost of the extra work

performed. Such reasonable cost to be determined by the Contracting Officer in accordance with paragraph (b) on the following page.

- (b) In computing reasonable cost for the purposes of (iii) above, the Contracting Officer shall include the reasonable cost to the Contractor of all materials used, of all labor, common and skilled, of foremen, trucks and the fair rental of all machinery used upon the extra work for the period of such use. If the extra work requires the use of machinery not upon the work or to be used upon the work, then the cost of transportation of such machinery to and from the work shall be added to the fair rental, but said transportation shall not cover a distance exceeding 100 miles. The Contracting Officer shall include in the cost of extra work the cost to the Contractor of any additional insurance that may be required covering public liability and bodily injuries to his employees engaged in the extra work, and the cost of Social Security or other direct assessment upon the Contractor's payroll by Federal or other properly authorized public agencies. The cost of extra work shall not include any cost or rental of small tools, buildings, or any portion of the time of the Contractor or his superintendent, or any allowance for use of capital or the premium on the bond as assessed upon the amount of extra work, these items being considered as being covered by the fifteen percent (15%) added to the reasonable cost.
- (c) Dimensions, or materials of the Subject Matter of the contract, or any part thereof, either before or after commencement of construction. Where such alterations increase the quantity or standard of the work to be done, payment for such increase shall be made in the same way that payment is made for extra work under (a) and (b) above. Where such alterations diminish the quantity or standard of the work to be done, an adjustment shall be made to the benefit of the City, based upon the unit prices where used or, where unit prices are not used, as the Contracting Officer shall determine.

BIDDERS TO INVESTIGATE

Bidders required to submit their proposals upon the following express conditions, which shall apply to and become part of every bid received, via:

Bidders must satisfy themselves by personal examination of the location of the proposed work and by such other means as they may desire, as to actual conditions and requirements of the work, and the accuracy of the quantities.

INFORMATION NOT GUARANTEED

It is understood and agreed that the City does not warrant or guarantee that the materials, conditions and pipes or other structures encountered during construction will be the same as those indicated by the information given on the drawings. The bidder must satisfy himself regarding the character, quantities, and conditions of the

various materials and the work to be done.

It is further understood and agreed that the bidder or the Contractor will not use any of the information made available to him, or obtained in an examination made by him, in any manner as a basis or ground of claim or demand of any nature against the City or the Contracting Officer, arising from or by reason of any variance which may exist between the information offered and the actual materials or structures encountered during the construction work.

ITEMS

The parts of the work have been divided into items in order to enable the bidder to bid for the different portions of the work in accordance with his estimate of their cost, so that in the event of an increase or decrease in the quantity of any particular item of work, the actual quantities executed may be paid for at the price bid for that particular item of work.

INDETERMINATE ITEMS

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

COMPARISON OF BIDS

Bids will be compared on the basis of the lump sums, or quantities and unit prices bid, stated by the bidders in their proposals should the City elect to make such evaluation. The net sum thus obtained will be used to determine the order of bidders. In the event that there is a discrepancy between the lump-sum prices or unit prices written in words and written in figures, the prices written in words shall govern.

DEPOSIT FORFEITED

In case the party to whom the contract is awarded shall fail or neglect to execute the contract and furnish a satisfactory bond within the time specified, the City may determine that the bidder has abandoned the contract and thereupon the proposal and acceptance shall be null and void, and the security accompanying the proposal shall be forfeited to and retained by said City as liquidated damages for such failure or neglect and to indemnify said City for any loss which may be sustained by failure of the bidder to execute the contract and furnish bond as aforesaid. After the execution of the contract and the acceptance of the bond by the City the security accompanying the proposal of the successful bidder shall be returned.

THE HANDLING OF LIVE SEWAGE

The attention of the bidder is particularly called to the requirement that in submitting

his bid he has considered that the Contractor, as a contractual obligation, shall handle all live sewage in existing sewer lines as a necessary part of the sewer work and for this work no additional compensation will be considered.

WATER SUPPLY

The Contractor shall obtain and pay for a hydrant permit from the City. The Contractor shall obtain approval from the ENGINEER prior to opening any fire hydrants. Designated fire hydrants will be provided to the Contractor for water usage.

For all necessary operations the City will, without charge, provide water under available system pressure from the nearest hydrant of the City water distribution system. The Contractor shall furnish any necessary pipe or hose extensions to conduct the water to the points of use, and shall exercise due care not to waste water.

LABOR CONDITIONS

The attention of the bidder is called to those parts of the contract regarding labor conditions, wage rates, etc.

QUESTIONS REGARDING CONTRACT DOCUMENTS

In general, no answer will be given in reply to an oral question involving interpretation of the Contract Documents. Discrepancies, omissions or doubts as to the meanings of the Contract Documents should be communicated in writing to the Commissioner of Public Works for interpretation no later than five (5) business days prior to bid opening date. Any interpretation made will be in the form of an addendum to the Contract Documents which we will forward to all bidders.

GENERAL NOTES

1. Prior to the start of any construction activity in any previously unoccupied location the Contractor will supply the Engineer with a traffic flow plan for the Engineer's approval.
2. Where applicable the Contractor will supply all barricades, barriers, signing, lighting, etc. warranted to ensure the safety of the general public throughout the work site as a subsidiary obligation without any additional cost to the City of Worcester and subject to the Engineer's approval.
3. Prior to the start of any work the contractor will be required to supply and install construction safety signing on each approach to the work zone as directed by the Engineer. Signing shall read "Street Under Construction" or "Road Work Ahead" or as directed by the Engineer. Signing shall conform to applicable provisions of section 850 of the Massachusetts Standard Specifications for Highways and Bridges latest edition.
4. Any necessary detouring will be arranged by the Contractor through the Engineer and subject to the approval of the Department of Public Works and Parks.
5. The Contractor will be required to provide adequate access to businesses affected by all construction activities.
6. The Contractor will be required to have onsite at all times during the course of all construction activities a full-time superintendent whom will be in responsible charge of this project. This individual will be the exclusive agent for the Contractor maintaining continuous correspondence with the City Engineers.
7. The Contractor will notify the Engineer in writing whenever a change of superintendent is warranted
8. Any existing conditions disturbed by the construction operations shall be restored by the Contractor at his own expense.
9. The Contractor shall provide the Engineer with a list of streets, which will require police details at least 24 hours in advance of the work to be performed.
10. In case of discrepancies between City of Worcester Standard Specification & Details and the Supplement to Specifications, the City's Standard Specification & Details govern and take precedence over the Supplement to Specifications.

SPECIAL PROVISIONS

NOTICE TO PROCEED

The Bidder must agree to commence work on or before the date specified in the written "Notice to Proceed" issued by the City, and/or Engineer acting on behalf of the City, and to fully complete the project within the time specified in the contract.

SCHEDULE OF WORK

The Contractor shall submit, to and for the comments of the Contracting Officer, a schedule of operations within fourteen (14) days after the mailing of the executed Contract to the Contractor. The schedule shall show the proposed methods of construction and sequence of work and the time the Contractor proposed to complete the various items of work within the time specified in the contract.

PROPER NOTIFICATION

The Contractor will be required to provide at least 48-hour notice to the Contracting Officer before locating in work sites previously unoccupied under this contract or before proceeding with paving operations.

HOURS OF WORK

In general, the City will permit the Contractor to work Monday thru Friday between the hours of 7:00 A.M. and 5:00 P.M. except as provided by the Contracting Officer.

CASTINGS

The Contractor will be required to return to the City-Yard any or all excess castings, either water or sewer that were replaced or abandoned by the Contracting Officer. This work will be performed as a subsidiary obligation by the Contractor and no additional payment will be made by the City.

OVERLOADED TRUCKS

The Contracting Officer will not accept any materials delivered to any project in motor vehicles or semi-trailer units that exceed the legal maximum gross weight allowed for the particular class, as specified in Section 19A of Chapter 90 of the General Laws of Massachusetts.

The provisions of subsection 7.03 of the Standard Specifications shall still apply.

RULES AND REGULATIONS CONCERNING DISTINCTIVE SLOW MOVING VEHICLE EMBLEM

In accordance with the provisions of Section 7 of Chapter 90 of the General Laws as most recently amended by Chapter 684 of the Acts of 1970 and following due notice and a public hearing held on January 8, 1971 at the Registry of Motor Vehicles, 100 Nashua Street, Boston, Massachusetts, I hereby prescribe the following standards and specifications for a distinctive slow-moving vehicle emblem.

- 1.1 The minimum total construction and the dimensions of the emblem shall conform to Society of Automotive Engineers standards as last revised in June, 1967.
- 1.2 The emblem shall be securely mounted on the rear of the vehicle with a broad base down facing squarely to the rear of said vehicle, as near to center as possible with the bottom of the emblem not less than 3 feet nor more than 5 feet above ground. Said emblem shall be Incorporated herein and made a part of these rules and regulations is the standard of the Society of Automotive Engineers, SAE-J943A as last revised in June 1967, pertaining to a slow-moving vehicle identifications emblem.

FINAL CLEAN-UP

Upon completion of the work and before acceptance and final payment, the Contractor shall remove and dispose of in an approved manner at his own expense, from the right-of-way, construction site, and adjoining property, all temporary structures and all surplus materials and rubbish which the Contractor may have accumulated during the prosecution of the work, and shall leave the areas in a neat and orderly condition. No equipment or material shall be left within any of the aforementioned areas after acceptance of the Contract without the written permission of the Engineer. The Contractor shall not abandon any material at or near the site regardless of whether or not it has any value.

PERMITS

The Contractor will be responsible for any and all City of Worcester permits including the Street Opening Permit for each location, which can be obtained from the Management Services Department located at 20 East Worcester Street, Worcester, Massachusetts.

EMERGENCY TELEPHONE NUMBERS

A 24-hour telephone number must be supplied along with the name of the person to be notified for repairs or emergencies. Failure to respond will necessitate the actuation of City crews at the Contractor's expense.

BID DOCUMENT

There is a fifty dollar (\$50.00) non-refundable charge for each bid document that must be tendered by either a Cashier's Check, Certified Check or Money Order payable to the City of Worcester.

COVID-19 GUIDELINES AND PROCEDURES

Contractor shall develop and implement a COVID-19 health and safety plan in accordance with the Commonwealth of Massachusetts COVID-19 Guidelines and Procedures for all Construction Sites and Workers at all Public Work. The guidelines are included in Appendix C.

COVID-19 protocols will be addressed and discussed during pre-construction conference. No additional compensation shall be considered to satisfy local, state, or federal regulations as it relates to these guidelines.

GENERAL SPECIFICATIONS
SECTION I LOCATION AND WORK TO BE DONE

The work herein specified to be done consists of rehabilitating sanitary, surface, and combined sewers and manholes in various locations and streets, in the City of Worcester, Massachusetts.

The approximate amount of Base Bid rehabilitation is as follows:

- Replacement of manhole frame and cover sets
- Rodent control
- 393 linear feet of geopolymer lining of 48-inch x 72-inch to 60-inch x 84-inch with 24-inch x 18-inch invert sanitary sewers
- 378 linear feet of geopolymer lining of 60-inch x 84-inch with 24-inch x 18-inch invert sanitary sewers
- 619 linear feet of structural cured-in-place pipe for 12-inch sanitary sewers
- Reinstatement and grouting of all active service connections in lined pipe
- 136 vertical feet of geopolymer cement lining of manholes
- Handling of existing flows (temporary bypass pumping)

The approximate amount of rehabilitation in the alternates is as follows:

- Alternate No. 1: 1,069 linear feet of geopolymer lining of 48-inch x 72-inch sanitary sewer
Reinstatement and grouting of all active service connections in lined pipe
Handling existing flows (temporary bypass pumping)
- Alternate No. 2: 1,069 linear feet of structural cured-in-place pipe for 48-inch x 72-inch sanitary sewer
Reinstatement and grouting of all active service connections in lined pipe
Handling existing flows (temporary bypass pumping)

The location, general characteristics, and principal details are shown on a set of eight (8) drawings, entitled:

CITY OF WORCESTER, MASSACHUSETTS
DEPARTMENT OF PUBLIC WORKS & PARKS
CONTRACT NO. S23-1
CAMBRIDGE STREET SEWER INTERCEPTOR REHABILITATION
PROJECT

The drawings listed above are the contract drawings, sometimes referred to herein as "the drawings". Additional drawings showing details in accordance with which the work is to be constructed will be furnished from time to time by the Contracting Officer, if found necessary, and shall then become a part hereof.

SECTION II

The Contractor shall supply Worcester Standard Manhole Frames and Covers. The Unit Bid Price for item shall include furnishing and installation of Frames and Covers.

SECTION III HANDLING AND DISTRIBUTION

The Contractor shall, at his own expense, handle, haul, and distribute all materials and all surplus materials on the different portion of the work as required.

He shall provide suitable and adequate storage room for materials and equipment during the progress of the work and be responsible for any loss of or damage to materials and equipment furnished or accepted by him until the final acceptance of the work.

Delays in handling involving storage and demurrage charges by transportation companies and vendors shall be at the expense of the contractor.

SECTION IV SAMPLES – INSPECTION – APPROVAL

All materials and equipment furnished by the Contractor to be incorporated in the work shall be subject to the inspection and approval of the Contracting Officer.

As soon as possible after the contract has been awarded, the Contractor shall furnish to the Contracting Officer data relating to materials and equipment. Such data shall be sufficiently complete to enable the Contracting Officer to identify the particular product in question.

If the Contracting Officer so requires, either prior to beginning or during the progress of the work, the Contractor shall submit samples of materials for such special tests as may be necessary to demonstrate that they conform to specifications. Such samples shall be furnished, taken, packed, and shipped as directed, at the expense of the contractor. Except as otherwise noted, the City shall make arrangements for and pay for the tests.

Facilities and labor for the handling and inspection of all materials and equipment shall be furnished by the Contractor. Defective materials and equipment shall immediately be removed from the site of the work.

The Contractor shall place his orders for the various materials sufficiently early to permit the completion of all testing and inspection before the materials are required for incorporation in the work. He may not claim that his work has been delayed because of his own failure to purchase his materials early enough to allow for the time required for such inspection and testing.

When required, the Contractor shall furnish to the Contracting Officer triplicate sworn copies of manufacturer's shop or mill tests (or reports from independent testing

laboratories) relative to materials, equipment performance ratings, and concrete data.

After approval of the samples, data, etc., the materials and equipment used on the work shall in all respects conform therewith.

SECTION V OCCUPYING PRIVATE LAND

The Contractor shall not (except after consent from the proper parties) enter or occupy with men, tools, materials, or equipment, any land outside the rights-of-way or property of the City.

SECTION VI PERMITS

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

SECTION VII INTERFERENCE WITH AND PROTECTION OF STREETS DRIVES, ETC.

The Contractor shall not close nor obstruct any portion of a street, road, or private way without obtaining permits therefore from the proper authorities. If any street 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 Contracting Officer.

Streets, roads, private ways, and walks shall be maintained passable by the Contractor at his expense, and the Contractor shall assume full responsibility for the adequacy and safety of provisions made.

The Contractor shall conduct his work so as to interfere as little as possible with private business and public travel. He shall at his own expense, wherever necessary or required, maintain fences, provide watchmen, maintain lights, and take such other precautions as may be necessary to protect life and property, and shall be liable for all damages occasioned in any way by his act or neglect, or that of his agents, employees, or workmen.

SECTION VIII STORAGE OF MATERIALS AND EQUIPMENT

All excavated materials, construction equipment, and materials and equipment to be incorporated in the new work, shall be so placed as not to injure the work and so that free access may be had at any time to all parts of the work and to all public utility installations in the vicinity of the work. Materials and equipment shall be kept neatly piled and compactly and conveniently stored so as to inconvenience as little as possible public travel and adjoining tenants.

SECTION IX INSUFFICIENCY OF SAFETY PRECAUTIONS

If at any time, in the opinion of the Contracting Officer, the work is not properly lighted, barricaded, and in all respects safe in respect to public travel, persons on or about the work, or public or private property, the Contracting Officer shall have the right to order such safeguards to be erected and such precautions to be taken as he deems advisable and the Contractor shall promptly comply with such orders. If under such circumstances, the Contractor does not or cannot immediately put the same into proper and approved conditions, or, if the Contractor or his representative is not upon the ground so that he can be immediately notified of the insufficiency of safety precautions there, the Contracting Officer may put the work into such a condition that it shall be in his opinion, in all respects safe, and the Contractor shall pay all expenses of such labor and materials as may have been used for this purpose by him or by the Contracting Officer. Such action of the Contracting Officer, or his failure to take such action, shall in no way relieve the Contractor of the entire responsibility for any cost, loss, or damage by any party sustained on account of the insufficiency of the safety precautions taken by him or by the Contracting Officer acting under authority of this section.

SECTION X PUBLIC SAFETY

The Contractor shall at his expense furnish all required barricades, warning and detour signs, and shall at all times provide adequate control of moderate traffic with flagmen. Wherever, in the opinion of the Contracting Officer, traffic is sufficiently congested or public safety is endangered, the City will furnish uniformed Police Officers without charge to the Contractor to direct traffic and to keep traffic off any part of the highway in which construction is being carried on. These Officers shall be in addition to the Contractor's watchmen required under the other items of the contract or his flagmen required herein.

The employment of traffic watchmen, flagmen, or special officers for any purpose connected with the project shall in no way relieve the Contractor of any responsibility or liability under the terms of the contract.

SECTION XI CONTRACTING OFFICER TO GIVE ORDERS

The Contracting Officer shall make all necessary explanations as to the meaning and intention of the drawings and specifications, and shall give all necessary orders and directions.

The order or sequence of execution of the work and the general conduct of the work shall be subject to the approval of the Contracting Officer, who shall have authority to direct the order or sequence where public necessity or welfare shall require, which approval or direction, shall however, in no way affect the responsibility of the Contractor in the conduct of the work. Whenever the Contractor is not present on any part of the work where it may be desired to give directions, orders may be given by the Contracting Officer, and shall be received and obeyed

by the superintendent or foreman who may have charge of the particular work in reference to which orders are given.

SECTION XII LIABILITY OF CONTRACTOR

The Contractor shall take all responsibility for the work done under this contract, for the protection of the work, and for preventing injuries to persons and damage to property and utilities on or about the work. He shall in no way be relieved of his responsibility by any right of the Contracting Officer to give permission or issue orders relating to any part of the work, nor by any such permission given or orders issued nor by failure of the Contracting Officer to give such permission or issue such orders. The Contractor shall bear all losses resulting to him or to the City on account of the amount or character of the work, or because the nature of the land in or on which work is done is different from what was estimated or expected, or on account of the weather, elements, or other causes.

SECTION XIII LINES, GRADES, AND MEASUREMENTS

The controlling lines and grades shall be given to the Contractor, who shall provide at his own expense such batter boards, forms, materials, and labor as may be required. Additional batter boards, lines, grades, and forms shall be furnished and set by the Contractor as directed. If the Contractor, through willfulness or carelessness, removes or permits to be removed said reference marks before the prosecution of the work requires it, they shall be replaced at his expense.

The Contractor shall make all measurements and check dimensions necessary for the proper construction of the work called for by the drawings and specifications, and during the prosecution of the work, he shall make all necessary measurements to prevent misfitting in said work, and he shall be responsible therefore and for the accurate construction of the entire work.

SECTION XIV WORK TO CONFORM

All work shall conform during its progress and on its completion truly to the lines, levels, and grades indicated on the drawings or given by the Contracting Officer and shall be built in a thoroughly substantial and workmanlike manner, in accordance with the plans and specifications and directions given from time to time by him. In no case shall any work in excess of the plan requirements and specifications be paid for unless ordered in writing by said Contracting Officer.

All work done without instructions having been given therefore by the Contracting Officer, or done without proper lines or levels, or done during the absence of the Contracting Officer or his agent, will not be estimated or paid for except when such work is authorized by the Contracting Officer in writing. Work so done may be ordered uncovered or taken down, removed, and replaced at the Contractor's sole cost and expense.

SECTION XV DISCREPANCIES ERRORS AND OMISSIONS

The drawings and specifications are intended to be explanatory of each other, but should any discrepancy appear or any misunderstanding arise as to the import of anything contained in either, the interpretation and decision of the Contracting Officer shall be final and binding on both parties to this contract.

Any correction or errors or omissions in drawings and specifications may be made by the Contracting Officer when such correction is necessary for the proper fulfillment of their intention as construed by him. Where said correction of errors or omissions, except as provided in the next two paragraphs as shown below, adds to the amount of work to be done by the Contractor, compensation for said additional work shall be made under the items for Extra Work except where additional work may be classed under some item of work for which a unit price is included in the proposal.

The fact that specific mention of a fixture, or of any part of the work is omitted in the specifications whether intentionally or otherwise, when the same is clearly shown or indicated on the drawings, or is usually and customarily required to complete fully such work as is specified herein, will not entitle the Contractor to consideration in the matter of any claim for extra compensation, but the said fixtures or work, or both, must be installed or done the same as if called for by both the drawings and drawings and specifications.

All work indicated on the drawings and not mentioned in the specifications, or vice versa, and all work and material usual and necessary to make the work complete in all its parts, whether or not they are indicated on the drawings or mentioned in the specifications, shall be furnished and executed the same as if they were called for by both the drawings and specifications.

SECTION XVI PIPE LOCATION

Pipelines will be located substantially as indicated on the drawings, but the right is reserved to make such modifications in location as may be found desirable to avoid interference with existing structures or for other reasons. Where fittings, etc., are noted on the drawings, such notation is for the Contractor's convenience and does not relieve him from laying and jointing different or additional items, where required, at the unit prices agreed upon in the proposal.

SECTION XVII LIMITS OF NORMAL EXCAVATION

In determining the quantities of excavation to which unit prices shall apply, the limits of normal width and depth of excavation shall be as described below unless other limits are indicated on the drawings or specified.

For pipes in trench, the normal width of the trench shall be measured between vertical planes which are a distance apart equal to the sum of 18 inches plus 1-1/3

times the nominal inside diameter of the pipe. If the width so computed is less than 3 feet, a width of 3 feet shall be taken as the normal width for payment. The normal depth shall be measured to a distance of 0.5 feet below the bottom of the outside of the pipe in earth and in rock unless there be a cradle underneath the pipe, in which case the normal depth shall be measured to the underside of the cradle. The width of trench for the cradle shall be assumed to be that above specified for pipes in trenches. No allowance will be made for additional width or depth of trench for bell holes or at the manholes.

For other structures, the normal width shall be measured between vertical planes 1 ft. outside the neat lines of the several parts of the structure, except that the width at any elevation shall be measured as not less than the width at a lower elevation. The normal depth shall be measured to the underside of that part of the structure for which the excavation is made.

SECTION XVIII COMPUTATION OF QUANTITIES

For the estimating of quantities in which the computation of areas by geometric methods would be comparatively laborious it is stipulated and agreed that the planimeter shall be considered an instrument of precision adapted to the measurement of such areas.

It is further stipulated and agreed that the computation of the volume of prismsoids shall be by the method of average end areas.

SECTION XIX PROTECTION AGAINST WATER AND STORM

The Contractor shall take all precautions to prevent damage to the work by groundwater, storms, or by floodwater entering the site of the work directly or through the ground. In case of damage by storm or water, the Contractor shall make such repairs or replacements or rebuild such parts of the work as the Contracting Officer may require in order that the finished work may be completed as required by the drawings and specifications.

SECTION XX PRECAUTIONS DURING ADVERSE WEATHER

During adverse weather 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 by other approved means.

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 approved 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 shall be warm throughout when used.

The Contracting Officer may suspend construction operations at any time when, in his judgment, the conditions are unsuitable or the proper precautions are not being taken, whatever the weather may be, in any season.

SECTION XXI DEFINITIONS

Wherever the words defined in this section or pronouns used in their stead occur in the specifications, they shall have the meanings herein given.

As Directed, As Required, Etc.

Wherever in the specifications, or upon the drawings, the words “as directed”, “as required,” “as permitted,” or words of like import are used, it shall be understood that the direction, requirement, or permission of the Contracting Officer is understood and similarly, the words “approved,” “acceptable,” “satisfactory” or words of like import shall mean approved by or acceptable and satisfactory to the Contracting Officer.

Elevation

The figures given in the contract and specifications or upon the drawings after the word “elevation” or abbreviation of it shall mean the distance in feet above the datum adopted by the Contracting Officer.

Rock

The word “rock” wherever used as the name of an excavated material shall mean boulders and pieces of concrete or masonry exceeding one-half cubic yard in volume, or solid ledge rock which, in the opinion of the Contracting Officer requires for its removal, drilling and blasting or wedging, or sledging, or barring, or breaking up with a power-operation tool. No soft or disintegrated rock which can be removed with a hand pick or power-operated excavator shovel, no loose, shaken, or previously blasted rock or broken stone in rock fillings or elsewhere, and no rock exterior to the maximum limits of measurement allowed, which may fall into the excavation, will be measured or allowed. Excavated stone paving blocks and concrete roadway base within the limits of the trench excavation shall be defined and measured as “rock” excavation.

Earth

The word “earth” shall mean all kinds of material excavated or which are to be excavated, except rock as above defined.

SECTIONS XXIII ABBREVIATIONS

Where any of the following abbreviations are used in these specifications, they shall have the meaning set forth opposite each.

AAR - Association of American Railroads
AASHO - American Association of State Highway Officials
ACI - American Concrete Institute
AGA - American Gas Association
AIEE (IEEE) -American Institute of Electrical Engineers (Institute of Electrical and Electronic Engineers Inc.)\

AISC - American Institute of Steel Construction
ANSI - American National Standards Institute -American Railway Association
AREA - American Railway Engineering Association
-United States of America Standards Institute (formerly American Standards Association)
ASCE - American Society of Civil Engineers
ASLA - American Society of Landscape Architects
ASME - American Society of Mechanical Engineers -American Society for Testing and Materials
AWS - American Welding Society
AWWA - American Water Works Association
CIPRA - Cast Iron Pipe Research Association
EIS - Environmental Impact Statement
MEC - Massachusetts Electrical Code
NASSCO – National Association of Sewer Service Companies
NBS - National Bureau of Standards
NCPI - National Clay Pipe Institute
NEC - National Electrical Code, Latest Edition
NEMA - National Electrical Manufacturers Association
NEWWA - New England Water Works Association
NFPA - National Fire Protection Association
PACP – Pipeline Assessment and Certification Program
USASI - Standard of the United States of America Standards Institute (formerly American Standards Association)
FEDERAL SPECIFICATION - Federal Specifications issued by the Federal Supply Service of the General Services Administration Washington,D.C
AWG - American or Brown and Sharpe. Wire Gage.
STL.W.G. - U.S. Steel Wire, Washburn and Moen, American Steel & Wire Cos., Roetling Gage
USSGage- United States Standard Gage

WORCESTER STANDARD SPECIFICATIONS

Except as indicated in the specifications and on the plans, all work shall be in accordance with the pertinent requirements of the



CITY OF WORCESTER
DEPARTMENT OF PUBLIC WORKS & PARKS

STANDARD SPECIFICATIONS
&
DETAILS

February 15, 2022



(Not Included - Available on -
<http://www.worcesterma.gov/engineering>)

SUPPLEMENT TO SPECIFICATIONS

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SUPPLEMENT TO SPECIAL PROVISIONS (ON PAGES E1 TO E3)

SPECIAL PROVISIONS

In addition to Special Provisions located on pages E1 through E3, the Specifications shall be amended and supplemented by the following:

1. Hauling, Handling and Storage of Materials

- A. The Contractor shall, at its own expense, handle and haul all materials furnished by it and shall remove any of its surplus materials at the completion of the work.
- B. The Contractor shall provide suitable and adequate storage for equipment and materials furnished by it that are liable to injury and shall be responsible for any loss of or damage to any equipment or materials by theft, breakage, or otherwise.
- C. All excavated materials and equipment to be incorporated in the Work shall be placed so as not to injure any part of the Work or existing facilities and so that free access can be had at all times to all parts of the Work and to all public utility installations in the vicinity of the work. Materials and equipment shall be kept neatly piled and compactly stored in such location as will cause a minimum of inconvenience to public travel and adjoining owners, tenants and occupants.
- D. 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.

2. Easements

- A. As indicated on the drawings, a portion of the work is located in easements obtained by the Owner. The Contractor has no rights outside of the easements unless they are obtained from the property owner.
- B. Contractor shall schedule work so that it will cause minimum inconvenience and nuisance to abutting property owners, over the shortest possible time.
- C. Easements shall be kept clean; no rubbish or discarded construction materials shall be allowed to accumulate. Storage of excess construction materials, including soil, ledge, equipment, or machinery on easements will not be allowed.
- D. Restoration of fences, shrubs, trees and grass, both natural and artificial, shall be completed promptly following completion of the work in an easement, to minimize disruption and inconvenience to property owners.
- E. Unless approved by the Engineer, the use of easements for ease of access to and egress from other areas of the project will not be permitted.

3. 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 own expense, provide suitable and safe means for completely covering all open excavations and for accommodating travel when work is not in progress.
- B. Bridges provided for access to private property during construction shall be removed when no longer required.
- C. The length of open trench will be controlled by the particular surrounding conditions but shall always be confined to the limits prescribed by the Engineer.
- D. If the excavation becomes a hazard, or if it excessively restricts traffic at any point, then special construction procedures shall be taken, such as limiting the length of trench and prohibiting stocking excavated material in the street.
- E. All street excavations shall be completely closed at the end of each work day. Backfilling or use of steel plates of adequate strength to carry traffic shall be used.

4. Maintenance of Traffic

- A. Unless permission to close the street is received in writing from the proper authority, all excavated materials and equipment shall be placed so that vehicular and pedestrian traffic may be safely maintained at all times.
- B. Should the Chief of Police deem it necessary, uniformed officers will be assigned to direct traffic. The Contractor shall make all arrangements in obtaining uniformed officers required.
- C. The Contractor shall at its own expense, as directed by the Police Traffic Control/Safety Officer, provide and erect acceptable barricades, barrier fences, traffic signs, and all other traffic devices not specifically covered in a bid item, to protect the work from traffic, pedestrians, and animals. The Contractor shall provide sufficient temporary lighting such as lanterns/flashers (electric battery operated) or other approved illuminated traffic signs and devices to afford adequate protection to the traveling public, at no additional cost to the Owner. See Section 01552 CONSTRUCTION ZONE SAFETY PLAN.
- D. The Contractor shall furnish all construction signs that are deemed necessary by and in accordance with Part VI of the Manual on Uniform Traffic Control Devices as published by the U.S. Department of Transportation. In addition, the Contractor may be required to furnish up to 128 square feet of additional special construction warning signs. Size and exact wording of signs shall be determined by the Engineer during construction.

- E. The intent of policing is to ensure public safety by direction of traffic. Police officers are not to serve as watchmen to protect the Contractor's equipment and materials.
- F. Nothing contained herein shall be construed as relieving the Contractor of any of its responsibilities for protection of persons and property under the terms of the Contract.

5. Care, Protection, and Security of Property

- A. The Contractor shall be responsible for the preservation of all public and private property, and shall use every precaution necessary to prevent damage thereto. If any direct or indirect damage is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work on the part of the Contractor, such property shall be promptly restored by the Contractor, at his expense, to a condition similar or equal to that existing before the damage was done, to the satisfaction of the Engineer.
- B. The Contract shall provide security for the private property with temporary by-pass pumping during the entire duration of the temporary by-pass. Once the temporary by-pass pumping is not required, the Contractor shall notify the owner and/or contact person of the private property. The private property shall be secured and left in the original condition prior to the temporary by-pass. If any damages or trespassing occurs at the private property during the temporary by-pass, the Engineer is to be notified immediately. The Contractor is responsible for all property damage encountered during the temporary by-pass.

6. Protection and Relocation of Existing Structures and Utilities

- A. All existing buildings, utilities, pipes, poles, wires fences, curbing, property line markers and other structures which the Engineer decides must be preserved in place without being temporarily or permanently relocated, shall be carefully supported and protected from damage by the contractor. Should such property be damaged, it shall be restored by the Contractor, at no additional cost to the Owner.
- B. The Contractor shall determine the location of all underground structures and utilities (including existing water services, drain lines, electrical lines, and sewers). Services to buildings shall be maintained, and all costs or charges resulting from damage thereto shall be paid by Contractor.
- C. When fences interfere with the Contractor's operations, the Contractor shall remove and (unless otherwise specified) promptly restore them in accordance with Section 01564 EXISTING FENCES.
- D. On paved surfaces the Contractor shall not use or operate tractors, bulldozers, or other power-operated equipment with treads or wheels which are shaped so as to cut or otherwise damage such surfaces.

- E. All property damaged by the Contractor's operations shall be restored to a condition at least equal to that in which it was found immediately before work was begun. Suitable materials and methods shall be used for such restoration.
- F. Restoration of existing property and structures shall be carried out as promptly as practicable and shall not be left until the end of the construction period.

7. Maintenance of Flow

- A. The Contractor shall, at his own cost, provide for the flow of sewers and drains interrupted during the progress of the work and shall immediately cart away and dispose of all offensive matter. The entire procedure of maintaining existing flow shall be fully discussed with the Engineer well in advance of the interruption of any flow.
- B. All existing drainage facilities including, but not limited to; brooks, streams, canals, channels, culverts, catch basins and drainage piping shall be adequately safeguarded so as not to impede drainage or to cause siltation of downstream areas in any manner whatsoever. If the Contractor damages or impairs any of the aforesaid drainage facilities, he shall repair the same within the same day.
- C. At the conclusion of the work, the Contractor shall remove all silt in drainage structures caused by his operations as described in Section 01740, CLEANING UP.

8. 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.
- B. 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.
- C. The Contractor shall reimburse the Owner for any expense, 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.

9. Sanitary Regulations

Sanitary conveniences for the use of all persons employed on the work, properly screened from public observation, shall be provided in sufficient numbers in such manner and at such locations as may be approved. The contents shall be removed and disposed of in a satisfactory manner as the occasion requires. The Contractor shall rigorously prohibit the committing of nuisances within, on or about the work. Any employees found violating

these provisions shall be discharged and not again employed on the work without the written consent of the Engineer. The sanitary conveniences specified above shall be the obligation and responsibility of the Contractor.

10. Safety and Health Regulations

This project is subject to the Safety and Health regulations of the U.S. Department of Labor set forth in 29 CFR, Part 1926, and to the Massachusetts Department of Labor and Industries, Division of Industrial Safety "Rules and Regulations for the Prevention of Accidents in Construction Operations (454 CMR 10.0 et. seq.)." Contractors shall be familiar with the requirements of these regulations.

11. Site Investigation

The Contractor acknowledges that he has satisfied himself as to the conditions existing at the site of the work, the type of equipment required to perform this work, the quality and quantity of the materials furnished insofar as this information is reasonably ascertainable from an inspection of the site, as well as from information presented by the drawings and specifications made a part of this contract. Any failure of the Contractor to acquaint himself with available information will not relieve him from the responsibility for estimating properly the difficulty or cost of successfully performing the work. The Owner assumes no responsibility for any conclusion or interpretation made by the Contractor on the basis of the information made available by the Owner.

12. Weather Protection

In conformance with Sections 44F and 44G of Chapter 149 of the General Laws of Massachusetts, the General Contractor shall install weather protection and shall furnish adequate heat in the area so protected during the months of November through March. Standards for such specifications shall be established by the Director of Building Construction in the Executive Office for Administration and Finance.

13. Electric Service

- A. The Contractor shall make all necessary applications and arrangements and pay for all fees and charges for electrical energy for power and light necessary for the proper completion of this contract during its entire progress. The Contractor shall provide and pay for all temporary wiring, switches, connections, and meters.
- B. There shall be sufficient electric lighting so that all work may be done in a workmanlike manner where there is not sufficient daylight.

14. Hazardous Waste

Should the Contractor, while performing work under this contract, uncover hazardous materials, as defined in Massachusetts Hazardous Waste Regulations 310 CMR 30.00, he shall immediately notify the Engineer. The Contractor is not, and has no authority to act as,

a handler, generator, operator or disposer of hazardous or toxic substances found or identified at the site, and the Owner shall undertake all such functions.

15. Sewer Service Connections

- A. All sewer service connections shall be identified and located prior to each segment replacement to expedite reconnection.
- B. The Contractor shall affix a written notice to the door of each home that has sewer service on the segment to be replaced 48-hours prior to disconnection of the service and again the day of disconnection.
- C. Services on the segments of mainline scheduled to be pipe burst, shall be disconnected from the existing main and connected to the temporary bypass pumping system prior to bursting.
- D. Flow from the existing sewer services shall be bypass pumped as specified in Section 01575 HANDLING EXISTING FLOWS and in Section 01535 TEMPORARY BYPASS PUMPING SYSTEM.

16. Twin Manholes

- A. The City of Worcester has a combination of sanitary manholes, storm drain manholes, and “twin manholes”. The Contractor is advised that some manholes in this project proposed for work may be twin manholes.
- B. A twin manhole is defined as a manhole that is shared by both the sanitary and storm drain systems. The manhole typically has two inverts. In a twin manhole, the majority of the sanitary inverts have been sealed with an aluminum plate and restraint. The plating system was installed to prevent storm water from entering the sanitary system. It is crucial that this system be in place to prevent surcharging of the sanitary system. See Appendix B for Twin Manhole Inspection Procedure.

17. Bituminous Pavement

- A. Bituminous pavement shall include permanent trench binder course pavement, 2-inches thick; permanent trench top course pavement, 2-inches thick; and 12-inches of processed gravel subbase. Permanent pavement shall be extended 12-inches beyond limits of excavation, as shown on the drawings.

18. Pipe Location

Pipe shall be located substantially as indicated on drawings. The Owner reserves the right, acting through the Engineer, to make such modifications as may be deemed desirable to avoid interference with existing structures or for other reasons.

19. Dimensions of Existing Structures

Where the dimensions and locations of existing structures are of critical importance in the installation or connections of new 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.

20. Occupying Private Property

The Contractor shall not enter upon nor occupy with men, equipment or materials any property outside of the public roadways or Owner's easements, except with the written consent of the property owner or property owner's agent.

21. Existing Utility Locations - Contractor's Responsibility

- A. The location of existing underground services and utilities shown on the drawings is based on available records. It is not warranted that all existing utilities and services are shown, nor that shown locations are correct. The Contractor shall be responsible for having the utility companies locate their respective utilities on the ground prior to excavating.
- B. To satisfy the requirements of Massachusetts law, Chapter 82, Section 40, the Contractor shall, at least 72 hours, exclusive of Saturdays, Sundays and holidays, prior to excavation in the proximity of telephone, gas, cable television and electric utilities, notify the utilities concerned by calling "DIG SAFE" at telephone number: 1-888-344-7233 or 811.
- C. The Contractor shall coordinate all work involving utilities and shall satisfy himself as to the existing conditions of the areas in which he is to perform his work. He shall conduct and arrange his work so as not to impede or interfere with the work of other contractors working in the same or adjacent areas.
- D. A limited subsurface utility survey was performed from #379 to #553 Cambridge Street and is available upon request. The information shown in the survey does not waive the Contractor's responsibility to locate existing utilities.

22. Coordination of Work

The General Contractor shall be responsible for coordinating his own work as well as that of any subcontractors. He shall be responsible for notification of the Engineer when each phase of work is expected to begin and the approximate completion date.

23. Access Points for Cured-in-Place Pipe Inversions

A schedule listing the access point locations, area of excavation, depth of excavation, and dates of access with work hours shall be submitted to the Engineer prior to the cured-in-place pipe rehabilitation work beginning. Once the access point is not required, the

Contractor shall notify the Engineer.

24. Maintenance of Trench Surface

After backfilling and compacting the trench, the Contractor shall be responsible for keeping the ground surface dry and passable at all times until the surface has been restored to original conditions.

25. Compliance with Permits

The Contractor shall perform all work in conformance with requirements of the Permits, which appear in Section 00890, PERMITS.

26. Cutting, Fitting and Patching

- A. The Contractor shall do all cutting, fitting, or patching of his work that may be required to make its several parts come together properly and fit it to receive or be received by work of other Contractors, as shown upon or reasonably implied by the drawings and the specifications for the completed structure, including all existing work.
- B. The Contractor shall not endanger any work by cutting, digging, or otherwise and shall not cut or alter the work of any other Contractor, save with the consent of the Engineer.
- C. All holes or openings required to be made in new or existing work, particularly at pipe, conduit, or other penetrations not covered by escutcheons or plates shall be neatly patched. All such holes shall be made completely watertight as approved by the Engineer.
- D. Size and locations of holes required in steel, concrete, or other structural or finish materials for piping, wiring, ducts, etc., which have not been located and detailed on the drawings shall be approved by the Engineer prior to layout and cutting thereof. All holes shall be suitably reinforced as required by the Engineer.
- E. Workmanship and materials of patching and repair work shall match the adjacent similar work and shall conform to the applicable sections of the specification. Patches and joints with existing work shall provide, as applicable in each case, visual, structural, and waterproofing continuity.

27. Contractor's Representative

Contractor shall designate a representative who will be available to respond to emergency calls by the Owner at any time day and night and on weekends and holidays should such a situation arise.

28. Construction Crews

The Contractor shall not increase the number of construction crews assigned to the work without providing one week advance notice to the Engineer.

29. Massachusetts Data Security Regulations

The Contractor is required to comply with data security regulations contained in 201 CMR 17.00 that have been established to safeguard personal information of Massachusetts residents contained in paper or electronic records. The Contractor shall not submit to the Engineer or Owner documents in paper or electronic form that contain personal information (person's name combined with one or more of the following – Social Security Number, driver's license number or state-issued identification card number, financial institution account number, or credit or debit card number). Any document submitted to the Engineer that violates this provision shall be returned to the Contractor and the Contractor shall remove personal information from the document prior to resubmitting it to the Engineer. The Contractor shall require each Subcontractor to also comply with the MA data security regulations insofar as they involve submittal of personal information to the Engineer and Owner.

30. Bidder Certification – OSHA Training

- A. As of July 1, 2006, all employees who work on Massachusetts public works construction sites, on projects estimated to cost more than \$10,000, must have no less than ten (10) hours of OSHA-approved safety and health training.
- B. This law will apply to any bid submitted on or after July 1, 2006 and to any contract awarded on or after July 1, 2006. This law directs the Massachusetts Attorney General to restrain award of the construction contracts to any contractor who is in violation of this requirement and to restrain the performance of these contracts by non-complying contractors.
- C. Noncompliance with this law will disqualify contractors from bidding on public contracts.

31. Winter Work

- A. The Owner will allow the Contractor to work within the public ways on this Project during the winter months.
- B. The Contractor will be required to backfill all excavations at the end of each work day, or place Jersey barriers around open excavations.
- C. The Owner has agreed to provide snow removal services on all public ways affected by this Project. The Owner will not remove snow from the Contractor's work area that the public will not be using for either driving or pedestrian activity.

- D. The Contractor will provide snow removal services on any public way affected by his work that has been authorized by the Owner to be closed to through traffic. Snow will be plowed in accordance with the Owner's normal plowing schedule for the closed public ways.
- E. In no event will the Owner remove snow on any private way affected by the Contractor's work on this Project. The Contractor may coordinate snow removal activities with whoever provides these services for the owners of the private way(s).

32. Nighttime/Weekend Work

- A. Construction activity shall be restricted to a normal 8-hour day, 5-day week between the hours of 7:00 a.m. and 5:00 p.m., Monday through Friday, except when required due to high traffic areas or vicinity to schools or other sensitive buildings. Continuous work for CIPP lining may extend beyond work hours; however, no new work shall be started after 4:00 p.m. unless authorized by the Owner and approved by the Engineer in advance.
- B. No construction work shall be allowed on Saturdays, Sundays or Holidays without written authorization from the Owner and approval of the Engineer. The compensation of detail officers and the Engineer for work approved outside of the limitations aforementioned shall be the responsibility of the Contractor and shall be at no additional cost to the Owner.

MEASUREMENT AND PAYMENT

Measurement and Payment shall be as specified in this section:

1.01 GENERAL:

1. All work performed as described in these contract documents will be paid for under one or more of the items listed in the BID ITEM SHEET. All other activities required in connection with performance of the work, including all work required under this Contract, whether described in the contract documents or mandated by applicable codes, permits and laws, will not be separately paid for unless specifically provided for in the BID ITEM SHEET, but will be considered incidental to performance of the overall project.
2. Each unit or lump-sum price stated in the BID ITEM SHEET shall constitute full compensation as herein specified for each item of work completed in accordance with the drawings and specifications.
3. The payment items listed herein and in the BID ITEM SHEET are intended to provide full payment for the work shown on the drawings and specified herein. Any work called for or implied in the documents but not listed as a payment item shall be considered incidental to the overall project.
4. Unless otherwise noted, each item shall be furnished and installed in accordance with the technical section whether a specific applicable payment item exists or not.

1.02 MANHOLE FRAMES AND COVERS:

1. The work for this item shall constitute full compensation to the Contractor for furnishing and installing new manhole frames and covers, and shall be measured per set.
2. The work shall be paid for at the contract unit bid price under Item 236.

1.03 RODENT CONTROL:

1. The work for this item shall constitute full compensation to the Contractor for rodent control and be measured as lump sum.
2. The work shall be paid for at the contract unit bid price under Item 270.

1.04 GEOPOLYMER LINING:

1. The work of this item shall be measured at the contract unit price bid per linear foot of geopolymer lining installed from inside edge of manhole to inside edge of manhole.

2. Measurement, including all material, labor, tools and equipment shall be based on the actual length of pipes lined as determined by the Engineer. Geopolymer lining shall be installed as specified in Section 02431, GEOPOLYMER LINING OF SANITARY SEWERS.
3. Locating active and inactive service connections and television inspection in conjunction with investigation shall be considered incidental to the work and shall not be measured separately for payment.
4. Repairing the pipe invert in accordance with specification Section 02431, GEOPOLYMER LINING OF SANITARY SEWERS shall be considered incidental to the work and shall not be measured separately for payment.
5. Reinstating service and lateral connections, service connection materials, and excavations for the purpose of reinstating connections shall be considered incidental to the work and shall not be measured separately for payment.
6. Inspecting, testing and grouting of reinstated service connections shall be paid for at the contract unit bid price under Items 704 and 709.
7. Television inspection and cleaning (pre and post inspection) of sewer lines associated with the installation of geopolymer cement liner shall be considered incidental to the work and shall not be measured separately for payment.
8. Flushing/dyed water testing for active/inactive service connections in conjunction with the television inspection of sewer lines associated with the installation of geopolymer cement liner shall be considered incidental to the work and shall not be measured separately for payment.
9. Excavation of an access point and restoring it to its original condition after the installation of the geopolymer cement liner shall be considered incidental to the work and shall not be measured separately for payment. If the access point is at a manhole, the manhole shall be replaced as specified in the Worcester Standard Specifications. Manhole replacement at an access point shall be considered incidental to the work and shall not be measured separately for payment.
10. The work shall be paid for at the contract unit bid price under Items 700, 701, and 707.
11. Ten percent of the payment for the subdivision Item 700, 701, and 707 "Geopolymer Lining" shall be withheld until the pipeline rehabilitation's have satisfactorily completed and passed field testing/inspection(s) as specified in Section 02431, GEOPOLYMER LINING OF SANITARY SEWERS.

1.05 STRUCTURAL CURED-IN-PLACE PIPE:

1. The work of this item shall be measured at the contract unit price bid per linear foot

of structural cured-in-place pipe installed from inside edge of manhole to inside edge of manhole.

2. Measurement, including all material, labor, tools and equipment shall be based on the actual length of pipes lined as determined by the Engineer. Structural Cured-In-Place Pipe shall be installed as specified in Section 02428, CURED-IN-PLACE PIPE.
3. Locating active and inactive service connections and television inspection in conjunction with investigation shall be considered incidental to the work and shall not be measured separately for payment.
4. Repairing the pipe invert in accordance with specification Section 02428, CURED-IN-PLACE PIPE shall be considered incidental to the work and shall not be measured separately for payment.
5. Reinstating service and lateral connections, service connection materials, and excavations for the purpose of reinstating connections shall be considered incidental to the work and shall not be measured separately for payment.
6. Inspecting, testing and grouting of service connections shall be paid for at the contract unit bid price under Item 712.
7. Inspecting, testing, and grouting of service connections associated with Item 703 shall be considered incidental to the work and shall not be measured separately for payment.
8. Television inspection and cleaning (pre and post inspection) of sewer lines associated with the installation of structural cured-in-place pipe shall be considered incidental to the work and shall not be measured separately for payment. This includes, but is not limited to, heavy cleaning to remove grease, roots, tuberculation, or any other obstructions that could prevent the installation of structural cured-in-place pipe.
9. Flushing/dyed water testing for active/inactive service connections in conjunction with the television inspection of sewer lines associated with the installation of structural cured-in-place pipe shall be considered incidental to the work and shall not be measured separately for payment.
10. Excavation of an access point and restoring it to its original condition after the installation of the cured-in-place liner shall be considered incidental to the work and shall not be measured separately for payment. If the access point is at a manhole, the manhole shall be replaced as specified in the Worcester Standard Specifications. Manhole replacement at an access point shall be considered incidental to the work and shall not be measured separately for payment.
11. The work shall be paid for at the contract unit bid price under Items 703 and 710.
12. Ten percent of the payment for the Items 703 and 710 “Structural Cured-in-Place

Pipe” shall be withheld until the pipeline rehabilitation’s have satisfactorily completed and passed field testing/inspection(s) as specified in Section 02428, CURED-IN-PLACE PIPE.

1.06 SEWER MANHOLE REHABILITATION:

1. Geopolymer Lining of Manholes:

- A. The work of this item shall be measured at the unit price bid per vertical foot of manhole lined.
- B. Measurement shall be based on the actual vertical footage of manhole lined and shall constitute full compensation for supplying all material, labor, tools, and equipment required to line the manhole as specified in Section 02435, SEWER MANHOLE REHABILITATION. No additional payment shall be made for material sprayed in the manhole invert or manhole frame.
- C. Cleaning and plugging or grouting of active leaks in the manhole structure prior to lining, invert sealing, and exterior grouting shall be considered incidental to the work and will not be measured separately for payment.
- D. The work under this section shall be paid at the contract unit price under Item 705.

- 2. Ten percent of the payment for the subdivision Item 705 “Geopolymer Lining of Manholes” shall be withheld until the manhole rehabilitations have satisfactorily completed and passed field testing/inspection(s) as specified in Section 02435, SEWER MANHOLE REHABILITATION.

1.07 HANDLING OF EXISTING FLOWS (TEMPORARY BYPASS PUMPING):

- 1. Handling existing sewage flows (temporary bypass pumping) in accordance with Section 01575, HANDLING EXISTING FLOWS, including providing, installing, bypass piping trenching, including excavation, backfill, bedding, select material, clearing, crushed stone, grubbing, testing, and removing all required equipment, piping, pumping, restoration of the ground surface, including gravel sub-base, temporary and permanent pavement replacement, and all work incidental thereto and not specifically included for payment under other items as required shall be measured and paid per lump sum at the contract unit price under Items 702, 708, and 711.

1.08 SERVICE AND LATERAL CONNECTION REHABILITATION:

1. Grout Service and Lateral Connection:

- A. The work of this item shall be measured per service grouted for work associated with Items 700, 701, 707, and 710. Work of this item is not associated with Item

703.

- B. The contract unit price per service grouted to be paid shall constitute full compensation for supplying all material, labor, tools, and equipment required to grout services as specified in Section 02443, SERVICE CONNECTION REHABILITATION.
- C. Bypass pumping and plugging or blocking of sewer flow shall be considered incidental to the work and shall not be measured separately for payment.
- D. The work shall be paid for at the contract unit bid price under Item 704, 709, and 712.

1.09 MOBILIZATION:

The lump sum for this item shall constitute full compensation to the Contractor for the general mobilization necessary to make the contract operational, exclusive of the cost of materials. The total for mobilization to be paid at the lump sum price under Item 706 and shall not exceed 5 percent of the total of items 236, 270, and 700 through 705, excluding Item 900 (City Use).

1.10 ENVIRONMENTAL PROTECTION:

The work of this section shall not be separately measured for payment but shall be considered incidental to the project.

1.11 SIGNAGE:

The work of this section shall not be separately measured for payment but shall be considered incidental to the project.

1.12 PORTABLE CHANGEABLE MESSAGE SIGNS:

The work of this section shall not be separately measured for payment but shall be considered incidental to the project.

1.13 PORTABLE TEMPORARY TRAFFIC SIGNALS

The work of this section shall not be separately measured for payment but shall be considered incidental to the project.

1.14 REMOVAL AND RESETTING OF EXISTING FENCES

The work of this section shall not be separately measured for payment but shall be considered incidental to the project.

1.15 RESTORATION OF LAWNS AND CROSS-COUNTRY AREAS

The work of this section shall not be separately measured for payment but shall be considered incidental to the project.

1.16 DOCUMENTATION:

All documentation, as described in Specification Section 01331, DOCUMENTATION, to be provided to the Owner shall not be separately measured for payment but shall be considered incidental to the project.

1.17 WARRANTY INSPECTION:

All warranty inspections and related work shall not be separately measured for payment but shall be considered incidental to the project.

1.18 DEWATERING:

The work of this section shall not be separately measured for payment but shall be considered incidental to the project.

1.19 SUPPORT OF EXCAVATION:

The work of this section shall not be separately measured for payment but shall be considered incidental to the project.

1.20 FIELD CONCRETE:

The work of this section shall not be separately measured for payment but shall be considered incidental to the project.

1.21 ELECTRICAL:

The work of this section shall not be separately measured for payment but shall be considered incidental to the project.

1.22 CONSTRUCTION ZONE SAFETY PLAN:

The work of this section shall not be separately measured for payment but shall be considered incidental to the project.

1.23 CONNECTIONS TO EXISTING STRUCTURES:

Connections to existing structures shall be considered incidental to the work and shall not be measured separately for payment.

1.24 DUST CONTROL

The work of this section shall not be separately measured for payment but shall be considered incidental to the project.

1.25 PAVEMENT REPLACEMENT

The work of this section shall not be separately measured for payment but shall be considered incidental to the project.

1.26 PRICE ADJUSTMENTS MANDATED BY MGL CHAPTER 30, SECTION 38A

Price adjustments for certain payment items shall be as described in Specification Section 01250 PRICE ADJUSTMENTS. Payment shall be made at the unit prices included in BID ITEM SHEET or, if no such items are contained in BID ITEM SHEET, by change order.

SECTION 00331

TV INSPECTION LOGS AND MANHOLE INSPECTION REPORTS AND FIELD OBSERVATIONS PROVIDED BY THE OWNER

PART 1 - GENERAL

1.01 PURPOSE:

A. PURPOSE OF LOGS, REPORTS AND FIELD OBSERVATIONS:

1. The purpose of the TV Inspection, Manhole Inspections and Field Observations Logs was to determine the condition of the existing sewer system and assess the extent of cleaning, repairs and/or replacement required for the system.
2. The inspections and observations provided information to prepare the design specifications included in these contract documents and to meet the requirements of the Owner.
3. Information reported from the TV Inspection, Manhole Inspections and Field Observations Logs are those observed in the field at the particular location and time the observations were made, and do not necessarily represent the present conditions.

1.02 SCOPE:

A. TV INSPECTION LOGS:

1. TV Inspection of existing pipelines has been performed, with reasonable care. The results of the inspection program are appended hereto and are a part of the Contract Documents. Videos of what was encountered at the time of the inspection may be seen by appointment, upon request, during the bidding period at the office of Weston & Sampson Engineers, Inc., 427 Main Street, Suite 100, Worcester, Massachusetts 01608. Contractors may, after obtaining Owner's permission, carry out additional pipeline inspection, at no expense to the Owner.
2. TV Inspection Logs provided in the Contract Documents are limited by the methods used for obtaining and expressing such data and is subject to various interpretations. The terms used to describe conditions encountered are subject to local usage and individual interpretation.
3. TV Inspections have been taken substantially at the locations indicated on the drawings and shown on the logs. Information presented in the inspection logs, as to the pipe condition, material build up in the pipe; etc. is based on visual observation from the videos. Information reported on the TV Inspection logs are those observed in the field at the particular location and at the time the videos were taken, and do not necessarily represent the present conditions. Condition of the pipeline, material build up in the pipe, and other factors may differ now from those originally observed.

Contractors should be aware that present conditions might affect methods of construction.

B. MANHOLE INSPECTION FORMS:

1. Manhole Inspections of existing manhole structures have been performed, with reasonable care. The results of the inspection programs are appended hereto and are a part of the Contract Documents. Contractors may, after obtaining Owner's permission, carry out additional manhole inspections at no expense to the Owner.
2. Manhole Inspection Reports provided in the Contract Documents are limited by the methods used for obtaining and expressing such data, and is subject to various interpretations. The terms used to describe conditions encountered are subject to local usage and individual interpretation.
3. Manhole Inspection Reports have been taken substantially at the locations indicated on the drawings and shown on the logs. Information presented in the inspection logs, as to extent of manhole failure, infiltration rates; material build up in the manholes; etc. is based on visual observation. Information reported on the Manhole Inspection Reports is those observed in the field at the particular location and at the time observations were made, and do not necessarily represent the present conditions. Condition of the manholes, infiltration rates, and material build up in the manholes, and other factors may differ now from those originally observed. The Contractors should be aware that present conditions might affect methods of construction.

C. FIELD OBSERVATIONS:

1. Observations of unusual field conditions if observed during the TV and Manhole Inspections are noted on the contract drawings.

PART 2 – PRODUCTS

Not Used

PART 3 - EXECUTION

3.01 EXECUTION:

- A. TV Inspection Logs and Manhole Inspection Reports are for the general information of the Contractors. The Contractors are obligated, to examine the site, records of investigations and other data pertinent to the site, and then, based upon their own interpretations and investigations, decide the character and quantity of material to be encountered, the difficulties or obstacles likely to be encountered, and other conditions affecting the work. The TV Inspection Logs and Manhole Inspection Reports are accurate only at the particular locations and times the original inspections were made. No other warranty, either expressed or implied, by the Owner, Engineer or their agents is made to the accuracy of the information contained on TV Inspection Logs and Manhole

Inspection Reports, or other data shown on the drawings or presented in the Contract Documents.

END OF SECTION

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SECTION 00890

PERMITS

PART 1 – GENERAL

1.01 DESCRIPTION:

This Section provides specific information and defines specific requirements of the Contractor regarding the preparation and acquisition of permits required to perform the work of this project.

1.02 RELATED WORK:

- A. SUPPLEMENT TO SPECIFICATION – SPECIAL PROVISIONS
- B. Section 01550, SIGNAGE (TRAFFIC CONTROL)
- C. Section 01562, DUST CONTROL
- D. Section 01570, ENVIRONMENTAL PROTECTION
- E. Section 02300, EARTHWORK

1.03 GENERAL REQUIREMENTS:

- A. The Contractor shall obtain and pay for all permits required.

<u>Permits to be Obtained by Contractor</u>	<u>Status</u>
• City of Worcester – Street Opening Permit • Trench Permit (520 CMR 14.00)(effective date 3/1/09) • City of Worcester – Hydrant Use Permit • City of Worcester – Drain Permit	* * * *
*Contractor shall prepare permit application and obtain the permit after contract is awarded, bearing all expenses.	

PART 2 - PRODUCTS

Not Used

PART 3 – EXECUTION

3.01 PERFORM WORK IN ACCORDANCE WITH REQUIREMENTS:

- A. The Contractor shall perform the work in accordance with the Contract Documents, including the attached permits/order of conditions, and any applicable municipal requirements.
- B. Prior to commencing any construction activities, the Contractor shall demonstrate to the Owner and the Engineer, through on-site inspection and submitting copies of permits or approvals, that it is in full compliance with the terms and conditions of all permits specified herein. The Contractor shall maintain full compliance with all permits throughout the performance of the work, and upon request, grant access to permitting authorities to inspect the site for the purpose of verifying such compliance.

END OF SECTION

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SECTION 01014

SCOPE AND SEQUENCE OF WORK

PART 1- GENERAL

1.01 WORK INCLUDED:

- A. This Section of the specifications covers the scope and sequence of work for the “Cambridge Street Sewer Interceptor Rehabilitation Project” in Worcester, Massachusetts:

The scope of the Base Bid includes: installation of 393 linear feet of geopolymer lining of 48-inch x 72-inch with 24-inch x 18-inch invert sanitary sewer; installation of 378 linear feet of geopolymer lining of 60-inch x 84-inch with 24-inch by 18-inch invert sanitary sewer; installation of 619 linear feet of structural cured-in-place pipe of 12-inch sanitary sewers; geopolymer lining of 136 vertical feet of manholes; replacement of 6 manhole frames and covers, reinstatement and rehabilitation of all active service and lateral connections, handling of existing flows, and other related tasks.

The scope of Alternate No. 1 includes: installation of 1,069 linear feet of geopolymer lining of 48-inch x 72-inch sanitary sewers, reinstatement and rehabilitation of all active service and lateral connections, handling of existing flows, and other related tasks.

The scope of Alternate No. 2 includes: installation of 1,069 linear feet of structural cured-in-place pipe for 48-inch x 72-inch sanitary sewers, reinstatement and rehabilitation of all active service and lateral connections, handling of existing flows, and other related tasks.

- B. The Contractor shall furnish all labor, materials, equipment, and incidentals required to complete the work as shown on the drawings and as specified herein.
- C. Sewer system rehabilitations include:
1. Geopolymer cement lining of sewer mains (manhole to manhole) to repair and seal multiple cracks and holes which are leaking or have the potential to leak (refer to section 02431, GEOPOLYMER LINING OF SANITARY SEWERS)
 2. Structural lining of sewer mains (manhole to manhole) to repair and seal multiple cracks and holes which are leaking or have the potential to leak (refer to Section 02428, CURED-IN-PLACE PIPE);
 3. Rehabilitating service connections including reinstating services and grouting to repair and seal cracks and holes which are leaking or have the potential to leak or to seal a reinstated service connection at a liner (refer to Section 02443, SERVICE CONNECTION REHABILITATION);
 4. Rehabilitating manholes including invert sealing, exterior sealing, interior coating, and building bench and invert (refer to Section 02435, SEWER MANHOLE REHABILITATION);

5. Handling existing flows (refer to Section 01575, HANDLING EXISTING FLOWS).

1.02 RELATED WORK:

SUPPLEMENT TO SPECIFICATIONS – SPECIAL PROVISIONS

PART 2 – PRODUCTS

Not Used

PART 3 - EXECUTION

3.01 SEQUENCE OF WORK:

- A. Cleaning and inspecting shall be performed prior to all other pipeline rehabilitation work in each segment of sewer (manhole to manhole).
- B. Structural lining (manhole to manhole) required in a segment of sewer shall be completed prior to any television inspecting, pressure testing, or grouting of service connections required in that segment.
- C. Exterior and interior sealing of manholes shall be completed following the completion of all adjacent pipeline rehabilitation work.
- D. The Contractor shall be responsible for scheduling its activities and the activities of any subcontractors involved, to meet the completion date, or milestones, established for the contract. Scheduling of all work shall be coordinated with the Owner and Engineer.
- E. All work may be scheduled at the Contractor's discretion within the time of contract so long as it adheres to this scope and sequence of work and all plans and specifications. The schedule is also subject to approval by the Engineer.
- F. The Contractor must coordinate with the City, Resident Engineer, Property Owners, and Businesses prior to any work or bypass pumping setup. Each inversion shall not be longer than 24-hours.

END OF SECTION

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SECTION 01250

PRICE ADJUSTMENTS

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. Price adjustments, as required by MGL Chapter 30, Section 38A, shall be implemented for this Project. Price adjustments, as enumerated in Part 3 of this specification, shall be made for the following items:

Water and Sewer Projects

- Diesel fuel and gasoline
- Liquid asphalt
- Portland cement contained in cast-in-place concrete

Road and Bridge Projects

- Diesel fuel and gasoline
- Asphalt
- Concrete
- Steel

- B. Price adjustments shall be made in accordance with the methodology adopted by the Massachusetts Department of Transportation in the following SPECIAL PROVISIONS documents, which are attached, but modified as contained herein:

1. Document 00811 Monthly Price Adjustment for Hot Mix Asphalt Mixtures, revised July 8, 2016
2. Document 00812 Monthly Price Adjustment for Diesel fuel and Gasoline, revised January 26, 2009
3. Document 00813 Price Adjustments for Structural Steel and Reinforcing Steel, dated October 11, 2018
4. Document 00814 Price Adjustments for Portland Cement concrete Mixes, dated January 12, 2009

- C. Base and Period Prices used to calculate price adjustments shall be as published by the Massachusetts Department of Transportation as presented in Documents 00811 through 00814.

1.02 CONTRACTOR CREDIT TO OWNER SHOULD PRICES DECREASE:

- A. Price adjustments will only be made if the variance between the base price and the period price is Five Percent (5%) or more.

- B. In the instance where the period price is below the base price by 5% or more, then the Contractor shall credit the Owner the adjustment.

PART 2 - PRODUCTS

Not used

PART 3 - EXECUTION

3.01 DIESEL FUEL AND GASOLINE:

- A. Price adjustments shall be determined based on documented quantities of diesel fuel and gasoline usage for site dedicated equipment. This methodology shall replace the price adjustment basis on fuel usage factors, as described within the Massachusetts Department of Transportation Document 00812.
- B. All site dedicated equipment shall be approved by the Engineer for the calculation of any qualifying price adjustment. Prior to the start of work the Contractor shall submit to the Engineer a list of all dedicated equipment for the project. The Contractor shall forward updated submittals, as necessary, throughout the duration of the contract. Only that equipment included within the current approved list shall be considered eligible for calculating a price adjustment under this Section 01250.
- C. The Contractor shall submit fuel delivery slips to the Engineer as a basis for calculating total diesel fuel and gasoline usage for site dedicated equipment. At a minimum, the delivery slips will include the name of the fuel delivery company, the date and location of fueling, the type of fuel, description of the fueled equipment and the quantity for each type of fuel delivered in gallons. Any slips not providing the minimum information shall not be included in the calculation of total diesel fuel and gasoline usage for price adjustment purposes.

3.02 LIQUID ASPHALT:

- A. The "Period Price Method" shall be used to determine price adjustments. For projects utilizing reclaimed asphalt include Reclaimed Asphalt Pavement (RAP) Factor (0.0 to <1.0) in calculation of the total price adjustment. Otherwise, use RAP Factor = 1.0.
- B. For bid items involving asphalt paving that are measured and paid on a linear foot basis, or some other basis besides tonnage, the number of tons shall be determined by the Engineer using compacted measure of thickness within the established payment limits.
- C. Asphalt paving not separately measured for payment but rather included as an incidental component of work under a related bid item shall not be considered for price adjustment.

3.03 STRUCTURAL AND REINFORCING STEEL:

- A. Steel price adjustments shall not be made for water and sewer projects.
- B. Period prices for steel are subject to change up to four (4) months after the date of original publication. Therefore, no price adjustment will be made until the index for the period is finalized.

3.04 PORTLAND CEMENT AND CONCRETE:

- A. The price adjustment applies to all projects contained herein in Section 1.01A.
- B. Field Concrete used in water and sewer projects, typically used for thrust blocks and concrete encasement, shall not be considered for price adjustment. Cast-in-place concrete used on these projects will be included in the price adjustment determination.

END OF SECTION

\\wse03.local\WSE\Projects\MA\Worcester MA\2191051 Cambridge Street Design\Design\Specs\WSE Specs\01250 - Price Adjustments (MA).docx

ATTACHMENT FOR SECTION 01250 PRICE ADJUSTMENTS

MASSDOT DOCUMENTS 00811-00814

DOCUMENT 00811
SPECIAL PROVISIONS
MONTHLY PRICE ADJUSTMENT FOR HOT MIX ASPHALT (HMA) MIXTURES
ENGLISH AND METRIC UNITS
Revised: 07/08/2016

This provision applies to all projects using greater than 100 tons (91 megagrams) of hot mix asphalt (HMA) mixtures containing liquid asphalt cement as stipulated in the Notice to Contractors section of the bid documents.

Price Adjustments will be based on the variance in price, for the liquid asphalt component only, between the Base Price and the Period Price. They shall not include transportation or other charges. Price Adjustments will occur on a monthly basis.

Base Price

The Base Price of liquid asphalt on a project as listed in the Notice to Contractors section of the bid documents is a fixed price determined by the Department at the time of the bid using the same method as the determination of the Period Price detailed below. The Base Price shall be used in all bids.

Period Price

The Period Price is the price of liquid asphalt for each monthly period as determined by the Department using the average selling price per standard ton of PG64-28 paving grade (primary binder classification) asphalt, FOB manufacturer's terminal, as listed under the "East Coast Market - New England, Boston, Massachusetts area" section of the Poten & Partners, Inc. "Asphalt Weekly Monitor". This average selling price is listed in the issue having a publication date of the second Friday of the month and will be posted as the Period Price for that month. The Department will post this Period Price on its website at <http://www.mhd.state.ma.us/> within two (2) business days following its receipt of the relevant issue of the "Asphalt Weekly Monitor". Poten and Partners has granted the Department the right to publish this specific asphalt price information sourced from the Asphalt Weekly Monitor. This method of period price determination was formerly called the New Asphalt Period Price Method. Separate website postings using both the New Asphalt Period Price Method and the Old Asphalt Period Price Method were discontinued after June 2013.

Price Adjustment Determination, Calculation and Payment

The Contract Price of the HMA mixture will be paid under the respective item in the Contract. Price Adjustments, as herein provided, either upwards or downwards, will be made after the work has been performed using the monthly period price for the month during which the work was performed.

Price Adjustments will be paid only if the variance from the Base Price is 5% or more for a monthly period. The complete adjustment will be paid in all cases with no deduction of the 5% from either upward or downward adjustments.

The Price Adjustment applies only to the actual virgin liquid asphalt content in the mixture placed on the job in accordance with the Standard Specifications for Highways and Bridges, Division III, Section M3.11.03.

Price Adjustments will be separate payment items. The pay item numbers are 999.401 for a positive price adjustment (a payment) and 999.402 for a negative price adjustment (a deduction). Price Adjustments will be calculated using the following equation:

Price Adjustment = Tons of HMA Placed X Liquid Asphalt Content % X RAP Factor X (Period Price - Base Price)

No Price Adjustment will be allowed beyond the Completion Date of this Contract, unless there is a Department-approved extension of time.

***** END OF DOCUMENT *****

DOCUMENT 00812

SPECIAL PROVISIONS
MONTHLY PRICE ADJUSTMENT FOR DIESEL FUEL AND GASOLINE –
ENGLISH UNITS

Revised: 01/26/2009

This monthly fuel price adjustment is inserted in this contract because the national and worldwide energy situation has made the future cost of fuel unpredictable. This adjustment will provide for either additional compensation to the Contractor or repayment to the Commonwealth, depending on an increase or decrease in the average price of diesel fuel or gasoline.

This adjustment will be based on fuel usage factors for various items of work developed by the Highway Research Board in Circular 158, dated July 1974. These factors will be multiplied by the quantities of work done in each item during each monthly period and further multiplied by the variance in price from the Base Price to the Period Price.

The Base Price of Diesel Fuel and Gasoline will be the price as indicated in the Department's web site (www.mhd.state.ma.us) for the month in which the contract was bid, which includes State Tax.

The Period Price will be the average of prices charged to the State, including State Tax for the bulk purchases made during each month.

This adjustment will be effected only if the variance from the Base Price is 5% or more for a monthly period. The complete adjustment will be paid in all cases with no deduction of the 5% from either upward or downward adjustments.

No adjustment will be paid for work done beyond the extended completion date of any contract.

Any adjustment (increase or decrease) to estimated quantities made to each item at the time of final payment will have the fuel price adjustment figured at the average period price for the entire term of the project for the difference of quantity.

The fuel price adjustment will apply only to the following items of work at the fuel factors shown:

ITEMS COVERED	FUEL FACTORS	
	Diesel	Gasoline
Excavation: and Borrow Work: Items 120, 120.1, 121, 123, 124, 125, 127, 129.3, 140, 140.1, 141, 142, 143, 144., 150, 150.1, 151 and 151.1 (Both Factors used)	0.29 Gallons / CY	0.15 Gallons / CY
Surfacing Work: All Items containing Hot Mix Asphalt	2.90 Gallons / Ton	Does Not Apply

***** END OF DOCUMENT *****

DOCUMENT 00813

SPECIAL PROVISIONS

PRICE ADJUSTMENTS FOR STRUCTURAL STEEL AND REINFORCING STEEL

October 11, 2018

This special provision applies to all projects containing the use of structural steel and/or reinforcing steel as specified elsewhere in the Contract work. It applies to all structural steel and all reinforcing steel, as defined below, on the project. Compliance with this provision is mandatory, i.e., there are no "opt-in" or "opt-out" clauses. Price adjustments will be handled as described below and shall only apply to unfabricated reinforcing steel bars and unfabricated structural steel material, consisting of rolled shapes, plate steel, sheet piling, pipe piles, steel castings and steel forgings, and.

Price adjustments will be variances between Base Prices and Period Prices. Base Prices and Period Prices are defined below.

Price adjustments will only be made if the variances between Base Prices and Period Prices are 5% or more. A variance can result in the Period Price being either higher or lower than the Base Price. Once the 5% threshold has been achieved, the adjustment will apply to the full variance between the Base Price and the Period Price.

Price adjustments will be calculated by multiplying the number of pounds of unfabricated structural steel material or unfabricated reinforcing steel bars on a project by the index factor calculated as shown below under Example of a Period Price Calculation.

Price adjustments will not include guardrail panels or the costs of shop drawing preparation, handling, fabrication, coatings, transportation, storage, installation, profit, overhead, fuel costs, fuel surcharges, or other such charges not related to the cost of the unfabricated structural steel and unfabricated reinforcing steel.

The weight of steel subject to a price adjustment shall not exceed the final shipping weight of the fabricated part by more than 10%.

Base Prices and Period Prices are defined as follows:

Base Prices of unfabricated structural steel and unfabricated reinforcing steel on a project are fixed prices determined by the Department and found in the table below. While it is the intention of the Department to make this table comprehensive, some of a project's unfabricated structural steel and/or unfabricated reinforcing steel may be inadvertently omitted. Should this occur, the Contractor shall bring the omission to the Department's attention so that a contract alteration may be processed that adds the missing steel to the table and its price adjustments to the Contract.

The Base Price Date is the month and year in which MassDOT opened bids for the project. This date is used to select the Base Price Index.

Period Prices of unfabricated structural steel and unfabricated reinforcing steel on a project are variable prices that have been calculated using the Period Price Date and an index of steel prices to adjust the Base Price.

The Period Price Date is the date the steel was delivered to the fabricator as evidenced by an official bill of lading submitted to the Department containing a description of the shipped materials, weights of the shipped materials and the date of shipment. This date is used to select the Period Price Index.

The index used for the calculation of Period Prices is the U.S. Department of Labor Bureau of Labor Statistics Producer Price Index (PPI) Series ID WPU101702 (Not Seasonally Adjusted, Group: Metals and Metal Products, Item: Semi-finished Steel Mill Products.) As this index is subject to revision for a period of up to four (4) months after its original publication, no price adjustments will be made until the index for the period is finalized, i.e., the index is no longer suffixed with a "(P)".

Period Prices are determined as follows:

Period Price = Base Price X Index Factor

Index Factor = Period Price Index / Base Price Index

Example of a Period Price Calculation:

Calculate the Period Price for December 2009 using a Base Price from March 2009 of \$0.82/Pound for 1,000 Pounds of ASTM A709 (AASHTO M270) Grade A36 Structural Steel Plate.

The Period Price Date is December 2009. From the PPI website*, the Period Price Index = 218.0.

The Base Price Date is March 2009. From the PPI website*, the Base Price Index = 229.4.

Index Factor = Period Price Index / Base Price Index = $218.0 / 229.4 = 0.950$

Period Price = Base Price X Index Factor = $\$0.82/\text{Pound} \times 0.950 = \$0.78/\text{Pound}$

Since $\$0.82 - \$0.78 = \$0.04$ is less than 5% of \$0.82, no price adjustment is required.

If the \$0.04 difference shown above was greater than 5% of the Base Price, then the price adjustment would be 1,000 Pounds X \$0.04/Pound = \$40.00. Since the Period Price of \$0.78/Pound is less than the Base Price of \$0.82/Pound, indicating a drop in the price of steel between the bid and the delivery of material, a credit of \$40.00 would be owed to MassDOT. When the Period Price is higher than the Base Price, the price adjustment is owed to the Contractor.

* To access the PPI website and obtain a Base Price Index or a Period Price Index, go to <http://data.bls.gov/cgi-bin/srgate>

End of example.

The Contractor will be paid for unfabricated structural steel and unfabricated reinforcing steel under the respective contract pay items for all components constructed of either structural steel or reinforced Portland cement concrete under their respective Contract Pay Items.

Price adjustments, as herein provided for, will be paid separately as follows:

Structural Steel

Pay Item Number 999.449 for positive (+) pay adjustments (payments to the Contractor)

Pay Item Number 999.457 for negative (-) pay adjustments (credits to MassDOT Highway Division)

Reinforcing Steel

Pay Item Number 999.466 for positive (+) pay adjustments (payments to the Contractor)

Pay Item Number 999.467 for negative (-) pay adjustments (credits to MassDOT Highway Division)

No price adjustment will be made for price changes after the Contract Completion Date, unless the MassDOT Highway Division has approved an extension of Contract Time for the Contract.

BASE PRICES

The Department's table of Base Prices specified above is updated monthly. The current table is attached to this Document 00813 and included in each new contract.

DOCUMENT 00814

SPECIAL PROVISIONS
PRICE ADJUSTMENT FOR PORTLAND CEMENT CONCRETE MIXES

January 12, 2009

This provision applies to all projects using greater than 100 Cubic Yards (76 Cubic Meters) of Portland cement concrete containing Portland cement as stipulated in the Notice to Contractors section of the Bid Documents. This Price Adjustment will occur on a monthly basis.

The Price Adjustment will be based on the variance in price for the Portland cement component only from the Base Price to the Period Price. It shall not include transportation or other charges.

The Base Price of Portland cement on a project is a fixed price determined at the time of bid by the Department by using the same method as for the determination of the Period Price (see below) and found in the Notice to Contractors.

The Period Price of Portland cement will be determined by using the latest published price, in dollars per ton (U.S.), for Portland cement (Type I) quoted for Boston, U.S.A. in the Construction Economics section of *ENR Engineering News-Record* magazine or at the ENR website <http://www.enr.com> under Construction Economics. The Period Price will be posted on the MassHighway website the Wednesday immediately following the publishing of the monthly price in ENR, which is normally the first week of the month.

The Contract Price of the Portland cement concrete mix will be paid under the respective item in the Contract. The price adjustment, as herein provided, upwards or downwards, will be made after the work has been performed, using the monthly period price for the month during which the work was performed.

The price adjustment applies only to the actual Portland cement content in the mix placed on the job in accordance with the Standard Specifications for Highways and Bridges, Division III, Section M4.02.01. No adjustments will be made for any cement replacement materials such as fly ash or ground granulated blast furnace slag.

The Price Adjustment will be a separate payment item. It will be determined by multiplying the number of cubic yards of Portland cement concrete placed during each monthly period times the Portland cement content percentage times the variance in price between the Base Price and Period Price of Portland cement.

This Price Adjustment will be paid only if the variance from the Base Price is 5% or more for a monthly period. The complete adjustment will be paid in all cases with no deduction of the 5% from either upward or downward adjustments.

No Price Adjustment will be allowed beyond the Completion Date of this Contract, unless there is a Department-approved extension of time.

*

END OF DOCUMENT

SECTION 01311

CONSTRUCTION MEETINGS

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. This Section specifies requirements for project meetings including but not limited to Pre-Construction Conference and Progress Meetings.
- B. It shall be the responsibility of the Contractor to coordinate work between all subcontractors, sections, and trades required for the proper completion of the Work.

1.02 PRE-BID CONFERENCE:

- A. Bidders are strongly encouraged to attend a Pre-Bid Conference on site at DPWP Engineering, 20E Worcester Street, Worcester, MA at 10:00 AM on August 18, 2022.

1.02 PRE-CONSTRUCTION CONFERENCE:

- A. After the bids have been opened but prior to the start of the construction there will be a pre-construction conference to discuss the phasing and scheduling of the Project. The specific time and place of the conference shall be arranged by the Engineer after the Contract has been awarded.
- B. This pre-construction conference is intended to establish lines of communication between the parties involved, review responsibilities and personnel assignments, establish project schedules, discuss proposed performance methods, and coordinate Work to be performed by subcontractors.
- C. Authorized representatives of the Owner, Engineer and their consultants, the Contractor, its Superintendent and Site Foreman, and all others invited by the Contractor, shall attend the pre-construction conference. All participants at the conference shall be familiar with the Project and authorized to conclude matters relating to the Work.
- D. Discuss items of significance at the pre-construction conference that could affect progress including at least the following:

1. Tentative construction schedule
2. Critical Work sequencing
3. Designation of responsible personnel
4. Procedures for processing field decisions and Change Orders
5. Procedures for processing Applications for Payment
6. Distribution of Contract Documents
7. Submittal of Shop Drawings, Product Data and Samples
8. Preparation of record documents
9. Use of the premises
10. Office, work and storage, and laydown areas
11. Equipment deliveries
12. Construction safety procedures
13. Environmental health and safety procedures
14. First aid
15. Security
16. Housekeeping
17. Working hours
18. Traffic Control
19. Emergency Vehicle Access to and around work site
20. Environmental protection measures for construction site

1.03 PROGRESS MEETINGS:

- A. During the course of the Project, the Contractor shall attend weekly progress meetings as scheduled by the Owner. The Owner, based on work progress and activities, may adjust the progress meetings to biweekly or other. The attendance of subcontractors may be required during the progress of the Work. The Contractor's delegate to the meeting shall be prepared and authorized to discuss the following items:

1. Progress of Work/Critical Work Sequencing in relation to Contract Schedule.
2. Proposed Work activities for forthcoming period.
3. Resources committed to Contract.
4. Coordination of Work with others.
5. Status of procurement of equipment and materials.
6. Status of Submittals.
7. Outstanding actions, decisions, or approvals that affect Work activities.
8. Site access and/or security issues
9. Hazards and risks
10. Housekeeping
11. Quality issues
12. Potential Claims

13. Change Orders
 14. Costs, budget, and payment requests
- B. The Contractor shall revise the construction schedule after each progress meeting where revisions to the schedule have been made or recognized and the revised schedule shall be submitted to the Engineer and Owner.

PART 2 - PRODUCTS

Not used.

PART 3 – EXECUTION

Not used.

END OF SECTION

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SECTION 01330

SUBMITTALS

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. The Contractor shall provide the Engineer with submittals as required by the contract documents.

1.02 RELATED WORK:

- A. Divisions 1 – 3 of these specifications that require submittals.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 GENERAL:

- A. As required by the General Conditions, Contractor shall submit a schedule of shop and working drawing submittals.
- B. The Contractor shall submit the shop and working drawing submittals either electronically or hard copy.

3.02 ELECTRONIC SUBMITTALS:

- A. In accordance with the accepted schedule, the Contractor shall submit promptly to the Engineer by email (Mahoney.Carolyn@wseinc.com) or on an external hard drive (mail to Weston & Sampson Engineers, attention: CSD), one electronic copy in Portable Document Format (PDF) of shop or working drawings required as noted in the specifications, of equipment, structural details and materials fabricated especially for this Contract.
- B. Each electronic copy of the shop or working drawing shall be accompanied by the Engineer's standard shop drawing transmittal form, included as Exhibit 1 of this section (use only for electronic submittals), on which is a list of the drawings, descriptions and numbers and the names of the Owner, Project, Contractor and building, equipment or structure.
- C. The Contractor shall receive a shop drawing memorandum with the Engineer's approval or comments via email.

3.03 HARD COPY SUBMITTALS:

- A. In accordance with the accepted schedule, the Contractor shall submit promptly to the Engineer, by mail (to Weston & Sampson Engineers, attention: CSD), six (6) copies each of shop or working drawings required as noted in the specifications, of equipment, structural details and materials fabricated especially for this Contract.
- B. Each shipment of drawings shall be accompanied by the Engineer's (if applicable) standard shop drawing transmittal form on which is a list of the drawings, descriptions and numbers and the names of the Owner, Project, Contractor and building, equipment or structure.

3.04 SHOP AND WORKING DRAWINGS:

- A. Shop and working drawings shall show the principal dimensions, weight, structural and operating features, space required, clearances, type and/or brand of finish of shop coat, grease fittings, etc., depending on the subject of the drawings. When it is customary to do so, when the dimensions are of particular importance, or when so specified, the drawings shall be certified by the manufacturer or fabricator as correct for this Contract.
- B. All shop and working drawings shall be submitted to the Engineer by and/or through the Contractor, who shall be responsible for obtaining shop and working drawings from his subcontractors and returning reviewed drawings to them. All shop and working drawings shall be prepared on standard size, 24-inch by 36-inch sheets, except those, which are made by changing existing standard shop or working drawings. All drawings shall be clearly marked with the names of the Owner, Project, Contractor and building, equipment or structure to which the drawing applies, and shall be suitably numbered. Each shipment of drawings shall be accompanied by the Engineer's (if applicable) standard shop drawing transmittal form on which is a list of the drawings, descriptions and numbers and the names mentioned above.
- C. Only drawings that have been prepared, checked and corrected by the fabricator should be submitted to the Contractor by his subcontractors and vendors. Prior to submitting drawings to the Engineer, the Contractor shall check thoroughly all such drawings to satisfy himself that the subject matter thereof conforms to the Contract Documents in all respects. Shop drawings shall be reviewed and marked with the date, checker's name and indication of the Contractor's approval, and only then shall be submitted to the Engineer. Shop drawings unsatisfactory to the Contractor shall be returned directly to their source for correction, without submittal to the Engineer. Shop drawings submitted to the Engineer without the Contractor's approval stamp and signature will be rejected. Any deviation from the Contract Documents indicated on the shop drawings must be identified on the drawings and in a separate submittal to the Engineer, as required in this section of the specifications and General Conditions.
- D. The Contractor shall be responsible for the prompt submittal and resubmittal, as necessary, of all shop and working drawings so that there will be no delay in the work due to the absence of such drawings.

- E. The Engineer will review the shop and working drawings as to their general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Corrections of comments made on the drawings during the review do not relieve the Contractor from compliance with requirements of the Contract Documents. The Contractor is responsible for: confirming and correlating all quantities and dimensions; selecting fabrication processes and techniques of construction; coordinating his work with that of all other trades; and performing his work in a safe and satisfactory manner. The review of the shop drawings is general and shall not relieve the Contractor of the responsibility for details of design, dimensions, code compliance, etc., necessary for interfacing with other components, proper fitting and construction of the work required by the Contract and for achieving the specified performance. The Engineer will review submittals two times: once upon original submission and a second time if the Engineer requires a revision or corrections. The Contractor shall reimburse the Owner amounts charged to the Owner by the Engineer for performing any review of a submittal for the third time or greater.
- F. With few exceptions, shop drawings will be reviewed and returned to the Contractor within 30 days of submittal.
- G. No material or equipment shall be purchased or fabricated especially for this Contract nor shall the Contractor proceed with any portion of the work, the design and details of which are dependent upon the design and details of equipment or other features for which review is required, until the required shop and working drawings have been submitted and reviewed by the Engineer as to their general conformance and compliance with the project and its Contract Documents. All materials and work involved in the construction shall then be as represented by said drawings.
- H. Two copies of the shop and working drawings and/or catalog cuts will be returned to the Contractor. The Contractor shall furnish additional copies of such drawings or catalog cuts when he needs more than two copies or when so requested.

END OF SECTION

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EXHIBIT 1 TO SECTION 01330 SUBMITTALS

SHOP DRAWING TRANSMITTAL FORM

Shop Drawing Transmittal							
Instruction for Preparing Transmittal No action will be taken on any item unless accompanied by this form. TRANSMITTAL NOS. to be consecutive (1, 2, 3, etc.). Each resubmittal of same item shall use same number with suffix letter (A, B, etc.). SPEC. SECT. NO: Only one spec. section no. to each transmittal. DESCRIPTION: Complete identification of document or group of documents. SOURCE: Originator of document(s) being submitted.				DRAWING NO: Identification of document(s). CONTRACT DRAWING REFERENCE: Contract drawing number(s) showing details of document(s). SPECIAL INSTRUCTIONS: Special cases and emergencies, changes in distribution and special handling requests, etc. should be entered here. SIGNATURE OF CONTRACTOR: Signature of individual who reviews and approves material prior to submittal to engineer.			
THIS SECTION TO BE COMPLETED BY CONTRACTOR							
TRANSM. NO.		SPEC. SECT. NO.		DATE		CONTRACTORS JOB NO. W&S JOB NO.	
PROJECT NAME & CONTRACT NO.				LOCATION			
Attention: CSD (Mahoney.Carolyn@wseinc.com) Weston & Sampson Engineers, Inc. 55 Walkers Brook Drive Reading, MA 01867				F R O M		BY W&S	
ITEM NO.	DESCRIPTION	SOURCE	DRAWING NO. CATALOG NO. BROCHURE, ETC	NO. OF COPIES	CONTRACT DRAWING REF.	ACTION CODE	REVIEWED BY
1							
2							
3							
4							
THIS CERTIFIES THAT ALL ITEMS SUBMITTED HEREWITH HAVE BEEN CHECKED BY THE CONTRACTOR, ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE CONTRACT DOCUMENTS, EXCEPT AS NOTED, AND ARE APPROVED BY THE CONTRACTOR FOR THIS PROJECT.							
THIS SECTION TO BE COMPLETED BY W&S							
ACTION CODE: 1. FURNISH AS SUBMITTED 2. FURNISH AS NOTED 3. REVISE AND RESUBMIT 4. REJECTED- SEE REMARKS 5. ACKNOWLEDGEMENT 6. SUBMITTAL NOT REQUIRED, RETURNED WITHOUT REVIEW				SIGNATURE & TITLE			
1. INSTALLATION SHALL PROCEED ONLY WHEN ACTION CODE IS 1 OR 2 2. ACTION CODED 3 SHALL BE RESUBMITTED WITHIN TIME LIMIT SET IN CONTRACT 3. REVIEW DOES NOT RELIEVE CONTRACTOR FROM RESPONSIBILITY OF COMPLIANCE WITH ALL REQUIREMENTS OF THE CONTRACT DOCUMENTS				Signature of individual who reviews and approves material prior to submittal to engineer.			
Weston & Sampson							

SECTION 01331

DOCUMENTATION

PART 1 – GENERAL

1.01 WORK INCLUDED:

- A. This section covers the requirements for documentation to be furnished by the Contractor on this project.

1.02 RELATED WORK:

- A. Section 02428, CURED-IN-PLACE PIPE
- B. Section 02431, GEOPOLYMER LINING OF SANITARY SEWERS
- C. Section 02440, SEWER CLEANING AND INSPECTION
- D. Section 02435, SEWER MANHOLE REHABILITATION
- E. Section 02443, SERVICE CONNECTION REHABILITATION

1.03 DOCUMENTATION:

- A. The Contractor shall maintain printed television inspection logs of sewer segments, for each sewer line segment undergoing repair/rehabilitation under this contract and provide one (1) copy of the logs within five (5) working days of the work being performed. Log sheet format shall be approved by Engineer prior to start of work.
- B. The log sheet(s) as a minimum shall clearly identify:
 - 1. Project Name
 - 2. Street Location, Name, Intersection, Station
 - 3. Date of inspection
 - 4. Total Length of Line Inspected
 - 5. Line Size(s)/Joint Spacing/Type
 - 6. Line and Manhole(s) Condition
 - 7. Significant observations such as service connections, offset joints, drop joints, broken/cracked pipe, protruding services, roots, collapsed sections, infiltration, presence of scale and corrosion and other discernible features. Observations shall

be made in accordance with NASSCO PACP standards and scoring for each pipe segment and shall be included on the Television Inspection Reports.

8. Filename.
- C. All logs shall be provided to the Engineer in PDF format (one log per PDF file) at the completion of the project.
- D. All television inspection shall be recorded in accordance with NASCCO specifications and as follow:
 - File Format: MPEG-4 (.mp4)
 - Codec: AVC (H.264)
 - Frame Size 16/9: 1280 x 720 or Frame Size 4/3: 960 x 720
 - Frame Rate: 60 fps
 - Pixel Aspect Ratio 1:1 (square pixels)
 - Video Standard: NTSC
 - Scan Type: Progressive

All television inspection shall include accompanying audio and shall be cross-referenced in an Access Database provided by the ENGINEER. Inspections shall be recorded one at a time, with each segment recorded as a separate file on the external hard drive. The contractor shall provide two (2) original and labeled copies of each external hard drive to the Engineer. All external hard drives shall have a typed label with the following:

[Date work was performed]
Cambridge Street Sewer Interceptor Rehabilitation Project
Worcester, MA
Engineer: Weston & Sampson

File names for television inspection of pipes (video files, report files, and photographs taken during television inspection) shall be provided as following:

- a. AssetID_Date_Media_Iteration
- b. Where “AssetID” is the identifying number for the pipe asset, “Date” is in the format “YYYYMMDD”, “Media” can be either “Report”, “CCTV”, “Photo”, and “Iteration” starts at “1” and increases by one (1) for each subsequent video in the same pipe asset. The “Iteration” does not need to increase if the same AssetID is inspected on a different day. The date provides the distinction. For example, if pipe asset ID 26765 on Dallas Street was inspected on August 1, 2015, the Video file name would be:

- i. SM26765_20150801_CCTV_1
- c. And the Report file name would be:
 - i. SM26765_20150801_Report_1
- d. In the event of a reverse setup, the next filenames would be:
 - i. SM26765_20150801_CCTV_2
 - ii. SM26765_20150801_Report_2
- e. In the event the pipe segment was inspected on August 2, the next filenames would be:
 - i. SM26765_20150802_CCTV_1
 - ii. SM26765_20150802_Report_1
- f. Stationing shall be recorded at a minimum of every foot and at all points of interest, to allow instant access to any given footage. Manhole to manhole sewer segments shall not be split between two (2) external hard drives.
- E. The Contractor shall additionally provide one (1) copy of all logs relative to work performed on sewer manholes within five (5) working days of the work being performed.
- F. The Contractor shall take a digital photograph, in JPEG format, at each manhole before and after manhole rehabilitation. Digital photographs shall have a minimum resolution of eight (8) megapixels. The files shall be provided on the external hard drives as specified in 1.03.D.

File names for the inspection and/or rehabilitation of manholes (photographs, report files, and video files) shall be provided as the following:

- a. AssetID_Date_Media_Iteration
- b. Where “AssetID” is the identifying number for the manhole asset, “Date” is in the format “YYYYMMDD”, “Media” can be either “Internal_Photo”, “Report”, or “CCTV”, and “Iteration” starts at “1” and increases by one (1) for each subsequent video in the same manhole asset. The “Iteration” does not need to increase if the same AssetID is inspected on a different day. The date provides the distinction. For example, if a photograph was taken of the pre-rehabilitation work performed on manhole asset ID 26765 on Dallas Street on August 1, 2015, the photograph would be:
 - i. SS26765_20150801_Internal_Photo_1

c. And the Report file name would be:

i. SS26765_20150801_Report_1

d. And the post-rehabilitation photograph would be:

i. SS26765_20150801_Internal_Photo_2

e. In the event that the rehabilitation work was not completed until the following day, August 2, 2015,, the post-rehabilitation photograph would be:

i. SS26765_20150802_Internal_Photo_1

G. The Contractor shall deliver to the Owner, at no additional cost, two (2) external hard drives each including the following information at the end of the project. The external hard drives shall be USB powered and capable of USB 2.0 connectivity and will become the property of the Owner upon delivery. The Contractor shall use file folders to organize individual types of data on the external hard drives. The Contractor shall include the following data on the external hard drives prior to delivery to the Engineer.

- Sewer Manhole Rehabilitation
 - Pre and Post Rehabilitation Manhole Inspection Photos in JPEG format
 - Filenames shall be in accordance with 1.03F of this section.
 - Each manhole rehabilitation log as a separate PDF file
 - Filenames shall be in accordance with 1.03F of this section.
- Cured-in-Place Pipe – Organized per Inversion
 - Pre-inversion Television Inspection MPEG-4 or greater Files
 - Refer to paragraph 1.03D of this section
 - Each pre-inversion television inspection log as a separate PDF file
 - Refer to paragraph 1.03D of this section
 - Each liner order sheet (describing the material ordered) as a separate PDF file
 - Each service connection reinstatement sign-off sheet as a separate PDF file
 - Each thermo couple log kept during inversion process as a separate PDF file
 - Post-inversion Television Inspection MPEG-4 OR Greater Files
 - Refer to paragraph 1.03D of this section
 - Each post-inversion television inspection log as a separate PDF file
 - Refer to paragraph 1.03D of this section
 -
- Geopolymer Liner Organized per Inversion
 - Pre-lining Television Inspection MPEG-4 or greater Files
 - Refer to paragraph 1.03D of this section
 - Each pre-lining television inspection log as a separate PDF file
 - Refer to paragraph 1.03D of this section
 - Post-lining Television Inspection MPEG-4 OR Greater Files
 - Refer to paragraph 1.03D of this section
 - Each post-lining television inspection log as a separate PDF file

- Refer to paragraph 1.03D of this section
- Service Connection Test and Grout
 - Television Inspection MPEG-4 or greater Files
 - Refer to paragraph 1.03D of this section
 - Each television inspection log as a separate PDF file
 - Refer to paragraph 1.03D of this section

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

END OF SECTION

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SECTION 01380

HEALTH AND SAFETY PLAN

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. Prior to the start of work on the site, Contractor shall prepare and submit a site-specific health and safety plan that includes consideration of all known and potential hazards at the site. Work may not proceed at the project site until the Contractor's health and safety plan has been received and reviewed by the Engineer.

1.02 REFERENCES:

- A. OSHA 29 CFR 1910.120

PART 2 – PRODUCTS

2.01 HEALTH AND SAFETY PLAN:

- A. The health and safety plan shall include, but not necessarily be limited to the following:
 - 1. Identification of Contractor's Site Safety Officer.
 - 2. Identification of Hazards and Risks Associated with Project.
 - 3. Contractor's Standard Operating Procedures, Including Personnel Training and Field Orientation.
 - 4. Respiratory Protection Training Requirements.
 - 5. Levels of Protection and Selection of Equipment Procedures.
 - 6. Type of Medical Surveillance Program.
 - 7. Personal Hygiene Requirements and Guidelines.
 - 8. Zone Delineation of the Project Site.
 - 9. Site Security and Entry Control Procedures.
 - 10. Field Monitoring of Site Contaminants.
 - 11. Contingency and Emergency Procedures.
 - 12. Listing of Emergency Contacts.

PART 3 - EXECUTION

3.01 PERSONAL PROTECTIVE EQUIPMENT:

- A. The personal protective equipment required to provide the appropriate level of dermal and respiratory protection shall be determined based on the results of continuous air monitoring performed by the Contractor and the standards set forth in the Contractor's health and safety plan. The Engineer may conduct duplicate air monitoring for quality control purposes. Modified Level D protection shall be the minimum requirement for all on-site personnel.

END OF SECTION

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SECTION 01535

TEMPORARY BYPASS PUMPING SYSTEM

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. This Section includes furnishing of all materials, labor, equipment, power, and maintenance, to implement a temporary pumping system for the purpose of diverting existing sanitary and/or combined sewer flows around the work area for the duration of the project.
- B. The design, installation and operation of the temporary pumping system shall be the Contractor's responsibility. The Contractor shall employ the services of a vendor firm who can demonstrate to the Engineer that it has the required expertise in the design and operation of temporary bypass pumping systems. The vendor firm shall provide at least five references of projects similar in size and complexity to this project that have been performed by the firm within the past three years.
- C. The by-pass system shall meet the requirements of all codes and regulatory agencies having jurisdiction.

1.02 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

- A. The Contractor shall submit a detailed description of the proposed pumping system stamped by a Professional Engineer in the State of Massachusetts and submit it and the vendor's references.
- B. The Contractor shall submit to the Engineer detailed plans and descriptions outlining all provisions and precautions to be taken by the Contractor regarding the handling of existing sanitary and/or combined sewer flows. This plan must be specific and complete, including such items as schedules, locations, elevations, capacities of equipment, materials and all other incidental items necessary and/or required to insure proper protection of the facilities, including protection of the access and bypass pumping locations from damage due to the discharge flows, and compliance with the requirements and permit conditions specified in these contract documents. No construction shall begin until all provisions and requirements have been reviewed by the Engineer.
- C. The plan shall include but not be limited to the following:
 - 1. Staging areas for pumps;
 - 2. Flow diversion method and types of materials;

3. Number, size, material, location and method of installation of suction piping;
4. Number, size, material, method of installation and location of discharge piping;
5. Bypass pump sizes, capacity, number of each size to be on site and the related power requirements;
6. Calculations of static lift, friction losses, and flow velocity (pump curves showing pump operating range shall be submitted);
7. Standby power generator size, location;
8. Downstream discharge plan;
9. Method of protecting suction and discharge areas from erosion and damage;
10. Thrust and restraint block sizes and locations;
11. Sections showing suction and discharge pipe depth, embedment, select fill and special backfill;
12. Method of noise control for each pump and/or generator, with external dB valve.
13. Any temporary pipe supports and anchoring required;
14. Design plans and computation for access to bypass pumping locations indicated on the drawings;
15. Calculations for selection of bypass pumping pipe size;
16. Schedule for installation of and maintenance of bypass pumping lines;
17. Plan indicating proposed location of bypass pumping lines.

1.03 RELATED WORK:

- A. Section 01014, SCOPE AND SEQUENCE OF WORK

PART 2 - MATERIALS

2.01 EQUIPMENT:

- A. All pumps used shall be centrifugal, end suction, fully automatic self-priming units that do not require the use of foot-valves, diaphragm pumps, isolation valves or vacuum pumps in the priming system. The pumps may be electric or diesel powered. All pumps used must be constructed to allow dry running for long periods to accommodate the cyclical nature of bypass flows. The pumps shall not be hydraulic submersible type.

- B. All pumps shall be Godwin Dri-prime Automatic Self-priming Pumps (CD, DPC, or HL Series) as manufactured by Xylem, (860) 889-2343, (207) 233-8322, or approved equal.
- C. The Contractor shall provide the necessary stop/start controls for each pump.
- D. The Contractor shall include one stand-by pump system (including suction and discharge piping) of each size to be maintained on site.
- E. Additional back-up pumps shall be on-line, isolated from the primary system by a valve.
- F. Discharge Piping - in order to prevent the accidental spillage of flows, all temporary discharge systems shall be constructed of rigid pipe with positive, restrained joints. Under no circumstances will aluminum "Irrigation" type piping or glued PVC pipe be allowed. Discharge hoses will only be allowed in short sections and with the specific permission of the Engineer.
- G. Allowable piping materials will be Godwin "QD" steel pipe (Xylem), or fused, high-density polyethylene pipe as manufactured by Xylem, or approved equal.

2.02 SYSTEM DESCRIPTION:

A. DESIGN REQUIREMENTS:

1. Bypass pumping systems shall have sufficient capacity to pump all existing sewer flows during the work period. Flows observed during temporary flow monitoring in the project area were as follows:

Meter Cambridge_SS06275: located at intersection of Cambridge Street and Dorrance Street (between 11/3/2021 – 3/25/2022)

- Minimum Flow: 3.03 MGD (observed on 2/2/2022)
 - Average Flow: 9.93 MGD
 - Peak Flow: 33.86 MGD (observed on 2/4/2022)
2. The Contractor shall provide all pipeline, plugs, pumps of adequate size to handle peak flow, and discharge piping to ensure that the total flow can be safely diverted around the area of work. Bypass pumping system will be required to operate 24 hours per day.
 3. The Contractor shall have adequate standby power and pumping equipment available and ready for immediate operation and use in the event of an emergency or breakdown. One standby pump for each size pump utilized shall be installed at the mainline flow bypassing locations, ready for use in the event of primary pump failure.

4. Bypass pumping system shall be capable of bypassing the flow around the work area and of releasing any amount of flow up to full available flow into the work area as necessary for satisfactory performance of work.
5. The Contractor shall maintain all service 24-hours a day. This work shall be incidental to the project. The Contractor shall maintain all building service flows 24-hours a day until service connections are reinstated.
6. The Contractor shall secure the private property during the entire duration of all individual building bypass operations. The Contractor shall give the owner/contact person for the private building and Engineer a minimum of three (3) days advance notice. The Contractor is responsible for securing the premises and responsible for any damages or stolen material from the property during the individual building bypass operations due to them failing to secure the premises. When the individual building bypass pumping operation is complete, the Contractor must notify the owner/contact person and Engineer, secure the building, and leave the building in the pre-construction condition.

B. PERFORMANCE REQUIREMENTS:

1. It is essential for the protection of the public safety and private property that there be no interruption in the flow throughout the duration of the project. To this end, the Contractor shall provide, maintain and operate all temporary facilities such as dams, plugs, pumping equipment (both primary and back-up units as required), conduits, all necessary power, and all other labor and equipment necessary to intercept the sanitary flows before it reaches the point where it would interfere with his work, carry it past his work and return it to the existing sanitary sewer system downstream of his work.
2. The design, installation and operation of the temporary pumping system shall be the Contractor's responsibility. The bypass system shall meet the requirements of all codes and regulatory agencies having jurisdiction.
3. The Contractor shall provide all necessary means to safely convey the sanitary sewer flow past the work area. The Contractor will not be permitted to stop or impede the flows under any circumstances.
4. The Contractor shall maintain flow around the work area in a manner that will not cause surcharging or significant level variations in the existing sewer system, and that will protect public and private property from damage and flooding.
5. The Contractor shall protect water resources, wetlands and other natural resources.
6. The Contractor shall be responsible to meet noise requirements (73dbA @ 15' and inside 45dbA @ 0'). All diesel driven primary and standby pumps shall be sound

attenuated. The use of Critical Silenced Canopy Pumps or acoustical Whisper Pac enclosures for sound attenuation is required.

7. The temporary bypass pumping system shall include floats (or other acceptable level sensing devices) that will transmit a high-water condition to an on-site autodialer that shall send an alarm condition to the Contractor's Superintendent. The autodialer shall also alert a designated "on-call" employee of the Contractor, should the Superintendent fail to acknowledge the call.
8. The contractor must have a standby pump activated in the event the lead pump fails.

PART 3 - EXECUTION

3.01 FIELD QUALITY CONTROL AND MAINTENANCE.

- A. The Contractor shall perform leakage and pressure tests of the bypass pumping discharge piping using clean water prior to actual operation. The Engineer shall be given 24 hours notice prior to testing.
- B. Contractor shall inspect bypass pumping system every two hours to ensure that the system is working correctly.
- C. The Contractor shall insure that the temporary pumping system is properly maintained, and a responsible operator shall be on hand at all times when pumps are operating.
- D. Spare parts for pumps and piping shall be kept on site as required.
- E. Adequate hoisting equipment for each pump and accessories shall be maintained on the site.

3.02 PRECAUTIONS:

- A. Contractor is responsible for locating any existing utilities in the area the Contractor selects to locate the bypass pipelines. The Contractor shall locate his bypass pipelines to minimize any disturbance to existing utilities and shall obtain approval of the pipeline locations from the Owner and the Engineer. All costs associated with relocating utilities and obtaining all approvals shall be paid by the Contractor.
- B. During all bypass pumping operation, the Contractor shall protect the work area and all local utilities from damage inflicted by any equipment. The Contractor shall be responsible for all physical damage to public and private property caused by human or mechanical failure.

3.03 INSTALLATION AND REMOVAL:

- A. The Contractor shall construct temporary bypass pumping structures only at the access locations indicated on the drawings and may be required to provide adequate suction conduit.
- B. Diverting or blocking of sewer flows shall incorporate primary and secondary devices. When diversion or blocking is no longer needed for performance and acceptance or work, it is to be removed in a manner that permits the flow to slowly return to normal without surge, to prevent surcharging or causing other major disturbances downstream.
- C. 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.
- D. Except as specifically permitted, the installation of the bypass pipelines is prohibited in all salt marsh/wetland areas. The pipeline must be located off streets and sidewalks and on shoulders of the roads. When the bypass pipeline crosses local streets and private driveways, the Contractor must place the bypass pipelines in trenches and cover with temporary pavement. Upon completion of the bypass 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.

END OF SECTION

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SECTION 01550

SIGNAGE (TRAFFIC CONTROL)

PART 1 - GENERAL

1.01 WORK INCLUDED:

This Section covers furnishing and installing traffic control signs and other devices.

1.02 SYSTEM DESCRIPTION:

The Contractor shall furnish and install all construction signs deemed necessary by and in accordance with the latest edition of Part VI of the Manual on Uniform Traffic Control Devices(MUTCD) as published by the U.S. Department of Transportation.

PART 2 - PRODUCTS

2.01 TRAFFIC WARNING AND REGULATING DEVICES:

Contractor shall provide warning signs, barricades and other devices in accordance with the specifications provided in the MUTCD. Size of signs, lettering, colors, method of support and other factors prescribed in the MUTCD shall be adhered to.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Contractor shall erect barricades, barrier fences, traffic signs, and other traffic control devices as required by the MUTCD, or as required by the Engineer, to protect the work area from traffic, pedestrians, and animals.
- B. Contractor shall relocate barricades, signs and other devices as necessary as the work progresses.
- C. Unless extended protection is required for specific areas, when the work has been completed, all temporary warning and regulatory devices used by the Contractor shall be removed so that traffic can move unimpeded through the area.

END OF SECTION

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SECTION 01551

PORTABLE CHANGEABLE MESSAGE SIGN

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. The work covered under this section shall consist of furnishing, maintaining, transporting and using a Trailer - Mounted Changeable Message Sign.
- B. All messages displayed shall be approved by the Engineer.

1.02 REFERENCES:

- A. The following standards form part of these specifications and indicates a minimum required standard:

Massachusetts Department of Transportation Standard Specifications for Highways and Bridges

Manual on Uniform Traffic Control Devices (MUTCD)

PART 2 - PRODUCTS

2.01 GENERAL:

- A. Materials required under this Section need not be new but must be in first class condition and acceptable to the Engineer. Any materials that in the judgement of the Engineer are unsatisfactory in appearance and/or performance shall be immediately replaced by acceptable units.

2.02 SPECIFIC REQUIREMENTS:

Refer to Sections 01330-Submittals and Section 01140-Special Provisions for information regarding required certification that all materials, products, equipment and/or services.

- A. The Trailer-Mounted Changeable Message Sign shall meet the requirements of this specification and shall consist of the following major components;
 - 1. Message Board
 - 2. Operator Interface (CPU and Keyboard)
 - 3. Power Supply
 - 4. Towable Trailer

B. Message Board

1. Type - The display can be Flip Disk, LED or a combination of both Flip Disk and LED (Hybrid).
2. Size – The message board shall have a minimum height of 74 inches, maximum height of 80 inches and a minimum width of 98 inches, maximum width of 115 inches.
- 3 Colors - The display shall be either fluorescent yellow or ITE amber.
3. Lines - The sign board shall have the capability of displaying at least three lines of 18- inch high characters with 1 to 9 characters per line.
4. Visibility and Viewing Angle - The sign shall be visible for one-half mile and legible from a minimum distance of 650 feet with a viewing angle of no less than 30 degrees, during both daytime and nighttime operation.
5. The entire message code shall be readable at least twice by the motorists when traveling at the posted speed limit.

2.03 OPERATOR INTERFACE:

- A. A means of creating/controlling the on-site display message(s) shall be provided with each sign. The operator interface shall contain as a minimum the following:
1. Operator's Display terminal with keyboard will provide a full screen display to allow the operator to preview the message content and format before it is sent to the sign panel. The keyboard shall be of a standard design.
 2. Controller (CPU)
 3. Lockable weatherproof enclosure for interface components.

2.04 CONTROLLER:

- A. The controller shall possess, as a minimum, the following features:
1. Full 32K user memory with the option for an additional 32K archive memory.
 2. Capacity to store a minimum of 199 pre-defined messages and a minimum of 50 user-created messages (not to exceed 32K).
 3. Changeable message flash rate capability.
 4. A minimum of 24 hour battery back-up.

5. Password activation shall be software available.

2.05 POWER-SUPPLY:

- A. The sign shall be capable of operation from the following sources:
 1. A diesel powered generator with a battery backup.
 2. A battery with diesel generator charging or solar charging.
 3. The power supply shall have a cover for weather protection and shall be lockable for security.

2.06 TOWABLE TRAILER:

- A. The trailer shall be of rugged construction suitable for towing at highway speeds and at low speed over rugged construction site terrain. The trailer shall have at least the following features:
 1. Complete lighting to standard highway specifications.
 2. A single axle with two (2) – 15-inch wheels (3500 GVW rated).
 3. Two (2) inch ball coupler with heavy duty safety chains.
 4. Four (4) corner-located leveling swivel jacks capable of leveling the trailer on one (1) in six (6) grade and capable of stabilizing the trailer in high winds of up to 80 MPH. in addition, a tongue leveling swivel jack shall be provided.
 5. Surge breaks with lockable parking in conformance with Federal weight regulations.
 6. The sign shall be capable of being locked in a stowed position while being towed.
 7. A hydraulic lift mechanism shall be provided to elevate the sign to its operating position.
 8. It shall be possible to lock the sign panel in several off-angle positions with respect to the trailer axis for enhanced visibility.

2.07 ENVIRONMENTAL:

- A. The Trailer-Mounted Changeable Message Sign shall be capable of performing all functions at ambient temperatures ranging from -30 degrees F to +165 degrees F. There shall be no degradation of operation due to fog, rain or snow.

2.08 MAINTENANCE:

- A. All components of the Trailer-Mounted Changeable Message Sign shall be readily accessible for ease of maintenance. Standard commercially available parts shall be used where possible.
- B. The sign shall require no special scheduled maintenance. Maintenance shall include periodic cleaning. When not being used, at the discretion of the Engineer, the sign shall be stored in an approved secure area.

2.09 DOCUMENTATION:

- A. As a minimum, the following documentation shall be supplied with each Trailer-mounted Changeable Message Sign:
 - 1. Operating Manual
 - 2. Parts Manual
 - 3. Wiring Diagrams
 - 4. Troubleshooting Guide

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. All warning devices shall be subject to removal, replacement and/or repositioning as often as necessary. The changeable message unit shall be available for immediate use on the project and be positioned as required by the Engineer. The Contractor shall be responsible for the maintenance of such device and appurtenances, throughout its use on the project, with no additional compensation thereof, other than as provided under the contract unit price. Should the unit be found defective in any way it shall be replaced immediately at the Contractor's expense.
- B. For work under this contract, Contractor shall provide up to 600 unit days of message sign operation, with possibly up to three (3) sign units operating for 200 days simultaneously, as required by the Engineer.

END OF SECTION

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SECTION 01552

CONSTRUCTION ZONE SAFETY PLAN

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. This Section covers the provisions for complying with Commonwealth of Massachusetts requirements for construction zone safety plans on public works projects.

1.02 DESCRIPTION:

- A. The Contractor shall implement traffic safety and control measures through the construction zone through road closures and detours and mitigate impacts on traffic outside of the construction zone in accordance with these contract documents.

1.03 RELATED WORK:

- A. SECTION 01110, CONTROL OF WORK AND MATERIALS
- B. SECTION 01550, SIGNAGE (TRAFFIC CONTROL)
- C. SECTION 01553, UNIFORMED OFFICERS FOR TEMPORARY TRAFFIC CONTROL

1.04 REFERENCES:

701 CMR 7.00 Use of Road Flaggers and Police Details on Public Works Projects

Massachusetts Department of Transportation Standard Specifications for Highways and Bridges – latest edition

PART 2 - PRODUCTS

- 2.01 Traffic control devices utilized by the Contractor shall meet the requirements of these contract documents and the latest Massachusetts Department of Transportation (MassDOT) Standard Specifications and Manual On Uniform Traffic Control Devices (MUTCD).

PART 3 - EXECUTION

3.01 OPERATION:

- A. Contractor shall be responsible for providing all temporary traffic control devices including barricades, barrier fences, signs, drums, cones, impact attenuators and other traffic control devices in accordance with typical traffic management plans and details shown on the drawings or as required by the Engineer.

- B. The Contractor shall prepare temporary traffic management plans and details that deviates significantly from the typical plans shown on the drawings and submit to the Engineer for review and approval prior to start of the work.
- C. Contractor shall relocate barricades, signs and other devices as necessary as the work progresses as required by the Owner's Traffic Control Officer or the Engineer.
- D. If police details fail to show up for work at the construction zone at the usual time for start of work, or otherwise leave the jobsite before work is completed for the day, the provisions of the Alternative Plan will be followed by the Contractor.
- E. Police details shall be utilized on this project in accordance with the traffic management plans.

3.02 ALTERNATIVE PLAN:

- A. In accordance with 701 CMR 7.06(6), whenever required police details do not arrive on time or fail to show up for work, the Alternative Plan will be implemented by the Contractor.
- B. The Alternative Plan for this project is as follows:
 - 1. Redeploy crew to work in areas not requiring temporary traffic control (if available).

END OF SECTION

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SECTION 01553

UNIFORMED OFFICERS FOR TEMPORARY TRAFFIC CONTROL

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. This Section covers the provisions for furnishing Uniformed Officers for Traffic Control and Maintenance of Traffic as described in Section 01110 CONTROL OF WORK AND MATERIALS.

1.02 DESCRIPTION:

- A. The Contractor shall coordinate with the local jurisdiction's Traffic Control Officer to determine the number of Officers deemed necessary to provide for public safety and to maintain a smooth flow of traffic through the construction area(s) affected.

1.03 RELATED WORK:

- A. SECTION 01110, CONTROL OF WORK AND MATERIALS
- B. SECTION 01550, SIGNAGE (TRAFFIC CONTROL)
- C. SECTION 01552, CONSTRUCTION ZONE SAFETY PLAN

PART 2 - PRODUCTS

2.01 UNIFORMED OFFICERS:

- A. Contractor shall provide the Engineer with a minimum of 24 hours' notice indicating the time of day, street location and confirm number of officers required for traffic control.
- B. Contractor shall give the Engineer a minimum of 3 hours prior cancellation notice should Contractor determine that due to weather or conditions beyond his control he would not need the scheduled officers.
- C. Contractor shall pay for officer(s) at the prevailing rate established by the local police department should officers not be needed and the Contractor fails to cancel the officers as noted in 2.01.B above.
- D. Where the Owner is paying directly for Traffic Officers and the Contractor cancels scheduled officers, the Contractor shall be responsible for payment of the wages for cancellations if not cancelled in accordance with 2.01.B and 2.01.C above.

PART 3 - EXECUTION

3.01 OPERATION:

- A. Contractor shall provide barricades, barrier fences, traffic signs, and other traffic control devices as required by the Owners Traffic Control Officer, or as required by the Engineer, to protect the work area from traffic, pedestrians, and animals.
- B. Contractor shall relocate barricades, signs and other devices as necessary as the work progresses as required by the Owners Traffic Control Officer or the Engineer.

END OF SECTION

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SECTION 01562

DUST CONTROL

PART 1 - GENERAL

1.01 DESCRIPTION:

This section of the specification covers the control of dust via calcium chloride and water, complete.

PART 2 - PRODUCTS

2.01 CALCIUM CHLORIDE:

- A. Calcium chloride shall conform to the requirements of AASHTO-M 144, Type I or Type II and Specification for Calcium Chloride, ASTM D98. The calcium chloride shall be packaged in moisture proof bags or in airtight drums with the manufacturer, name of product, net weight, and percentage of calcium chloride guaranteed by the manufacturer legibly marked on each container.
- B. Calcium chloride failing to meet the requirements of the aforementioned specifications or that which has become caked or sticky in shipment, may be rejected by the Engineer.

2.02 WATER:

- A. Water shall not be brackish and shall be free from oil, acid, and injurious alkali or vegetable matter.

PART 3 - EXECUTION

3.01 APPLICATION:

- A. Calcium chloride shall be applied when ordered by the Engineer and only in areas which will not be adversely affected by the application. See Section 01570, ENVIRONMENTAL PROTECTION.
- B. Calcium chloride shall be uniformly applied at the rate of 1-1/2 pounds per square yard or at any other rate as required by the Engineer. Application shall be by means of a mechanical spreader, or other approved methods. The number and frequency of applications shall be determined by the Engineer.
- C. Water may be sprinkler applied with equipment including a tank with gauge-equipped pressure pump and a nozzle-equipped spray bar.

- D. Water shall be dispersed through the nozzle under a minimum pressure of 20 pounds per square inch, gauge pressure.

END OF SECTION

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SECTION 01564

EXISTING FENCES

PART 1 - GENERAL

1.01 DESCRIPTION:

- A. This section of the specification covers the removal and resetting of existing fences.
- B. Where the removal of existing fences, at locations shown on the plans and where required by the Engineer, is required, the Contractor shall remove and reset such fences as required by the Engineer.

PART 2 - PRODUCTS

2.01 FENCING:

- A. The materials removed shall be utilized to reset the fence. Where necessary, new posts and bases shall be furnished and installed by the Contractor. Any materials damaged or lost during or subsequent to removal shall be replaced by the Contractor without additional compensation.
- B. All new materials required shall be equal in quality and design to the materials in the present fences.

PART 3 - EXECUTION

3.01 REMOVAL OF EXISTING FENCES:

- A. The present fences shall be carefully removed together with all appurtenances and satisfactorily stored and protected until required for resetting.

3.02 ERECTION:

- A. Fences shall be reset plumb and to the grades required and shall conform to the original fence or as the Engineer requires. Backfilling around the posts shall consist of suitable material satisfactorily compacted. If the fence posts were originally set in concrete bases, they shall be reset in concrete bases.

3.03 PAINTING:

- A. Painting, if required, shall be done as required by the Engineer.

END OF SECTION

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SECTION 01570

ENVIRONMENTAL PROTECTION

PART 1 – GENERAL

1.01 DESCRIPTION:

- A. The work covered by this section of the specifications consists of furnishing all labor, materials, tools and equipment and performing all work required for the prevention of environmental pollution during and as a result of construction operations under this contract.
- B. The requirements set forth in this section of the specifications apply to cross-country areas, river and stream crossings, and construction in and adjacent to wetlands, unless otherwise specifically stated.
- C. All work under this Contract shall be in accordance with the Conservation Commissions' Orders of Conditions as well as any conditional requirements applied, all of which are attached to Section 00890, PERMITS.
- D. Prior to commencement of work, the Contractor shall meet with representatives of the Engineer to develop mutual understandings relative to compliance of the environmental protection program.

1.02 RELATED WORK:

- A. Section 00890, PERMITS
- B. Section 01330, SUBMITTALS
- C. Section 01562, DUST CONTROL
- D. Section 02240, DEWATERING
- E. Section 02252, SUPPORT OF EXCAVATION
- F. Section 02300, EARTHWORK

1.03 SUBMITTALS:

- A. The Contractor shall submit details and literature fully describing environmental protection methods to be employed in carrying out construction activities within 100 feet of wetlands or across areas designated as wetlands.

PART 2 - PRODUCTS

2.01 CATCH BASIN PROTECTION:

- A. To trap sediment and to prevent sediment from clogging drainage systems, catch basin protection in the form of a siltation sack (Siltsack as manufactured by ACF Environmental, Inc. or approved equal) shall be provided as approved by the Engineer.

PART 3- EXECUTION

3.01 NOTIFICATION AND STOPPAGE OF WORK:

- A. The Engineer will notify the Contractor in writing of any non-compliance with the provisions of the Order of Conditions. The Contractor shall, after receipt of such notice, immediately take corrective action. Such notice, when delivered to the Contractor or his authorized representative at the site of the work, shall be deemed sufficient for the purpose. If the Contractor fails to act promptly, the Owner may order stoppage of all or part of the work through the Engineer until satisfactory corrective action has been taken. No claim for an extension of time or for excess costs or damage incurred by the Contractor as a result of time lost due to any stop work orders shall be made unless it was later determined that the Contractor was in compliance.

3.02 AREA OF CONSTRUCTION ACTIVITY:

- A. Insofar as possible, the Contractor shall confine his construction activities to those areas defined by the plans and specifications. All land resources within the project boundaries and outside the limits of permanent work performed under this contract shall be preserved in their present condition or be restored to a condition after completion of construction at least equal to that which existed prior to work under this contract.

3.03 PROTECTION OF WATER RESOURCES:

- A. The Contractor shall not pollute streams, lakes or reservoirs with fuels, oils, bitumens, calcium chloride, acids or other harmful materials. It is the Contractor's responsibility to comply with all applicable Federal, State, County and Municipal laws regarding pollution of rivers and streams.
- B. Special measures should be taken to insure against spillage of any pollutants into public waters.

3.04 LOCATION OF STORAGE AREAS:

- A. The location of the Contractor's storage areas for equipment and/or materials shall be upon cleared portions of the job site or areas to be cleared as a part of this project and shall require written approval of the Engineer. Plans showing storage facilities for equipment and materials shall be submitted for approval of the Engineer.

- B. No excavated materials or materials used in backfill operations shall be deposited within a minimum distance of one hundred (100) feet of any watercourse or any drainage facility. Adequate measures for erosion and sediment control such as the placement of baled straw around the downstream perimeter of stockpiles shall be employed to protect any downstream areas from siltation.
- C. There shall be no storage of equipment or materials in areas designated as wetlands.
- D. The Engineer may designate a particular area or areas where the Contractor may store materials used in his operations.
- E. Storage areas in cross-country locations shall be restored to pre-construction conditions with the planting of native species of trees and shrubs.

3.05 DISCHARGE OF DEWATERING OPERATIONS:

- A. Any water that is pumped and discharged from the trench and/or excavation as part of the Contractor's water handling shall be filtered by an approved method prior to its discharge into a receiving water or drainage system.
- B. Under no circumstances shall the Contractor discharge water to the areas designated as wetlands. When constructing in a wetlands area, the Contractor shall discharge water from dewatering operations directly to the nearest drainage system, stream, or waterway after filtering by an approved method.
- B. The pumped water shall be filtered through filter fabric and baled straw, a vegetative filter strip or a vegetated channel to trap sediment occurring as a result of the construction operations. The vegetated channel shall be constructed such that the discharge flow rate shall not exceed a velocity of more than 1 foot per second. Accumulated sediment shall be cleared from the channel periodically.

3.06 DUST CONTROL:

- A. During the progress of the work, the Contractor shall conduct his operations and maintain the area of his activities, including sweeping and sprinkling of streets as necessary, to minimize creation and dispersion of dust. If the Engineer decides it is necessary to use calcium chloride for more effective dust control, the Contractor shall furnish and spread the material, as directed. Calcium chloride shall be as specified under Section 01562, DUST CONTROL.
- B. Calcium Chloride shall not be used for dust control within a drainage basin or in the vicinity of any source of potable water.

3.07 CATCH BASIN PROTECTION:

- A. Catch basin protection shall be used for every catch basin, shown on the plans or as required by the Engineer, to trap sediment and prevent it from clogging drainage systems and entering wetlands. Siltation sacks shall be securely installed under the catch basin grate. Care shall be taken to keep the siltation sacks from breaking apart or clogging. All deposited sediment shall be removed periodically and at times prior to predicted precipitation to allow free drainage flow. Prior to working in areas where catch basins are to be protected, each catch basin sump shall be cleaned of all debris and protected. The Contractor shall properly dispose of all debris at no additional cost to the Owner.
- B. All catch basin protection shall be removed by the Contractor after construction is complete.

END OF SECTION

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SECTION 01575

HANDLING EXISTING FLOWS

PART 1 - GENERAL

1.01 WORK INCLUDED:

This Section covers all materials, equipment, and labor required to handle existing sanitary and combined sewage flows and installation and maintenance of all temporary connections, plugs, and by-pass pumping. Upon completion of the sewer rehabilitation project, all temporary plugs and connections shall be removed and flows returned to the existing sewer pipes.

1.02 RELATED WORK:

Section 01330, SUBMITTALS

Section 01535, TEMPORARY BYPASS PUMPING SYSTEM

Section 02058, CONTROLLED DENSITY FILL

1.03 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

Submit complete, checked shop drawings, showing equipment, method of by-passing, and the method of transferring flows from the existing system to the bypass system. Prior to starting work, the Contractor shall submit flow calculations for each pipeline to be bypassed that show pump capacity to be provided. Comply with requirements of Section 01330, SUBMITTALS.

PART 2 – PRODUCTS

Not Used

PART 3 - EXECUTION

3.01 MAINTAINING EXISTING FLOWS:

- A. The Contractor shall maintain all flows in the existing system until rehabilitation of the sewer is complete and ready for safe operation.
- B. The Contractor shall protect against surcharging of the existing system upstream of the work area by installing adequate temporary by-pass pumping to handle dry weather and wet weather flows. The bypass system shall have a sufficient capacity to handle full pipe capacity for the pipeline section to be bypassed times 1.25 and shall provide and maintain

sufficient flow at all times to prevent any backwater flooding due to obstructions caused by the construction.

- C. The Contractor shall repair any damage that occurs to existing pipes and structures to the satisfaction of the Engineer. Work performed under this section shall be considered incidental and shall not be measured separately for payment.
- D. The Contractor shall not allow sanitary 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.
- E. The temporary bypass pumping system shall include floats (or other acceptable level sensing devices) that will transmit a high water condition to an on-site autodialer that shall send an alarm condition to the Contractor's Superintendent. The autodialer shall also alert a designated "on-call" employee of the Contractor, should the Superintendent fail to acknowledge the call.
- F. The bypass pumping system shall include standby pump(s) that will activate in the event the lead pump fails.

END OF SECTION

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SECTION 01740

CLEANING UP

PART 1 - GENERAL

1.01 DESCRIPTION:

The Contractor must employ at all times during the progress of its work adequate cleanup measures and safety precautions to prevent injuries to persons or damage to property. The Contractor shall immediately, upon request by the Engineer provide adequate material, equipment and labor to cleanup and make safe any and all areas deemed necessary by the Engineer.

1.02 RELATED WORK:

- A. SUPPLEMENT TO SPECIFICATIONS SPECIAL PROVISIONS
- B. Section 01570 ENVIRONMENTAL PROTECTION

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

3.01 DAILY CLEANUP:

- A. The Contractor shall clean up, at least daily, all refuse, rubbish, scrap and surplus material, debris and unneeded construction equipment resulting from the construction operations and sweep the area. The site of the work and the adjacent areas affected thereby shall at all times present a neat, orderly and workmanlike appearance.
- B. Upon written notification by the Engineer, the Contractor shall within 24 hours clean up those areas, which in the Engineer's opinion are in violation of this section and the above referenced sections of the specifications.
- C. If in the opinion of the Engineer, the referenced areas are not satisfactorily cleaned up, all other work on the project shall stop until the cleanup is satisfactory.

3.02 MATERIAL OR DEBRIS IN DRAINAGE FACILITIES:

- A. Where material or debris has washed or flowed into or has been placed in existing watercourses, ditches, gutters, drains, pipes, structures, such material or debris shall be entirely removed and satisfactorily disposed of during progress of the work, and the ditches,

channels, drains, pipes, structures, and work shall, upon completion of the work, be left in a clean and neat condition.

3.03 REMOVAL OF TEMPORARY BUILDINGS, STRUCTURES AND EQUIPMENT:

- A. On or before completion of the work, the Contractor shall, unless otherwise specifically required or permitted in writing, tear down and remove all temporary buildings and structures it built; shall remove all temporary works, tools and machinery or other construction equipment it furnished; shall remove all rubbish from any grounds which it has occupied; shall remove silt fences and hay bales used for trapping sediment; and shall leave the roads and all parts of the property and adjacent property affected by its operations in a neat and satisfactory condition.

3.04 RESTORATION OF DAMAGED PROPERTY:

- A. The Contractor shall restore or replace, when and as required, any property damaged by its 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. Materials, equipment, and methods for such restoration shall be as approved by the Engineer.

3.05 FINAL CLEANUP:

- A. Before acceptance by the Owner, the Contractor shall perform a final cleanup to bring the construction site to its original or specified condition. This cleanup shall include removing all trash and debris off of the premises. Before acceptance, the Engineer shall approve the condition of the site.

END OF SECTION

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SECTION 02240

DEWATERING

PART 1 - GENERAL

1.01 WORK INCLUDED:

This section specifies designing, furnishing, installing, maintaining, operating and removing temporary dewatering systems as required to lower and control water levels and hydrostatic pressures during construction; disposing of pumped water; constructing, maintaining, observing and, except where indicated or required to remain in place, removing of equipment and instrumentation for control of the system.

1.02 RELATED WORK:

- A. Section 00890, PERMITS
- B. Section 01570, ENVIRONMENTAL PROTECTION
- C. Section 02252, SUPPORT OF EXCAVATION
- D. Section 02300, EARTHWORK

1.03 SYSTEM DESCRIPTION:

- A. Dewatering includes lowering the water table and intercepting seepage which would otherwise emerge from the slopes or bottom of the excavation; increasing the stability of excavated slopes; preventing loss of material from beneath the slopes or bottom of the excavation; reducing lateral loads on sheeting and bracing; improving the excavation and hauling characteristics of sandy soil; preventing rupture or heaving of the bottom of any excavation; and disposing of pumped water.
- B. Normal dewatering is defined as using conventional pumps installed in open excavations, ditches, or sumps. Special dewatering is defined as using single or two stage wellpoints, deep wells, or eductor and ejector systems installed in drilled holes or jetted in place.

1.04 QUALITY ASSURANCE:

- A. The Contractor is responsible for the adequacy of the dewatering systems. He shall retain the services of a Professional Engineer registered in the state where the project is located, experienced in dewatering systems, to independently evaluate the boring logs and any other soils information available to determine those areas that will require special dewatering techniques and to design the required system. The Contractor's Professional Engineer shall provide sufficient on-site inspection and supervision to assure that the dewatering is carried out in accordance with his design.

- B. The dewatering systems shall be capable of effectively reducing the hydrostatic pressure and lowering the groundwater levels to a minimum of 2 feet below excavation bottom, unless otherwise required by the Engineer, so that all excavation bottoms are firm and dry.
 - C. The dewatering system shall be capable of maintaining a dry and stable subgrade until the structures, pipes and appurtenances to be built therein have been completed to the extent that they will not be floated or otherwise damaged.
 - D. The dewatering system and excavation support (see Section 02252) shall be designed so that lowering of the groundwater level within the work area does not adversely affect structures, utilities or wells outside of the work area.
 - E. Where special dewatering is used, the Contractor shall obtain at his expense the services of a registered professional engineer to investigate, design and monitor the dewatering system. The Contractor shall also furnish materials and install at least two observation wells at each excavation area. The location of the wells shall be determined in the field by the Contractor's engineer.
- 1.05 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:
- A. At least two weeks prior to installing his dewatering system, Contractor shall submit the attached Certificate of Design completed and signed by Contractor, identifying the engineer responsible for design of the dewatering system. He shall also submit a schedule showing the timing of installation and operation of the dewatering system.
 - B. The Contractor shall submit to the Engineer for record purposes only, the following items bearing the Contractor's Engineer's stamp and signature, and identifying the codes and specifications followed in the design.
 - 1. Plans and description of the dewatering system, including the number, location and depth of wells, wellpoints or sumps; designs of filters to prevent pumping of fine soil; method and location for filtering and disposal of pumped water; and flow capacity of proposed system.
 - 2. Locations of observation wells.
 - C. The Contractor shall submit records of pump operation and groundwater elevations as required by the Owner's Engineer.

PART 2 - PRODUCTS:

Not Used

PART 3 - EXECUTION

3.01 DEWATERING OPERATIONS:

- A. All water pumped or drained from the work shall be disposed of in a manner which will not result in undue interference with other work or damage to adjacent properties, pavements and other surfaces, buildings, structures and utilities. Suitable temporary pipes, flumes or channels shall be provided for water that may flow along or across the site of the work. All disposal of pumped water shall conform to the provisions of Section 01570, ENVIRONMENTAL PROTECTION and Section 00890, PERMITS.
- B. Dewatering facilities shall be located where they will not interfere with utilities and construction work to be done by others.
- C. Dewatering procedures to be used shall be as described below:
 - 1. Crushed stone shall encapsulate the suction end of the pump to aid in minimizing the amount of silt discharged.
 - 2. For dewatering operations with relatively minor flows, pump discharges shall be directed into haybale sedimentation traps lined with filter fabric. Water is to be filtered through the haybales and filter fabric prior to being allowed to seep out into its natural water course.
 - 3. For dewatering operations with larger flows, pump discharges shall be into a steel dewatering basin. Steel baffle plates shall be used to slow water velocities to increase the contact time and allow adequate settlement of sediment prior to discharge into waterways.
 - 4. Where indicated on the contract drawings or in conditions of excess silt suspended in the discharge water, silt control bags are to be utilized in catchbasins.
- D. The Contractor shall be responsible for repair of any damage caused by his dewatering operations, at no cost to the Owner.

3.02 SPECIAL DEWATERING:

- A. If conventional dewatering methods are inadequate to ensure dry and stable conditions for structural foundations, the Contractor shall be required to use special dewatering as necessary.
- B. Special dewatering techniques may consist of one or two stage wellpoint systems, deep wells, or eductor 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.

- C. In areas requiring special dewatering, the Contractor shall lower the groundwater level to a minimum of 2 feet below the bottom of the final 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 engineer to ensure conformance with the requirements of these specifications. Construction will not be allowed until the Owner's Engineer is satisfied that the above provisions are met.

3.03 NOISE LEVEL REQUIREMENTS:

- A. All primary dewatering equipment shall be electrically operated and shall run on commercial power. Standby equipment shall be independent of commercial power and shall provide dewatering upon primary pump or power failure.
- B. All equipment utilized by the Contractor shall conform to the Department of Environmental Protection Division of Air Quality Control regulations governed by the following policy:

"A source of sound will be considered to be violating the Department's noise regulation (310 CMR 7.10) if the source:

1. Increases the broadband sound level by more than 10 dB(A) above ambient, or
2. Produces a "pure tone" condition - when any octave band center frequency sound pressure level exceeds the two adjacent center frequency sound pressure levels by 3 decibels or more.

These criteria are measured both at the property line and at the nearest inhabited residence. Ambient is defined as the background A-weighted sound level that is exceeded 90% of the time measured during equipment operating hours. The ambient may also be established by other means with the consent of the Department."

The Contractor shall construct sound enclosures or utilize other noise reduction techniques if the equipment does not meet the noise level requirements.

END OF SECTION

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CERTIFICATE OF DESIGN

Re: Contract Between:

OWNER: _____
(Name)

and

CONTRACTOR: _____
(Name)

on

CONTRACT: _____
(Number)

Date: _____

Title: _____

Contractor hereby certifies that _____:
(Engineer)

1. Is licensed or registered to perform professional engineering work in the state of _____;
(Location of Project)
2. Is qualified to design the _____
(Item)
specified in Section _____ of subject contract;
3. Has designed _____ before;
(Item)
4. Has prepared the design in full compliance with the applications and requirements of Section _____ of subject contract including all applicable laws, regulations, rules, and codes; and
5. The work has been signed and sealed pursuant to applicable state law.

FOR: _____
(Contractor)

BY: _____
(Signature)

(Name and Title)

Dated: _____

SECTION 02252

SUPPORT OF EXCAVATION

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. This section covers wood and steel sheeting or soldier piles and lagging with internal bracing for support of excavations. The requirements of this section shall also apply, as appropriate, to any methods of excavation support and underpinning which the Contractor elects to use to complete the work.
- B. The Contractor shall furnish and place timber or steel sheeting or soldier piles and lagging of the kinds and dimensions required, complying with these specifications, where required by regulation, indicated on the drawings or required by the Engineer.
- C. Vibration monitoring shall be provided during installation and extraction of sheeting whenever the braced excavation is adjacent to existing structures, in critical areas as noted in the contract documents, or as requested by the Engineer.
- D. Routine monitoring of the in-place excavation support system shall be provided.

1.02 RELATED WORK:

- A. Section 02240, DEWATERING
- B. Section 02300, EARTHWORK

1.03 QUALITY ASSURANCE:

- A. This project is subject to the Safety and Health regulations of the U.S. Department of Labor set forth in 29 CFR, Part 1926, and to the Massachusetts Department of Safety and Department of Labor, Division of Occupational Safety "Excavation & Trench Safety Regulation (520 CMR 14.00)" and "Rules and Regulations for the Prevention of Accidents in Construction Operations (454 CMR 10.0 et seq.)." Contractors shall be familiar with the requirements of these regulations.
- B. The Contractor is responsible for the adequacy of the excavation support system and shall retain the services of a Professional Engineer registered in the state where the project is located to design the required excavation support systems. The Contractor's Professional Engineer shall practice in a discipline applicable to excavation work, shall have experience in the design of excavation support systems and shall design in conformance with OSHA requirements. The Contractor's Professional Engineer shall provide sufficient on-site inspection and supervision to assure that the excavation support system is installed and functions in accordance with his design. Criteria listed herein defining the responsibilities of the Contractor's Professional Engineer are minimum requirements.

1.04 REFERENCES:

The following standards form a part of this specification as referenced herein.

American Society for Testing and Materials (ASTM)

ASTM	A6	General Requirements for Rolled Steel Plates, Shapes, Sheet Piling, and Bars for Structural Use
ASTM	A328	Steel Sheet Piling

1.05 SUBMITTALS:

- A. At least three weeks before starting installation of the excavation support system, the Contractor shall submit the attached Certificate of Design completed and signed by the Contractor and the Professional Engineer, identifying the Contractor's Professional Engineer who will be responsible for design of the excavation support system, and in accordance with Section 01330, including, for record purposes only:
 1. An overall time schedule for construction of the braced excavation system.
 2. A description of the anticipated sequence of construction.
 3.
 - a. Complete details of braced excavation methods, equipment and sizes and lengths of materials proposed to be used.
 - b. Details of vibration monitoring devices and reports.
 - c. Details of the means and methods that will be used in monitoring the integrity of the support system during its entire period of use to insure the safety of the excavation.
 - d. Complete computations for the design of the braced excavation system bearing the seal of the responsible Professional Engineer duly registered licensed to practice within a discipline applicable to excavation work, in the state where the project is located.
 - e. Any other pertinent data required for record purposes by the Engineer.
- B. Receipt of the information by the Engineer will not relieve the Contractor of the sole responsibility for the adequacy of the braced excavation system, and for assuring that there will be no resulting damage to adjacent pavement, utilities or structures, and for providing safe conditions within the sheeted areas.
- C. Further for the record, upon completion of the work of this section, the Contractor shall submit all records of survey, vibration monitoring and inspection of existing structures to the Owner's Engineer.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. Timber sheeting shall be sound spruce, pine, or hemlock, and either tongue and grooved or splined. Timber sheeting shall not be less than nominal 2-inches thick.
- B. Where steel sheet piling is indicated on the drawings or installation is ordered by the Engineer or required by OSHA standards, the material shall be of such size and strength as required by the excavation support design prepared and submitted by the Contractor's Professional Engineer. Steel sheet piling may be new or used material but shall not contain splices, cutouts, patches, or other alterations which would impair its integrity or strength. Steel sheeting shall be an approved standard section, weighing not less than 22 pounds per square foot of wall and conforming to ASTM A6 and A328.
- C. Where soldier piles and lagging are used, the steel piles shall conform to ASTM A6, and the lagging shall meet the requirements for timber sheeting, as defined above.
- D. Timber and steel used for bracing shall be of such size and strength as required in the excavation support design prepared and submitted by the Contractor's Professional Engineer. Timber or steel used for bracing shall be new or undamaged used material, which does not contain splices, cutouts, patches, or other alterations, which would impair its integrity or strength.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Work shall not be started until all materials and equipment necessary for construction are either on the site of the work or satisfactorily available for immediate use as required.
- B. The sheeting/lagging shall be sufficiently tight to minimize any resulting lowering of the groundwater level outside the excavation, as required in Section 02240, DEWATERING.
- C. The sheeting/piling shall be driven by approved means to the design elevation. No ends or edges of sheeting/piling shall be left exposed in a manner, which could create a possible hazard to safety of the public or a hindrance to traffic of any kind.
- D. If boulders or very dense soils are encountered, making it impractical to drive a sheeting/piling section to the desired depth, the section shall be treated as directed by the Contractor's Engineer.
- E. Within seven days of completing the initial installation of the earth support system, the Contractor shall submit a certification from his Professional Engineer, stating that the excavation support system as installed is in general compliance with the design or approved modifications thereto.

- F. The sheeting/piling shall be left in place where indicated on the drawings or required by the Engineer in writing. At all other locations, the sheeting/piling may be left in place or salvaged at the option of the Contractor. Wood or steel sheeting/piling permanently left in place shall be cut off at a depth of not less than two feet below finish grade unless otherwise required.
- G. All cut-off material is the property of the Contractor and shall be promptly removed by it from the site.
- H. The satisfactory construction and maintenance of the excavation support system, complete in place, shall be the responsibility of the Contractor.
- I. The Contractor shall be responsible for promptly repairing all damage to adjacent structures caused by the installation, performance, or removal of the excavation support system.

CERTIFICATE OF DESIGN

RE: Contract between

OWNER:

and

CONTRACTOR:

on

CONTRACT:

(Name)

(Name)

(Title)

(Number)

(Date)

The undersigned hereby certify that the engineer listed below:

1. Is licensed or registered to perform professional engineering work in the state of _____;
(Location of Project)
2. Is qualified by education and training to design the _____
specified in Section _____ of subject contract;
3. Has previously designed comparable excavation support systems;
4. Has prepared the design in full compliance with the requirements of subject contract, including all applicable laws, regulations, rules, and codes; and
5. Will inspect and supervise installation of the excavation support system and will monitor the in-place system to confirm that the system is installed and functions in accordance with the design.

CONTRACTOR

ENGINEER

By: _____
(Signature)

By: _____
(Signature)

(Name)

(Name)

(Title)

(Engineering Discipline)

(Date)

(Date)

END OF SECTION

SECTION 02300

EARTHWORK

PART 1 - GENERAL

1.01 WORK INCLUDED:

The Contractor shall make excavations of normal depth in earth for trenches and structures, shall backfill and compact such excavations to the extent necessary, shall furnish the necessary material and construct embankments and fills, and shall make miscellaneous earth excavations and do miscellaneous grading.

1.02 RELATED WORK:

- A. Section 00890, PERMITS
- B. Section 01740 CLEANING UP
- C. Section 01570, ENVIRONMENTAL PROTECTION
- D. Section 02240, DEWATERING
- E. Section 02252, SUPPORT OF EXCAVATION

1.03 REFERENCES:

American Society for Testing and Materials (ASTM)

ASTM	C131	Test Method for Resistance to Degradation of Small Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
ASTM	C136	Method for Sieve Analysis of Fine and Coarse Aggregates.
ASTM	C330	Specification for Lightweight Aggregate for Structural Concrete.
ASTM	D1556	Test Method for Density of Soil in Place by the Sand Cone Method.
ASTM	D1557	Test Methods for Moisture-density Relations of Soils and Soil Aggregate Mixtures Using Ten-pound (10 Lb.) Hammer and Eighteen-inch (18") Drop.
ASTM	D2922	Test Methods for Density of Soil and Soil-aggregate in Place by Nuclear Methods (Shallow Depth).

Massachusetts Department of Transportation (MassDOT) Standard Specifications for Highways and Bridges.

Code of Massachusetts Regulations (CMR) 310.40.0032 Contaminated Media and Contaminated Debris

Code of Massachusetts Regulations (CMR) 520 CMR 14.00 Excavation & Trench Safety Regulation

1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

Samples of all materials proposed for the project shall be submitted to the Engineer for review. Size of the samples shall be as approved by the Engineer.

1.05 PROTECTION OF EXISTING PROPERTY:

- A. The work shall be executed in such manner as to prevent any damage to facilities at the site and adjacent property and existing improvements, such as but not limited to streets, curbs, paving, service utility lines, structures, monuments, bench marks, observation wells, and other public or private property. Protect existing improvements from damage caused by settlement, lateral movements, undermining, washout and other hazards created by earthwork operations.
- B. In case of any damage or injury caused in the performance of the work, the Contractor shall, at its own expense, make good such damage or injury to the satisfaction of, and without cost to, the Owner. Existing roads, sidewalks, and curbs damaged during the project work shall be repaired or replaced to at least the condition that existed at the start of operations. The Contractor shall replace, at his own cost, existing benchmarks, observation wells, monuments, and other reference points, which are disturbed or destroyed.
- C. Buried drainage structures and pipes, observation wells and piezometers, including those which project less than eighteen inches (18") above grade, which are subject to damage from construction equipment shall be clearly marked to indicate the hazard. Markers shall indicate limits of danger areas, by means which will be clearly visible to operators of trucks and other construction equipment, and shall be maintained at all times until completion of project.

1.06 DRAINAGE:

- A. The Contractor shall provide, at its own expense, adequate drainage facilities to complete all work items in an acceptable manner. Drainage shall be done in a manner so that runoff will not adversely affect construction procedures or cause excessive disturbance of underlying natural ground or abutting properties.

1.07 FROST PROTECTION AND SNOW REMOVAL:

- A. The Contractor shall, at its own expense, keep earthwork operations clear and free of accumulations of snow as required to carry out the work.
- B. The Contractor shall protect the subgrade beneath new structures and pipes from frost penetration when freezing temperatures are expected.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. GRAVEL BORROW:

Gravel Borrow shall satisfy the requirements listed in MassDOT Specification Section M1.03.0, Type b.

B. CRUSHED STONE:

Crushed stone shall satisfy the requirements listed in MassDOT Specification Section M2.01.

C. SAND BORROW:

Sand Borrow shall satisfy the requirements listed in MassDOT Specification Section M1.04.0.

D. PEASTONE:

Peastone shall be smooth, hard, naturally occurring, rounded stone meeting the following gradation requirements:

Passing 5/8 inch square sieve opening	-	100%
Passing No. 8 sieve opening	-	0%

E. BACKFILL MATERIALS:

1. Class B Backfill:

Class B backfill shall be granular, well graded friable soil; free of rubbish, ice, snow, tree stumps, roots, clay and organic matter; with 30 percent or less passing the No. 200 sieve; no stone greater than two-third (2/3) loose lift thickness, or six inches, whichever is smaller.

2. Select Backfill:

Select backfill shall be granular, well graded friable soil, free of rubbish, ice, snow, tree stumps, roots, clay and organic matter, and other deleterious or organic material; graded within the following limits:

<u>Sieve Size</u>	<u>Percent Finer by Weight</u>
3-inch	100
No. 10	30-95
No. 40	10-70
No. 200	0-10

F. STATE HIGHWAY TRENCH BACKFILL:

When required by Permit, Controlled Density Fill (CDF) shall be used to backfill trenches. The CDF shall satisfy the requirements listed in MassDOT Specification Section M4.08.0.

G. PROCESSED GRAVEL:

1. Processed gravel shall satisfy the requirements listed in MassDOT Specification Section M1.03.1.
2. Processed gravel shall consist of inert material that is hard, durable stone and coarse sand, free from loam and clay, surface coatings and deleterious materials. The coarse aggregate shall have a percentage of wear, by the Los Angeles Abrasion Test, of not more than 50.

3. The gradation shall meet the following requirements:

<u>Sieve Designation</u>	<u>Percentage Passing</u>
3-in.	100
1 ½-in.	70-100
¾-in.	50-85
No. 4	30-60
No. 200	0-10

4. The approved source of bank-run gravel material shall be processed by mechanical means. The equipment for producing crushed gravel shall be of adequate size with sufficient adjustments to produce the desired materials. The processed material shall be stockpiled in such a manner to minimize segregation of particle sizes. All processed gravel shall come from approved stockpiles.

PART 3 - EXECUTION

3.01 DISTURBANCE OF EXCAVATED AND FILLED AREAS DURING CONSTRUCTION:

- A. Contractor shall take the necessary steps to avoid disturbance of subgrade during excavation and filling operations, including restricting the use of certain types of construction equipment and their movement over sensitive or unstable materials, dewatering and other acceptable control measures.
- B. All excavated or filled areas disturbed during construction, all loose or saturated soil, and other areas that will not meet compaction requirements as specified herein shall be removed and replaced with a minimum 12-inch layer of compacted crushed stone wrapped all around in non-woven filter fabric. Costs of removal and replacement shall be borne by the Contractor.
- C. The Contractor shall place a minimum of 12-inch layer of special bedding materials and crushed stone wrapped in filter fabric over the natural underlying soil to stabilize areas which may become disturbed as a result of rain, surface water runoff or groundwater seepage pressures, all at no additional cost to the Owner. The Contractor also has the option of drying materials in-place and compacting to specified densities.

3.02 EXCAVATION:

A. GENERAL:

- 1. The Contractor shall perform all work of any nature and description required to accomplish the work as shown on the Drawings and as specified.
- 2. Excavations, unless otherwise required by the Engineer, shall be carried only to the depths and limits shown on the Drawings. If unauthorized excavation is carried out below required subgrade and/or beyond minimum lateral limits shown on Drawings, it shall be backfilled with gravel borrow and compacted at the Contractor's expense as specified below, except as otherwise indicated. Excavations shall be kept in dry and good conditions at all times, and all voids shall be filled to the satisfaction of the Engineer.
- 3. In all excavation areas, the Contractor shall strip the surficial topsoil layer and underlying subsoil layer separate from underlying soils. In paved areas, the Contractor shall first cut pavement as specified in paragraph 3.02 B.1 of this specification, strip pavement and pavement subbase separately from underlying soils. All excavated materials shall be stockpiled separately from each other within the limits of work.
- 4. The Contractor shall follow a construction procedure, which permits visual identification of stable natural ground. Where groundwater is encountered, the size of the open excavation shall be limited to that which can be handled by the Contractor's

chosen method of dewatering and which will allow visual observation of the bottom and backfill in the dry.

5. The Contractor shall excavate unsuitable materials to stable natural ground where encountered at proposed excavation subgrade, as required by the Engineer. Unsuitable material includes topsoil, loam, peat, other organic materials, snow, ice, and trash. Unless specified elsewhere or otherwise required by the Engineer, areas where unsuitable materials have been excavated to stable ground shall be backfilled with compacted special bedding materials or crushed stone wrapped all around in non-woven filter fabric.

B. TRENCHES:

1. Prior to excavation, trenches in pavement shall have the traveled way surface cut in a straight line by a concrete saw or equivalent method, to the full depth of pavement. Excavation shall only be between these cuts. Excavation support shall be provided as required to avoid undermining of pavement. Cutting operations shall not be done by ripping equipment.
2. The Contractor shall satisfy all dewatering requirements specified in Section 02240, DEWATERING, before performing trench excavations.
3. Trenches shall be excavated to such depths as will permit the pipe to be laid at the elevations, slopes, and depths of cover indicated on the Drawings. Trench widths shall be as shown on the Drawings or as specified.
4. Where pipe is to be laid in bedding material, the trench may be excavated by machinery to, or just below, the designated subgrade provided that the material remaining in the bottom of the trench is not disturbed.
5. If pipe is to be laid in embankments or other recently filled areas, the fill material shall first be placed to a height of at least 12-inches above the top of the pipe before excavation.
6. Pipe trenches shall be made as narrow as practicable and shall not be widened by scraping or loosening materials from the sides. Every effort shall be made to keep the sides of the trenches firm and undisturbed until backfilling has been completed.
7. If, in the opinion of the Engineer, the subgrade, during trench excavation, has been disturbed as a result of rain, surface water runoff or groundwater seepage pressures, the Contractor shall remove such disturbed subgrade to a minimum of 12-inches and replace with crushed stone wrapped in filter fabric. Cost of removal and replacement shall be borne by the Contractor.
8. The Contractor shall obtain a trench permit from the municipality where the trench is located prior to making any excavations of trenches (any subsurface excavation

greater than three (3) feet in depth and fifteen (15) feet or less between soil walls as measured from the bottom).

9. All trenches required to be permitted must be attended, covered, barricaded, or backfilled. Covers must be road plates at least ¾-inch thick or equivalent, barricades must be fences at least 6-feet high with no openings greater than 4-inches between vertical supports and all horizontal supports required to be located on the trench-side of the fencing.

C. EXCAVATION NEAR EXISTING STRUCTURES:

1. Attention is directed to the fact that there are pipes, manholes, drains, and other utilities in certain locations. An attempt has been made to locate all utilities on the drawings, but the completeness or accuracy of the given information is not guaranteed.
2. As the excavation approaches pipes, conduits, or other underground structures, digging by machinery shall be discontinued and excavation shall be done by means of hand tools, as required. Such manual excavation, when incidental to normal excavation, shall be included in the work to be done under items involving normal excavation.
3. Where determination of the exact location of a pipe or other underground structure is necessary for properly performing the work, the Contractor shall excavate test pits to determine the locations.

3.03 BACKFILL PLACEMENT AND COMPACTION:

A. GENERAL:

1. Prior to backfilling, the Contractor shall compact the exposed natural subgrade to the densities as specified herein.
2. After approval of subgrade by the Engineer, the Contractor shall backfill areas to required contours and elevations with specified materials.
3. The Contractor shall place and compact materials to the specified density in continuous horizontal layers, not to exceed nine (9) inches in uncompacted lifts. The degree of compaction shall be based on maximum dry density as determined by ASTM Test D1557, Method C. The minimum degree of compaction for fill placed shall be as follows:

Percent of

<u>Location</u>	<u>Maximum Density</u>
Below pipe centerline	95
Above pipe centerline	92
Below pavement (upper 3 ft.)	95
Embankments	95
Below pipe in embankments	95
Adjacent to structures	92
Below structures	95

4. The Engineer reserves the right to test backfill for conformance to the specifications and Contractor shall assist as required to obtain the information. Compaction testing will be performed by the Engineer or by an inspection laboratory designated by the Engineer, engaged and paid for by the Owner. If test results indicate work does not conform to specification requirements, the Contractor shall remove or correct the defective Work by recompacting where appropriate or replacing as necessary and approved by the Engineer, to bring the work into compliance, at no additional cost to the Owner. All backfilled materials under structures and buildings shall be field tested for compliance with the requirements of this specification.
5. Where horizontal layers meet a rising slope, the Contractor shall key each layer by benching into the slope.
6. If the material removed from the excavation is suitable for backfill with the exception that it contains stones larger than permitted, the Contractor has the option to remove the oversized stones and use the material for backfill or to provide replacement backfill at no additional cost to the Owner.
7. The Contractor shall remove loam and topsoil, loose vegetation, stumps, large roots, etc., from areas upon which embankments will be built or areas where material will be placed for grading. The subgrade shall be shaped as indicated on the Drawings and shall be prepared by forking, furrowing, or plowing so that the first layer of the fill material placed on the subgrade will be well bonded to the subgrade.
8. Where called for on the Drawings, Lightweight Fill shall be placed and compacted as recommended by the manufacturer. The exact number of passes shall be approved by the Engineer to insure stability of the layer. As soon as the compaction of each layer has been completed, the next layer shall then be placed. The Contractor shall take all necessary precautions during construction activities in operations on or adjacent to the Lightweight Fill to insure that the material is not over-compacted. Construction equipment, other than for compaction, shall not operate on the exposed Lightweight Fill. The top surface of the Lightweight Fill lying directly below the gravel course shall be chinked by additional rolling of the Lightweight Fill to prevent infiltration of fines.

B. TRENCHES:

1. Bedding as detailed and specified shall be furnished and installed beneath the pipeline prior to placement of the pipeline. A minimum bedding thickness shall be maintained between the pipe and undisturbed material, as shown on the Drawings.
2. As soon as practicable after pipes have been laid, backfilling shall be started.
3. Unless otherwise indicated on the Drawings, select backfill shall be placed by hand shovel in 6-inch thick lifts up to a minimum level of 12-inches 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. Compaction of each lift in the zone around the pipe shall be done by use of power-driven tampers weighing at least 20 pounds or by vibratory compactors. Care shall be taken that material close to the bank, as well as in all other portions of the trench, is thoroughly compacted to densities required.
4. Class B backfill shall be placed from the top of the select backfill to the specified material at grade (loam, pavement subbase, etc.). Fill compaction shall meet the density requirements of this specification.
5. Water Jetting:
 - a. Water jetting may be used when the backfill material contains less than 10 percent passing the number 200 sieve, but shall be used only if approved by the Engineer.
 - b. Contractor shall submit a detailed plan describing the procedures he intends to use for water jetting to the Engineer for approval prior to any water jetting taking place.
 - c. Compaction of backfill placed by water jetting shall conform to the requirements of this specification.
6. If the materials above the trench bottom are unsuitable for backfill, the Contractor shall furnish and place backfill materials meeting the requirements for trench backfill, as shown on the drawings or specified herein.
7. Should the Engineer order crushed stone for utility supports or for other purposes, the Contractor shall furnish and install the crushed stone as directed.
8. In shoulders of streets and road, the top 12-inch layer of trench backfill shall consist of processed gravel for sub-base, satisfying the requirements listed in MassDOT standard specification M1.03.1.
9. Trenches in state highways shall be backfilled with Controlled Density Fill, in accordance with the state highway permit included in Section 00890, PERMITS.

C. BACKFILLING ADJACENT TO STRUCTURES:

1. The Contractor shall not place backfill against or on structures until they have attained sufficient strength to support the loads to which they will be subjected. Excavated material approved by the Engineer may be used in backfilling around structures. Backfill material shall be thoroughly compacted to meet the requirements of this specification.
2. Contractor shall use extra care when compacting adjacent to pipes and drainage structures. Backfill and compaction shall proceed along sides of drainage structures so that the difference in top of fill level on any side of the structure shall not exceed two feet (2') at any stage of construction.
3. Where backfill is to be placed on only one side of a structural wall, only hand-operated roller or plate compactors shall be used within a lateral distance of five feet (5') of the wall for walls less than fifteen feet (15') high and within ten feet (10') of the wall for walls more than fifteen feet (15') high.

3.04 DISPOSAL OF SURPLUS MATERIALS:

- A. Surplus excavated materials, which are acceptable to the Engineer, shall be used to backfill normal excavations in rock or to replace other materials unacceptable for use as backfill. Upon written approval of the Engineer, surplus excavated materials shall be neatly deposited and graded so as to make or widen fills, flatten side slopes, or fill depressions; or shall be neatly deposited for other purposes as indicated by the Owner, within its jurisdictional limits; all at no additional cost to the Owner.
- B. Surplus excavated material not needed as specified above shall be hauled away and disposed of by the Contractor at no additional cost to the Owner, at appropriate locations, and in accordance with arrangements made by him. Disposal of all rubble shall be in accordance with all applicable local, state and federal regulations.
- C. No excavated material shall be removed from the site of the work or disposed of by the Contractor unless approved by the Engineer.
- D. The Contractor shall comply with Massachusetts regulations (310 CMR 40.0032) that govern the removal and disposal of surplus excavated materials. Materials, including contaminated soils, having concentrations of oil or hazardous materials less than an otherwise Reportable Concentration and that are not a hazardous waste, may not be disposed of at locations where concentrations of oil and/or hazardous material at the receiving site are significantly lower than the levels of those oil and /or hazardous materials present in the soil being disposed or reused.

END OF SECTION

SECTION 02428

CURED-IN-PLACE PIPE

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. This section covers installation of cured-in-place pipe as called for herein and on the drawings. The work includes furnishing all equipment, material and labor required to perform the services described herein.

1.02 RELATED WORK:

- A. Section 00331, TELEVISION AND MANHOLE INSPECTION LOGS
- B. Section 00890, PERMITS
- C. Section 01014, SCOPE AND SEQUENCE OF WORK
- D. Section 01330, SUBMITTALS
- E. Section 01331, DOCUMENTATION
- F. Section 01535, TEMPORARY BYPASS PUMPING
- G. Section 01575, HANDLING EXISTING FLOWS
- H. Section 02440, SEWER CLEANING AND INSPECTION
- I. Section 02443, SERVICE CONNECTION REHABILITATION

1.03 QUALITY ASSURANCE:

- A. The work described herein shall be performed by a company with not less than five (5) years of experience in providing the required services, employing experienced workers and experienced supervisory personnel. Supervisory personnel shall have not less than three (3) years of experience in providing the required services and shall be present at the jobsite during all work related to the required services.

1.04 REFERENCES:

The following standards form a part of this specification as referenced:

American Society for Testing and Materials (ASTM)

ASTM F1216 Standard Practice for Rehabilitation of Existing Pipelines and Conduits
by the Inversion and Curing of a Resin-Impregnated Tube

The National Association of Sewer Service Companies (NASSCO)

Performance Specification Guideline for the Installation of Cured-in-Place Pipe (CIPP)

1.05 SYSTEM DESCRIPTION:

- A. Unless otherwise indicated herein, installation of cured-in-place pipe shall be carried out in accordance with ASTM F1216, Section 7.
- B. Curing of liner tube using hot water or steam shall be acceptable.
- C. The Contractor shall design all cured-in-place liners assuming the following parameters identified in the table below:

Design Parameters	Contract Scope
Design Conditions	Fully Deteriorated
Depth of Cover	Per Plans
Depth of Groundwater	5.5 Feet below Ground Surface Level
Soil Density	120 pcf
Soil Modulus	1,000 psi
Factor of Safety	2.0
Live Load	H2O or Railroad
Ovality	5% Minimum or as identified in available CCTV inspection logs available in Appendix A.

Physical Characteristics	Value (psi)
Short Term Flexural Modulus	400,000
Long Term Flexural Modulus	200,000
Short Term Flexural Strength	4,500
Long Term Flexural Strength	2,250
Reduction Factor	50%

- D. The Contractor may propose alternative cured-in-place processes and/or products for review and approval by the Engineer.

- F. The location, length, and approximate interior dimensions of the cured-in-place pipe to be installed are as shown on the drawings.
- G. The Contractor shall provide MSDS for all chemicals used in the lining process.

1.06 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF SECTION 01330 SUBMITTALS, SUBMIT THE FOLLOWING:

- A. Prior to beginning the work, submit the following:
 - 1. Qualifications of the firm/personnel who will perform the Work.
 - 2. Descriptions of system proposed for handling existing flows, if necessary, during the procedures to be carried out.
 - 3. Description of the system, equipment and material proposed for the cured-in-place pipe.
 - 4. Manufacturer's warranty.
- B. Prior to beginning the work, the Contractor shall submit, a written plan for contacting homeowners whose service connections may be affected due to the installation of liner. Such plan is subject to approval by the Engineer and the Owner.
- C. The Contractor shall submit the following information for each inversion within 21 days following completion of the liner installation. The information shall also be included on external hard drives as described in Section 01331, DOCUMENTATION.
 - Pre-inversion television inspection logs and videos
 - Liner order sheet describing the material ordered
 - Service connection reinstatement sign-off sheet
 - Thermo couple log kept during inversion process
 - Post-inversion television inspection logs and videos
 - Material testing results

Information should be organized by inversion and two (2) copies shall be delivered.

1.07 WARRANTY:

The cured-in-place pipe shall be warranted against infiltration and defects for one (1) year from the date the project is accepted by the Owner. Defects shall include, but not be limited to, dry spots; lifts; wrinkles; fins; delaminations; pinholes (with or without infiltration); mineral deposits; staining; and infiltration. Defects shall also include reinstated non-active service connections and reinstated connections specifically identified on the drawings to not be reinstated.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. Materials used for the cured-in-place pipe shall meet the requirements of ASTM F1216, X1.1.2, based on fully deteriorated pipe.
- B. Cured-in-place pipe shall be as manufactured by Insituform Technologies, National Liner, Cure-Line, or approved equal.
- C. Hydrophylic rubber gaskets shall swell to a minimum of 120% of its dry size when in contact with water and shall have a maximum swell size of 6 millimeters high. Gaskets must be adhered to the host pipe to ensure proper installation by either an adhesive sealant or mechanical fastener. Gaskets, fasteners and adhesives shall be as manufactured by Hydrotite, Adeka, LMK Technologies or approved equal.
- D. Materials used to patch/fill voids and holes in pipe invert shall be in accordance with Section 02435, MANHOLE REHABILITATION, Part 2 – Products.

PART 3 - EXECUTION

3.01 PIPE CLEANING AND INSPECTION:

Pipe cleaning and inspection shall be carried out in accordance with Section 02440, SEWER CLEANING AND INSPECTION and shall not be measured separately for payment.

3.02 FLOW CONTROL:

Flow control, if required, shall be in accordance with Section 01575, HANDLING EXISTING FLOWS.

3.03 WATER FOR CONSTRUCTION PURPOSES:

Availability of water for construction purposes shall be in accordance with SUPPLEMENT TO SPECIFICATIONS – SPECIAL PROVISIONS.

3.04 NOTIFICATION:

- A. The Contractor shall affix a written notice to the door of each home that has sewer service through the pipe being lined one week prior to the lining operation and again one day before the lining operation. A notice shall also be distributed following service connection reinstatement stating that the service connection has been restored to service.
- B. The written notice must be approved by the Engineer prior to its distribution.

- C. The printing and distribution of notices to the homeowners by the Contractor shall be considered incidental to the lining operation.

3.05 REPAIR PIPE INVERT:

- A. Existing pipe invert (including debris, deteriorated brick, block, and mortar) shall be removed and disposed of.
- B. Bricks shall be moistened by suitable means, as directed, until they are neither so dry as to absorb water from the mortar nor so wet as to be slippery when laid.
- C. Each brick shall be laid as a header in a full bed and joint of mortar without requiring subsequent grouting, flushing or filling, and shall be thoroughly bonded as directed.
- D. Repair pipe invert shall not be measured separately for payment.
- E. Patching and filling holes and missing bricks in pipe invert shall be performed prior to lining so that the invert has a uniform slope with no voids, holes, or depressions. The pipe invert repair shall include the lower one-third ($1/3$) portion of the pipe based on the vertical pipe diameter/height.

3.06 MANHOLE REHABILITATION:

- A. Manhole rehabilitation shall be completed following the completion of cured-in-place pipe. Manhole rehabilitation shall be in accordance with specification section 02435, Sewer Manhole Rehabilitation.

3.07 INSTALLATION:

- A. Each sewer segment shall be television inspected prior to the installation of the cured-in-place liner. The inspection shall be performed in “dry-pipe” conditions with no flow in the pipe. The pipe shall be clean and free of all obstructions prior to installation of the liner.
- B. Prior to installation of the cured-in-place pipe the Contractor shall install a hydrophilic rubber gasket on the inside of each pipe where it meets a manhole such that the hydrophilic rubber gasket is between the host pipe and the cured-in-place pipe. The annular space shall be made watertight at the ends of the liner in the manholes.
- C. The Contractor shall make television inspection camera available for confirming service connections to be reinstated. At the Engineer’s discretion, the Contractor shall dye test service connections to confirm that each service connection that should be reinstated is included on the attached Service Connection Reinstatement Certification Form. Contractor shall not reinstate inactive service connections. Contractor shall make reasonable efforts to confirm if a service is active, including review of available tie cards

with the Resident Representative (Resident Representatives shall obtain available tie cards) and dye testing/television inspection of properties as required. No additional payment will be made for television inspection of mainline or service line from mainline to property in conjunction with dye testing of service connections.

- D. The Contractor shall install a pre-liner or grout infiltration sources if required to install the cured-in-place pipe.
- E. Installation of the cured-in-place pipe shall be in accordance with ASTM F1216, Section 7.
- F. After the liner has been cured in place, the Contractor shall reinstate and brush all active service connections as required by the Engineer. Branch connections to buildings shall be reinstated to a minimum of 95% of the inside diameter of the existing service connection without excavation, utilizing a remotely controlled cutting and brushing device, monitored by a video TV camera. No additional payment will be made for excavations for the purpose of reinstating connections and the contractor will be responsible for all cost and liability associated with such excavation and restoration work.
- G. The service connections to be reinstated for each inversion will be listed on the attached form (Service Connection Reinstatement Certification Form) and will be signed by an authorized representative of the Contractor.
- H. All reinstated service connections shall be sealed with grout in accordance with Section 02443, SERVICE CONNECTION REHABILITATION. The Contractor shall make certain that the annular space between the host pipe and the cured-in-place pipe is fully sealed with grout.
- I. Each sewer segment shall be television inspected after the liner installation and service grouting have been completed. The inspection shall be performed in "dry-pipe" conditions with no flow in the pipe. Post rehabilitation television inspection shall be performed prior to removing any sewer bypass equipment. Post rehabilitation television inspection shall be considered incidental to the lining process and shall not be measured separately for payment.
- J. Once the cured-in-place liner is installation is completed any void space between the host pipe and the cured-in-place liner shall be filled with grout.
- K. The cured in place lining shall be installed through invert of manhole. Manhole access shall be reinstated by cutting full opening (100%) to match manhole bench and invert opening.

3.06 TESTING REQUIREMENTS:

- A. Cured-in-place pipe samples shall be prepared and tested by the Contractor in accordance with ASTM F1216 Section 8.1 unless otherwise stated in this section.

- B. The Contractor shall obtain 25% samples for each pipe inversion.
- C. If field conditions or pipe shape prevent the Contractor from obtaining the samples as specified in ASTM F1216 Section 8.1 the samples shall be taken as required by the Engineer.
- D. An independent testing laboratory shall test the cured-in-place pipe samples and the results are to be sent directly to the Engineers Resident Project Representative within 21 calendar days following the completion of each inversion.
- E. The cost of obtaining the samples and testing shall be the sole responsibility of the Contractor and shall be considered incidental to the lining process.
- F. Inversions where the cured-in-place pipe samples that do not meet the requirements of ASTM D790 and D638 as indicated in ASTM F1216 Section 8 will be televised by the Contractor, as required by the Engineer, at no additional cost to the Owner, for review by the Engineer. Liner deemed unacceptable by the Engineer will be removed and replaced at no additional cost to the Owner.

3.07 FIELD TESTING/INSPECTION:

- A. Prior to expiration of the warranty period, during periods of high groundwater, and at a time to be approved by the Engineer, the Contractor shall clean and television inspect each of the cured-in-place pipes in accordance with Section 02440, SEWER CLEANING AND INSPECTION. The contractor shall repair any defects found in the cured-in-place pipe. Defects shall include, but not be limited to, dry spots; lifts; wrinkles; fins; delaminations; pinholes (with or without infiltration); mineral deposits; staining; and infiltration. Defects shall also include reinstated non-active service connections and reinstated connections specifically identified on the drawings to not be reinstated. Removal and replacement of cured-in-place pipe with defects shall be performed if required by the ENGINEER. Defects shall be repaired by cured-in-place pipe or short liners, as required by the ENGINEER. Short liners shall be a minimum of four (4) linear feet per defect location. The Contractor shall reseal the annular space between the sewer main and the cured-in-place pipe at manhole locations and service connections until there are no visible leaks through television inspection.
- B. All inspecting, resealing, cured-in-place lining, short lining, or other repairs within the warranty period shall be provided at no additional cost to the Owner and as required by the ENGINEER.

SERVICE CONNECTION REINSTATEMENT CERTIFICATION FORM

The Contractor shall review sewer tie cards, television inspection tapes, and perform dye tests as necessary to determine which service connections should be reinstated following installation of a Cured-in-Place Liner. Details regarding the location of each service connection that will be reinstated, including Manhole-to-Manhole reach, stationing, and clock position shall be recorded on this form.

Service Connections to be Reinstated (Clock Position)

Inversion # _____	MH _____ to MH _____	_____
	MH _____ to MH _____	_____
	MH _____ to MH _____	_____
	MH _____ to MH _____	_____
	MH _____ to MH _____	_____
	MH _____ to MH _____	_____
	MH _____ to MH _____	_____
	MH _____ to MH _____	_____

The Contractor shall be responsible for reinstatement of **all active** service connections following Cured-in-Place Lining. If active service connections are found, prior to the project being complete, not to have been reinstated, the Contractor shall reinstate them within one (1) calendar day of notification, at his sole expense. If active service connections are found, at any future date, not to have been reinstated, the Contractor shall reinstate them within three (3) calendar days of notification, at his sole expense.

Contractor _____

Signature

_____ Date

_____ Print Name

END OF SECTION

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SECTION 02431

GEPOLYMER LINING OF SANITARY SEWERS

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. This specification covers work, materials and equipment required for the preparation and installation of a geopolymer lining system providing a minimum 50-year service life for internal protection and structural rehabilitation of existing sanitary sewer and storm infrastructure. This includes but is not limited to pipe, culverts, tunnels, manholes, wet wells, boxes, structures and other similar infrastructure. This is accomplished by using an approved structural, monolithic hand or spray-application of a high-build, geopolymer lining system with enhanced corrosion and abrasion protection, forming a new structure within existing deteriorated infrastructure. The protective lining works shall include all activities associated with the protective lining system, not limited to the following:
 - 1. Design of approved continuous protection liners to the internal surface of the host infrastructure (pipe, tunnels, manholes, culverts, boxes, structures, etc.).
 - 2. Pre-construction inspection and surface preparation of host infrastructure prior to application of protective lining system.
 - 3. Installation of approved continuous protection liners to the internal surface of the host infrastructure, for pipe; manhole to manhole, manhole to structure, or structure to structure and including lateral protection and reinstatement. Partial liner installations are not allowed.
 - 4. Quality Control Measures and post-construction inspection, repairs and testing.

1.02 RELATED WORK:

- A. Section 00331, TELEVISION AND MANHOLE INSPECTION LOGS
- B. Section 00890, PERMITS
- C. Section 01014, SCOPE AND SEQUENCE OF WORK
- D. Section 01330, SUBMITTALS
- E. Section 01331, DOCUMENTATION
- F. Section 01575, HANDLING EXISTING FLOWS

G. Section 02440, SEWER CLEANING AND INSPECTION

H. Section 02443, SERVICE CONNECTION REHABILITATION

1.03 QUALITY ASSURANCE:

- A. The work described herein shall be performed by a company with not less than five (5) years of experience in providing the required services, employing experienced workers and experienced supervisory personnel. Supervisory personnel shall have not less than three (3) years of experience in providing the required services and shall be present at the jobsite during all work related to the required services.

1.04 REFERENCES:

The following standards form a part of this specification as referenced:

American Society for Testing and Materials (ASTM)

ASTM C31	Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C39/C109	Compressive Strength Hydraulic Cement Mortars
ASTM C78/C293/C348	Flexural Strength of Concrete
ASTM C138/C642	Standard Test Method for Density
ASTM C267	Chemical Resistance of Mortars, Grouts, and Monolithic Surfacing and Polymer Concretes
ASTM C469	Static Modulus of Elasticity & Poisson's Ratio of Concrete Compression
ASTM C496	Splitting Tensile Strength of Cylindrical Concrete Specimens
ASTM C666	Freeze Thaw Durability
ASTM C 807 – Set Time of Hydraulic Cement Mortar	
ASTM C882	Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear
ASTM C1090	Shrinkage Test
ASTM C1138	Standard Test Method for Abrasion Resistance of Concrete

(Underwater Method)

ASTM C1140-03A	Preparing and Testing Specimens from Shotcrete Test Panels
ASTM C1202	Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration
ASTM F 2414	Practice for Sealing Sewer Manhole Using Chemical Grouting
ASTM F 2551	Practice for Installing a Protective Cementitious Liner System in Sanitary Manholes

American Concrete Institute (ACI)

ACI Certified Concrete Field Testing Technician, Level 1

1.05 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF SECTION 01330 SUBMITTALS, SUBMIT THE FOLLOWING:

A. The following items shall be submitted:

1. Project data and manufacturer's application instructions.
2. Quality Assurance Submittal:
 - a. Submit documentation stating the Application Contractor is an approved installer and licensed by the geopolymer system manufacturer and specialized equipment supplier.
 - b. Submit documentation stating the Application Contractor's experience, listing at least 5 past clients to verify previous satisfactory performance on projects of similar or greater size and difficulty factor. Submitted documentation shall include the project type, total value of the contract, date of project completion, as well as Owner and Engineer contact information, including names, addresses, and telephone numbers.
 - c. Submit documentation from the monolithic surfacing manufacturer listing at least 5 previous installations of the product including installation dates, description of work performed, contact names and telephone numbers.
 - d. Descriptions of system proposed for handling existing flows, if necessary, during the procedures to be carried out.

- e. Submit shop drawing and/or technical product data sheets which includes a description of the system, structural properties, equipment, and material proposed for the cured-in-place short liners.
 - f. Submit stamped design calculations substantiating the geopolymer lining system thickness by or under a Massachusetts Licensed Structural Engineer with experience in the design of sewer pipe or sewer pipe linings.
 - g. MSDS for all chemicals used in the short lining process.
 - h. Manufacturer's Warranty.
3. After cleaning and TV inspection by the Application Contractor of all proposed infrastructure to be rehabilitated and before beginning lining of any infrastructure, the Contractor shall submit to the Engineer for review the following:
- a. Video (2 copies) of the Licensed Applicator's TV inspection of the infrastructure prior to product application.
4. After rehabilitation of the infrastructure, the Contractor shall submit to the Engineer for their records the following:
- a. A Video (2 copies) of the Licensed Applicator's TV inspection of the completed Work.
 - b. Test results of field samples of Geopolymer Liner material as specified in the Contract Documents.

1.06 QUALITY ASSURANCE:

- A. Product Manufacturer: Company specializing in manufacturing quality Geopolymer Liner products with minimum 15 years' experience in the manufacture and distribution of a geopolymer product. Geopolymer product shall have a track record of use within sanitary sewer and/or storm infrastructure of at least 15 years.
- B. Application Contractor must be established in the geopolymer lining industry, have at least 5 years of experience in the geopolymer lining of structures, and have coated a minimum of 15,000 linear feet of horizontal infrastructure. The Application Contractor cannot share the experience of the manufacturer.
- C. Application Contractor shall initiate and enforce quality control procedures consistent with applicable ASTM and NACE standards together with pull testing and vacuum testing to assure a high-quality project.
- D. Application Contractor shall use an adequate number of skilled workmen who are thoroughly trained and experienced in the necessary crafts. These workmen shall be

completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section. The supervisor and foreman must have a minimum of 5 years' experience in geopolymer restoration.

- E. Application Contractor shall use approved specialty equipment adequate in size, capacity and number sufficient to accomplish the work of this Section in a timely manner.
- F. Single Source Responsibility: Geopolymer Liner and all products used with the Geopolymer Lining System, to include but not limited to Infiltration Control, Invert Repair and Patching, MH Chimney Treatment and MH Insert shall be approved by and/or supplied through the Product Manufacturer. Use only products approved by Product Manufacturer and used only within recommended limits.

1.07 DELIVERY, STORAGE, AND HANDLING:

- A. Delivery: Deliver materials in original containers with seals unbroken and labels intact and free of moisture. Do not use materials that have been directly exposed to moisture or if there is visible damage to the packaging.
- B. Receipt Process: All materials must be inspected by Application Contractor upon receipt and the Bill of Lading reviewed to confirm it properly documents amount(s) and type(s) of material(s) received, date and time of delivery as well as the shipping company delivering the material. Completed/signed Bill of Lading and material batch numbers shall be logged by the Application Contractor upon receipt of the material(s) and stored in project files for possible future reference. Receipt of material should also be noted in Daily Activity Log.
- C. Storage: Materials may be stored offsite, such as in a yard, for a period of time prior to use on the project. Upon delivery to the project, Contractor shall designate a specific space at the project site for staging and mixing materials. Protect this space and repair all damage resulting from use. Do not store kerosene, gasoline or other flammable liquids in this space. Remove oily rags at the end of each day's work. Regardless of storage location, Geopolymer Lining System products are to be kept dry, protected from weather and stored under cover within the temperature ranges recommended by the Manufacturer. Products are to be stored and handled according to their SDSs or appropriate classification. Damaged or unsuitable products shall be promptly removed from the job site and shall be replaced with suitable materials.

1.08 PROJECT CONDITIONS:

- A. Environmental Requirements: Application Contractor shall conform with all local, state and federal regulations including those set forth by OSHA and the EPA and any other applicable authorities. Confined space entry requirements shall be followed.

- B. Monitor and maintain the temperature inside the host infrastructure prior to, during and immediately following installation. Temperature conditions shall be maintained per Manufacturers' recommendations.
- C. Provide continuous ventilation and if necessary cooling and heating facilities to maintain surface and ambient temperatures before, during, and following application of finishes, within specified temperature range and for duration as directed by Manufacturer.
- D. Protection: Provide sufficient shielding to fully protect adjacent finished work.

1.09 WARRANTY:

- A. The geopolymer lining shall be warranted against infiltration and defects for one (1) year from the date the project is accepted by the Owner.
- B. The geopolymer lining shall be unconditionally guaranteed for materials and resistance against deterioration for a minimum period of five (5) years from the date of substantial completion. All defects discovered within this period, as determined by the Owner, shall be repaired or replaced in a satisfactory manner, and within a reasonable time, at no cost to the Owner.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. When more than one product is used in composite with other(s), all materials shall be supplied by the same manufacturer.
- B. Repair materials must be accepted and approved by the Engineer and must be compatible with the specified geopolymer lining system.

2.02 GEOPOLYMER LINING SYSTEM:

- A. The submitted geopolymer lining system shall meet the following product description requirements or approved equal.
- B. The Geopolymer Liner material shall be a factory blended, one-component (just add water), eco-friendly, micro-fiber reinforced ultra-dense geopolymer mortar synthesized from reactive SiO_2 and Al_2O_3 from industrial byproducts, enhanced with monocrySTALLINE quartz aggregate. This material shall be formulated to restore structural integrity while eliminating the infiltration of groundwater, provide enhanced corrosion resistance and shall be specifically formulated for ease of mechanical pumping, spraying and spin casting.
- C. The Geopolymer Liner shall not clog spinner heads or spray equipment.

- D. The Geopolymer Liner shall be formulated to produce a liner with improved compressive and flexural strength, high adhesion to damp surfaces, lower permeability and increased resistance to aggressive chemical attack.
- E. The fiber reinforced formula shall be developed to: improve chemical resistance, improve hydraulic abrasion resistance, provide dimensional stability and protect against penetration by substances such as fats, oils, grease, gases and chloride ions.
- F. The finished infrastructure must be such that once the Geopolymer Liner sets, the total liner thickness will be homogeneous and monolithic.
- G. The Geopolymer Liner material shall conform to the minimum requirements as presented in Table 1. The typical material properties, presented as minimum requirements in Table 1, have been obtained through the performance of independent third-party laboratory testing following ASTM Standards performed under standard laboratory conditions. Field tested material properties will meet or exceed warranted values. Material properties utilized in design engineering shall be equal or lesser of warranted values and values listed in Table 1 which follows:

Table 1

Physical Properties	ASTM Reference	Requirements
Set Time	ASTM C 807	Min. Initial 60 mins Max. Final 240 mins
Compressive Strength	ASTM C 39 / C 109	Min. 8,000 psi 55.15 MPa @ 28 days
Flexural Strength	ASTM C 78 / C 293	Min. 800 psi 5.51 MPa @ 28 days
Density	ASTM C 138 / C 642	Dry 90–110 lb/ft ³ 1,441–1,762 kg/m ³
Chemical Resistance, Sulfuric Acid PH 1.0	ASTM C 267	Max 1.0% mass loss @ 12 weeks
Modulus of Elasticity	ASTM C 469	Min. 5x10 ⁶ psi 34.47 GPa @ 28
Split Tensile Strength	ASTM C 496	Min. 900 psi 6.2 MPa @ 28 days
Freeze Thaw Durability	ASTM C 666	Max 0.1% Loss @ 300 cycles
Bond Strength to	ASTM C 882	Min. 3,000 psi 20.68 MPa @ 28
Shrinkage Test	ASTM C 1090	Max 0.02% @ 28 days
Abrasion Resistance	ASTM C 1138	Max 1.5% Weight Loss @ 6 cycles on 28 day sample
Rapid Chloride Ion Permeability	ASTM C 1202	Very Low @ 28 days

2.03 GEOPOLYMER – LINER THICKNESS DESIGN:

- A. The thickness calculations are site specific and involve a careful consideration of loading conditions that are applicable to those for the construction phase and long-term service of the infrastructure in question. The Contractor shall submit a stamped design thickness

report, by a Massachusetts Licensed Professional Engineer, experienced in infrastructure liner design, showing the assumptions made, input data used, design principles employed and the results of the calculations that would meet the standard of care, expected of professionals practicing in the same region and time period.

- B. The Contractor shall submit liner thickness calculations to the Engineer for review. Thickness calculations shall substantiate sufficient liner thickness to achieve desired 50-year service life. Regardless of design, installation thickness of 2.0-inch minimum shall be achieved.
- C. The Contractor shall submit their proposal based upon the appropriate length, size, design life and host infrastructure parameters designated in the Contract Documents.
- D. The Design Parameters shall be as presented in Table 2:

Table 2

Design Parameter	Contract Scope
Shape / Size	Per Plans
Pipe Material	Brick
Length	Per Plan
Bury Depth	Per Plans
Level of Deterioration	Fully Deteriorated
Ovality	5% Maximum
Live Loading Conditions	H2O or Railroad
Soil Density	120 pcf
Ground Water Elevation	Ground Surface Level

2.04 INFILTRATION CONTROL:

A. Heavy Infiltration

1. Injection grouting material shall be used to address heavy infiltration following manufacturer's instructions. Apply injection grouting material as approved by the geopolymer manufacturer.
2. Heavy infiltration means infiltration that meets the definition of a "runner" or "gusher", as defined by NASSCO's Pipeline Assessment Certification Program.
 - i. Runner - water running into the sewer through a faulty joint or pipe wall. A continuous flow will be visible.
 - ii. Gusher - water entering the pipe "under pressure" through a defect or faulty joint.

B. Mild to Moderate Infiltration

1. All fast-setting materials furnished shall be designed to be applied in dry powder form, with no prior mixing of water, directly to active leaks under hydrostatic pressure in pipes, manholes or related structures. Materials shall consist of rapid setting cements, siliceous aggregates, and various accelerating agents. Material shall not contain chlorides, gypsum, or metallic particles. Approved infiltration control material shall be compatible with the geopolymer lining system.
2. Physical Properties of approved material shall exhibit the following minimum physical properties:
 - i. Set Time
 - i. 30 seconds

2.05 INVERT REPAIR AND PATCHING:

- A. All material furnished shall be designed to fill large voids in pipe, manholes and structure walls and to repair or reconstruct inverts where no hydrostatic pressure exists.
- B. For infrastructure with heavily deteriorated inverts and which is rehabilitated under no flow or bypass conditions, where flow will not be returned until at least 12 hours after geopolymer liner application, a flowable fill with a minimum of 5,000 psi shall be used.
- C. For infrastructure which must be returned to service quickly, material shall consist of rapid setting cements, NSG aggregates, and various accelerating agents. Material shall not contain chlorides, gypsum, or metallic particles. Approved invert repair and patching material shall be compatible with the geopolymer lining system.
 1. Physical Properties of approved quick-setting material shall exhibit the following minimum physical properties:
 - A. Compressive Strength (ASTM C109)
 - i. 30 mins: >1,200 psi
 - ii. 1 hour: >2,500 psi
 - iii. 1 day: >3,500 psi
 - B. Bond Strength (ASTM C882)
 - i. 28 Day: >3,000 psi
 - C. Shrinkage (ASTM C1090) (i) < 0.1%

2.06 TREATMENT OF EXPOSED REBAR:

- A. When encountered, exposed rebar shall be cleaned and then coated with a rust inhibiting coating to chemically modify the existing rust and introduce an

inhibitor to reduce future rust formation. Approved rust inhibitor shall be compatible with the geopolymer lining system.

2.07 GEOPOLYMER LINER APPLICATION EQUIPMENT:

A. Horizontal Infrastructure

1. Manufacturer approved equipment shall be used in the application of the specified Geopolymer lining. The following outlines the equipment that is to be used on application to Horizontal Infrastructure.
2. Major equipment components consist of a generator, an air compressor, a high pressure washer, a high shear mixer, a high output pump, a gyroscopic high speed spin cast delivery assembly, an electronic retraction system capable of +/- 5% repeatability, and high pressure hoses and couplings.
3. Application equipment shall include a high shear mixer and high output swing tube pump. In addition, the application equipment will have safety sensors that monitors specific operation parameters.
4. Application equipment shall have visible display for the rate of water addition. This will ensure water/material ratios are known and controlled. Water/material ratio must be maintained per manufacturers' recommendations.
5. Application equipment shall measure the back pressure on the discharge side of the pump. The change in pressure will alert the operator to any potential changes in flow rates. Backpressures must not exceed the system providers' recommendations at all times.
6. Spinner head shall be attached to a gyroscopic mechanism to layer the materials. The gyroscopic mechanism can adjust the spinner head pattern and frequency. The multiple layering process allows more uniform application of the product and achieves higher thickness levels, in a single pass.
7. Retraction system shall be capable of pulling the sled assembly with no more than +/-5% tolerance. The tolerance shall be verified on a daily basis, prior to product application, and recorded in the daily log.
8. Retraction system shall have a visible display that monitors the controlled rate of retraction. The rate of retraction and the volume of material discharged is necessary to calculate the thickness of the applied materials.
9. The rate of retraction, material application volume, dry material usage and length of application covered should be monitored and recorded on a daily basis. This is critical to accurately verify the thickness of material applied

PART 3 - EXECUTION

3.01 PIPE CLEANING AND INSPECTION:

Pipe cleaning and inspection shall be carried out in accordance with Section 02440, SEWER CLEANING AND INSPECTION and shall not be measured separately for payment.

3.02 FLOW CONTROL:

Flow control, if required, shall be in accordance with Section 01575, HANDLING EXISTING FLOWS.

3.03 WATER FOR CONSTRUCTION PURPOSES:

Availability of water for construction purposes shall be in accordance with SUPPLEMENT TO SPECIFICATIONS – SPECIAL PROVISIONS.

3.04 NOTIFICATION:

- A. The Contractor shall affix a written notice to the door of each home that has sewer service through the pipe being lined one week prior to the lining operation and again one day before the lining operation. A notice shall also be distributed following service connection reinstatement stating that the service connection has been restored to service.
- B. The written notice must be approved by the Engineer prior to its distribution.
- C. The printing and distribution of notices to the homeowners by the Contractor shall be considered incidental to the lining operation.

3.05 REPAIR MATERIALS:

- A. Repair materials shall meet the specifications of this Section. The materials shall be trowel or spray applied utilizing proper equipment on to specified surfaces. The material thickness shall be specified by the Engineer according to Owner's requirements and manufacturer's recommendations.
- B. All surfaces shall be inspected during and after preparation and prior to application of the monolithic surfacing system. Any evidence of remaining contamination or latence shall be removed by additional water or abrasive blast, or other approved method before proceeding with application of the monolithic surfacing system.
- C. Approved repair materials, shall be trowelled to provide a smooth surface with an average profile equivalent to coarse sandpaper to receive the protective coating. No bugholes or honeycomb surfaces should remain after the final trowel procedure of the repair epoxy mortar.

- D. The repair materials shall be permitted to cure according to manufacturer recommendations. Curing compounds may not be used unless approved by the monolithic surfacing system manufacturer for compatibility with the specified system.
- E. Application procedure of the repair materials, if not performed by the monolithic surfacing system applicator, should be observed by the Applicator's representative to ensure proper finishing for suitability to receive the specified geopolymer liner.
- F. All surfaces shall be sufficiently smooth and even, to ensure good flow handling characteristics when coated with geopolymer materials.

3.06 APPLICATION OF GEOPOLYMER LINER MATERIAL:

- A. The work consists of spray applying and/or centrifugally spin-casting the specified Geopolymer Liner material to the inside of an existing structure. The necessary equipment and application methods to apply the liner materials shall be only as provided by the material Manufacturer. Material shall be mixed in accordance with Manufacturer's specifications to proper consistency, then the materials shall be pumped through a high-pressure material hose for delivery to the appropriate and / or selected application device.
- B. In brick, block, rock, concrete and corrugated metal pipelines, tunnels and manholes with deteriorated surfaces, mortar material shall be applied to specified thickness, but no less than one (1)-inch. Application on all pre-cast/poured-in-place manholes shall occur after preparing surfaces. Material shall be applied to the bench and invert area in such a manner as to provide for proper drainage without ponding and to compensate for abrasion. Material must be applied only when surfaces are damp, saturated surface-dry (SSD), but with no visible active infiltration.
- C. Hand Troweled Application
 - 1. In locations where equipment access is limited, or work scope is such that mobilization of equipment is not justifiable, material may be hand troweled into place.
 - 2. Proper mixing should be achieved with a portable mixing unit of sufficient strength to thoroughly mix product to Manufacturers recommended consistency.
 - 3. Application of material shall be performed in a manner such that material is applied evenly and consistently throughout the entirety of the structure.
 - 4. Material shall be applied to a specified uniform minimum thickness to meet or exceed the thickness indicated by the design prepared by Contractor's Licensed Engineer.
 - 5. Material shall be applied to the bench/invert area in such a manner as to provide for proper drainage without ponding and accounting for anticipated abrasion.

6. Troweling of materials shall begin immediately following the mixing of the product. Initial troweling shall be in a motion, to compress the material into any voids within the structure walls. Precautions should be taken not to over trowel.
7. In vertical installation applications, once troweling has been completed, the applied liner should be brushed or sponged to remove trowel marks and to break up the latent surface brought about by troweling. Brushing/sponging should be in the horizontal plane and as with troweling do not over work the lining material. In horizontal applications, brushing/sponging should be performed if specifically required in the project plans and/or specifications.

D. Hand Spray Application

1. Material hose shall be coupled to a low-velocity spray application nozzle. Pumping of the material shall commence and the mortar shall be atomized by the introduction of air at the nozzle, creating a low-velocity spray pattern for material application.
2. Spraying shall be performed in a manner such that material is applied evenly and consistently throughout the entirety of the structure.
3. Material thickness shall meet or exceed the thickness indicated by the design prepared by Contractor's Licensed Engineer.
4. Material shall be applied to the bench/invert area in such a manner as to provide for proper drainage without ponding and accounting for anticipated abrasion.
5. Troweling of materials shall begin immediately following the spray application. Initial troweling shall be in a motion, to compress the material into any voids within the structure walls. Precautions should be taken not to over trowel.
6. In vertical installation applications, once troweling has been completed, the applied liner should be brushed or sponged to remove trowel marks and to break up the latent surface brought about by troweling. Brushing/sponging should be in the horizontal plane and as with troweling do not over work the lining material. In horizontal applications, applied material should be troweled smooth. Brushing/sponging should be performed if specifically required in the project plans and/or specifications.

3.07 CURING OF THE GEOPOLYMER LINER MATERIAL:

- A. The Manufacturer's recommended cure schedule must be strictly adhered to at all times.
- B. SPECIAL NOTE: The use of curing compounds is not recommended for Geopolymer Liner material.

3.08 REINSTATEMENT OF LATERALS AND CONNECTING PIPES:

- A. Using the records from the pre-construction inspections, the Application Contractor shall insure that all laterals and other connecting pipes are properly reinstated and put back in service. Any excessive Geopolymer Liner material at the connection shall be removed.
- B. The Application Contractor shall insure that no infiltration is originating at the point of connection. If it is, the Application Contractor shall seal the leak with appropriate product(s).
- C. The laterals and pipe connections shall then be completed by hand, applying the liner to the outer surface of the connection to the pipe and smoothly tapering it into the lateral or connecting pipe. No rough edges or abrupt transitions that could catch debris or hinder the flow shall remain.

3.09 TERMINATION AND SEALING AT MANHOLES, JUNCTIONS, BENDS, INLETS, OUTLETS, SHAFTS AND OTHER STRUCTURES:

- A. Termination of the Geopolymer Liner at the end of a pipe or manhole shall be completed by hand applying the liner to the outer surface of the pipe or into the interior of the manhole.
- B. Unless specifically directed otherwise in the project plans/specification, all starter/intermediate/terminal manholes/junctions/bends/other structures which are directly impacted by rehabilitation activities will also receive an application of Geopolymer Liner. If no direction is provided, or should information conflict, these manholes are to be lined with a minimum thickness of 1-inch. The junctions, bends, shafts, and other structures are to be lined with a minimum thickness of 1-inch.

3.10 FINAL INSPECTION:

- A. A visual inspection should be made by the Inspector and Licensed Applicator periodically throughout the progression of construction, prior to the completion of a lining stage. Any deficiencies in the finished lining shall be marked and repaired by the Licensed Applicator according to the procedures set forth herein.
- B. While infrequent, small points of infiltration and/or surface cracking may occur in newly lined infrastructure. As with other trenchless repair technologies, repair methods are available to address the areas of concern and restore the infrastructure to its intended condition. To address the observed conditions, the following activities are to be performed:
 - 1. Points of Infiltration – The area will be cleaned and treated with either a topical application of patching material or in more severe cases will be drilled and chemical grout will be injected to permanently stop infiltration.

2. Surface Cracks – The area around the crack will be cleaned and the crack opened using a small wire brush. The crack will then be rinsed and filled with geopolymer material. The treated area will be blended to match the surrounding surface creating a permanent solution.
- C. At the completion of a lining stage of the infrastructure and once all repairs have been made and accepted, the Contractor shall document a final inspection video (2 copies) of the completed line segments. This inspection shall be performed by a color video inspection system. The finished Geopolymer Liner shall be continuous over the entire length of all runs and be free of wet spots. No infiltration of groundwater shall be observed. All service entrances shall be accounted for and shall be unobstructed. Documentation shall be submitted to the Engineer by the Contractor.

3.11 TESTING REQUIREMENTS:

- A. During application, Application Contractor shall regularly perform and record Geopolymer lining thickness readings with a method approved by manufacturer. Contractor shall submit all documentation on thickness readings to Engineer on a daily basis when lining application occurs.
- B. Sample and make five test cylinders per ASTM C31 and analyze with ASTM C39, for testing compressive strength from every 32,000 lbs. of material for Horizontal Infrastructure. Label the cylinders with the date, location, project, and product batch numbers. The product batch numbers are located on each geopolymer material bag. Send the cylinders to a third-party laboratory or the manufacturer for verification. Test in accordance with ASTM C 39, or as specified in contract documents. Test the geopolymer material for compressive strength at 7 days (1 cylinder) and 28 days (3 cylinders) and leave 1 cylinder for retainage.
 - a. Performance and Material Testing – Vertical Infrastructure (Manholes, Boxes, Structures, etc.)
 - i. Performance testing as directed in ASTM F 2551.
 - ii. Submit the following information to the Engineer: Product data, including manufacturer and brand name along with laboratory test results to verify 28-day compressive strength in accordance with ASTM C 39 or ASTM C 109. The samples must be undisturbed for a period of at least 24 hours before they can be transported. The project superintendent will require that samples of applied material be taken representative of each day's work of material used. Samples shall be obtained from the pump, hose or nozzle, identified, and sent to an independent test laboratory to verify 28-day compression strength testing as described in ASTM C 39 or ASTM C 109 and shall have a minimum average of the strength set forth in Section 2.04, Table 2.

- b. Performance and Material Testing – Horizontal Infrastructure (Pipes, Culverts, Tunnels, etc.)
- i. Submit the following information to the Engineer: Product data, including manufacturer and brand name along with laboratory test results to verify 28-day compressive strength in accordance with ASTM C 31 or ASTM C 39. The project superintendent will require that samples of the applied material will be taken first and last day of application and every 32,000 lbs. of material. The samples may be taken from the pump immediately before discharge into the hose or at the spin caster, if feasible. A minimum of five samples will be obtained as required by ASTM C 31 and analyzed by ASTM C 39 or C 109. The samples must be undisturbed for a period of at least 24 hours before they can be transported. The material thickness may be determined by using depth gauges during the spraying process. Permanent depth gauges may either be attached to the host infrastructure prior to Geopolymer liner application or a handheld depth gauge may be used by the installer during installation. The depth measurements should be made in at least three locations within the infrastructure being lined as well as near both ends and the middle of the infrastructure. These measurements must be written down in a log book which will be submitted to the Engineer at the end of the project, along with digital photos of the completed lining.

END OF SECTION

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SECTION 02435

SEWER MANHOLE REHABILITATION

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. This Section covers the rehabilitation of sewer manholes as called for herein and on the drawings. It is the intent of this specification to provide for the waterproofing, sealing, and structural enhancement of existing manholes by chemical grout exterior sealing of sewer manhole inverts, walls and corbels; and by application of a uniform cementitious layer of high-quality mortar or geopolymer as indicated by plans and as specified in Section 02431, GEOPOLYMER LINING OF SANITARY SEWERS
- B. The work shall include: elimination of infiltration by external chemical grout sealing; removal and patching of loose and/or unsound material; cleaning and preparation of surfaces; repair of invert, bench, and walls; and chemical grout sealing of the invert, bench, walls, and pipe connections; and spray application of a cementitious mix to form a liner. Other repairs shall be completed as indicated on the drawings and described herein.
- C. The Contractor shall furnish all equipment, material and labor required to perform all manhole rehabilitations described in this specification.
- D. External grouting of inverts, bench, walls, corbel, and pipe connections shall be performed prior to application of cementitious mix.

1.02 RELATED WORK:

- B. Section 01014, SCOPE AND SEQUENCE OF WORK
- C. Section 01330, SUBMITTALS
- C. Section 01331, DOCUMENTATION
- D. Section 01575, HANDLING EXISTING FLOWS
- E. Section 02431, GEOPOLYMER LINING OF SANITARY SEWERS

1.03 QUALITY ASSURANCE:

- A. The work described herein shall be performed by a company with not less than five (5) years of experience in providing the required services, employing experienced workers and experienced supervisory personnel. Supervisory personnel shall have not less than

three (3) years of experience in providing the required services and shall be present at the jobsite during all work related to the required services.

1.04 REFERENCES:

- A. The following standards form a part of this specification as referenced:

The National Association of Sewer Service Companies (NASSCO)

Performance Specification Guideline for Manhole Rehabilitation

American Society for Testing and Materials (ASTM)

ASTM C94	Ready-Mix Concrete
ASTM C39	Compressive Strength
ASTM C78	Flexural Strength of Concrete
ASTM C109	Comprehensive Strength
ASTM C138	Standard Test Method for Density
ASTM C267	Chemical Resistance
ASTM C469	Static Modulus of Elasticity & Poisson's Ratio of Concrete
	Compression
ASTM C496	Splitting Tensile Strength of Cylindrical Concrete Specimens
ASTM C596	Shrinkage
ASTM C666, Method A	Freeze/Thaw Resistance
ASTM C882	Standard Test Method for Bond Strength of Epoxy-Resin Systems used with Concrete by Slant Shear
ASTM C1090	Shrinkage Test
ASTM C1138	Standard Method for Abrasion Resistance of Concrete (Underwater Method)
ASTM C1202	Electrical indication of Concrete's Ability to Resist Chloride Ion Penetration
ASTM D4414	Standard Practice for Measurement of Wet Film Thickness for Organic Coatings
ASTM 543	Resistance of Plastics to Chemical Reagents
ASTM 638	Tensile Properties of Plastic
ASTM 695	Comprehensive Properties of Rigid Plastics
ASTM D790	Flexural Properties of Unreinforced and Reinforced Plastics

1.05 CEMENTITIOUS LINING SYSTEM DESCRIPTION:

- A. Unless otherwise indicated herein, sewer manhole sealing shall be carried out in accordance with the current edition of the Performance Specification Guideline for Manhole Rehabilitation (NASSCO).

- B. The Contractor may propose alternative processes and/or products for review and approval by the Engineer.
- C. The locations of the cementitious lining work to be completed are as shown on the drawings.

1.06 GEOPOLYMER LINER SYSTEM DESCRIPTION:

- A. Unless otherwise indicated herein, the application of a geopolymer liner shall be carried out in accordance with the current edition of the Performance Specification Guideline for Manhole Rehabilitation (NASSCO).
- B. When depth of manhole is less than 25 vertical feet, a thickness of 2-inches shall be used.
- C. The Contractor may propose alternative processes and/or products for review and approval by the Engineer.
- C. The locations where the geopolymer cement liner is to be applied are indicated on the drawings.

1.07 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF SECTION 01330 SUBMITTALS, SUBMIT THE FOLLOWING:

- A. Prior to beginning the work, submit the following:
 - 1. Qualifications of the firm/personnel who will perform the work.
 - 2. Provide at least five (5) references of different projects in which at least 50 manholes have been rehabilitated by the firm within the past three (3) years.
 - 3. Provide at least three (3) references of different projects completed in the last three (3) years in which an epoxy finish was applied to sanitary sewer manholes.
 - 4. Description of the system, equipment and material with MSDS Data Sheets proposed for sewer manhole rehabilitation.
 - 5. For the geopolymer cement liner, signed and sealed designs shall be prepared and submitted by a Licensed Professional Engineer licensed in Massachusetts or in which the product is manufactured in the following conditions:
 - i. Manholes – When 25 vertical feet or greater in depth as measured from top of ground at the rim on the manhole.

6. Description of the system proposed for bypass pumping during the procedures to be carried out.

7. Manufacturer's warranty

B. Refer to Section 01331, DOCUMENTATION, for required documentation to be submitted.

1.08 WARRANTY:

A. The manhole rehabilitation work performed shall be warrantied against infiltration and faulty workmanship and materials for a period of one (1) year after the project is accepted by the Owner.

PART 2 - PRODUCTS

2.01 REHABILITATION MATERIALS:

All products used for lining, sealing, patching, and cleaning shall be environmentally safe. The contractor shall submit MSDS Data Sheets for all materials used.

2.02 SEALING OF INVERT, STOPPING ACTIVE LEAKS AND EXTERIOR CHEMICAL SEALING:

The Contractor shall use a chemical grout that is environmentally safe for the sealing of sewers. The chemical grout shall be in accordance with Part 2, Products, of the NASSCO Suggested Standard Specification for Pressure Testing and Grouting of Sewer Joints, Laterals and Lateral Connections (Using the Packer Method with Solution Grouts).

2.03 PATCHING MIX:

A quick-setting cementitious material shall be used as a patching mix and is to be mixed and applied according to the manufacturer's recommendation and shall have the following minimum requirements.

Compressive Strength	ASTM C-109	6 hr 1,400 psi
Shrinkage	ASTM C-596	0% AT 90% Relative Humidity

2.04 INFILTRATION CONTROL MIX:

A rapid-setting cementitious product specifically for leak control shall be used to stop water infiltration and shall be mixed and applied according to the manufacturer's recommendations and shall have the following minimum requirements.

Compressive Strength	ASTM C-109	1 hr 600 psi

Compressive Strength	ASTM C-109	24 hr 1,800 psi

2.05 CEMENTITIOUS LINER MIX:

- A. The cementitious liner mix shall be used to form a structural enhancing monolithic liner covering all interior manhole surfaces and shall have the following minimum requirements at 28 days:

Compressive Strength	ASTM C-109	6,000 psi
Shrinkage	ASTM C-596	0%, 90% humidity
Freeze/Thaw Resistance	ASTM C-666	No visible damage after 100 cycles

- B. The liner mix shall be applied in one monolithic layer.

2.06 GEOPOLYMER LINING MATERIAL:

The geopolymer lining material may be centrifugally cast, manually sprayed, or hand troweled. The geopolymer lining material shall be a micro-fiber reinforced ultra-dense geopolymer. The geopolymer liner shall have the following minimum requirements at 28 days unless otherwise noted:

Compressive Strength	ASTM C39/C109	Min. 8,000 psi
Flexural Strength	ASTM C78/C293/C348	Min. 800 psi
Density	ASTM C138/C642	Dry 95–105 lb/ft ³ Wet 138–142 lb/ft ³ Hardened 144–146 lb/ft ³
Chemical Resistance	ASTM C267	Max. 2% loss @ 8 weeks
Modulus of Elasticity	ASTM D469	Min. 5,400,000 psi
Split Tensile Strength	ASTM C496	Min. 900 psi
Freeze Thaw Durability	ASTM C666	Max. 0.1% Loss @ 300 cycles
Bond Strength to Concrete	ASTM C882	Min. 3,000 psi
Shrinkage Test	ASTM C1090	Max. 0.02%
Abrasion Resistance	ASTM C1138	Max. 1.5% weight loss @ 6 cycles
Rapid Cl- Permeability	ASTM C1202	Very low

2.07 BRICK MATERIALS:

- A. Brick shall be sound, hard, and uniformly burned brick, regular and uniform in shape and size, of compact texture, and satisfactory to the Engineer. Bricks shall comply with ASTM C32, for Grade SS, hard brick, except that the mean of five tests for absorption shall not exceed 8 percent by weight.

- B. Rejected brick shall be immediately removed from the work and brick satisfactory to the Engineer substituted.
- C. Mortar shall be composed of Portland cement, hydrated lime, and sand in which the volume of sand shall not exceed three times the sum of the volumes of cement and lime. The proportions of cement and lime shall be as directed and may vary from 1:1/4 for dense hard-burned brick to 1:3/4 for softer brick. In general, mortar for Grade SS Brick shall be mixed in the volume proportions of 1:1/2:4-1/2; Portland cement to hydrated lime to sand.
- D. Cement shall be Type II Portland cement as specified for concrete masonry.
- E. Hydrated lime shall be Type S conforming to ASTM C207.
- F. Sand shall comply with ASTM C144 specifications for "Fine Aggregate," except that all of the sand shall pass a No. 8 sieve.

2.08 CONCRETE:

- A. Cement shall be domestic Portland cement conforming to ASTM C150, Type II.
- B. Fine aggregate shall be washed natural sand conforming to ASTM C33.
- C. Coarse aggregate shall be well graded crushed stone conforming to ASTM C33, size No. 67.
- D. No admixtures shall be used unless approved by the Engineer in writing.

2.09 WATER:

Water used in mixing shall be potable.

2.10 DELIVERY, STORAGE, AND HANDLING:

- A. Materials shall be delivered to the site in the Manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- B. All materials shall be stored properly and in accordance with Manufacturer's instructions.

PART 3 - EXECUTION

3.01 SAMPLING AND TESTING OF LINER:

- A. The Owner reserves the right to test all materials.

- B. Products that fail to meet the requirements of these specifications shall not be incorporated in the work.

3.02 SURFACE PROTECTION:

- A. During progress of work, where appearance is important, adjacent areas or grounds which may be permanently discolored, stained, or otherwise damaged by dust and rebound, shall be adequately protected and, if contacted, shall be cleaned by early scraping, brushing or washing, as the surroundings permit.
- B. No street markings shall be removed or covered throughout the progress of work.

3.03 EXISTING FLOWS:

The Contractor shall divert flows as required for the work and in accordance with the requirements specified in Section 01575, HANDLING EXISTING FLOWS.

3.04 CEMENTITIOUS LINING:

A. Preparation

1. Remove all foreign material from the manhole wall and bench using a high-pressure water spray (minimum 5,000 psi). Loose and protruding brick, mortar, and concrete shall be removed using a mason's hammer and chisel and/or scraper. Fill any large voids with quick-setting patching mix. Surfaces to be repaired shall be clean and free of loose materials. Additional surface preparation shall be as recommended by the manufacturer of the materials to be applied.
2. Leaks shall be stopped using a chemical grout, which shall be applied as per the manufacturer's recommendations. Leaks may require weep holes drilled at the manhole base to localize the infiltration during the application, after which the weep holes shall be sealed with a chemical grout and plugged with the quick-setting infiltration control mix prior to the final liner application. Areas with evidence of previous leakage (e.g., mineral deposits) shall also be grouted.
3. All pipe connections in brick and block manholes shall be grouted regardless of whether they are leaking or have signs of previous leakage. Grout ports shall be located near the pipe connections to ensure the sealing material is injected at the manhole/pipe connections. Grout ports shall also be located and drilled in the bench and invert for all brick and block manholes as necessary to seal the manhole base.

B. Invert Sealing

1. The Contractor shall carry out all work as described in the latest edition of the Performance Specification Guideline for Manhole Rehabilitation, Section 3.2C (NASSCO) using sealing materials and procedures accepted by the Engineer.
2. A minimum of four (4) grout ports shall be located and drilled in the manhole bench and invert of brick and block manholes as necessary to seal the invert and manhole base.
3. A quick setting patch mix shall be troweled uniformly not to exceed ½-inch, onto the damaged invert extended out onto the base of the manhole sufficiently to tie into the structurally enhanced monolithic liner to be applied.

C. Exterior Grouting

1. For precast manholes, grout ports shall be located two (2) feet (maximum) around the circumference of the manhole, approximately one (1) foot below and one (1) foot above each joint to seal all joints. Additional grout ports shall be located so as to seal any other defects not occurring at a joint.
2. For brick/block manholes, grout ports shall be located and drilled at 90-degree intervals and every two (2) vertical feet (maximum) around the circumference every two (2) feet (maximum) of the manhole to ensure proper grouting of the soil outside the manhole.
3. The Contractor shall prohibit debris from entering the invert by either covering the invert or plugging during application.
4. The chemical sealing material used shall be as described in chemical sealing (grouting) materials of the Performance Specification for Manhole Rehabilitation (NASSCO).

D. Interior Sealing

1. Interior lining of the manholes shall be conducted only after all other manhole rehabilitations have been completed.
2. Unless otherwise indicated herein, the Contractor shall carry out all work as described in the Performance Specification Guideline for Manhole Rehabilitation, Section 3.2 (NASSCO) using lining materials and procedures accepted by the Engineer.
3. Preparation, as described in section 3.05A, shall be completed prior to the placement of the cementitious liner.

4. Sealant shall not be placed on a frozen surface or during freezing weather. Sealant shall not be placed when it is anticipated that the temperature during the following 24 hours will drop below 32 degrees, Fahrenheit.
5. Pipes and/or service connections shall be temporarily plugged prior to the application of the cementitious manhole interior liner. A flash coat of the liner material shall be applied three (3) inches into each service connection. Temporary plugs shall be removed once the liner has cured sufficiently to prevent erosion of the new liner.
6. Thickness shall be verified with a wet gauge at random points of the new interior surfaces as required by the Engineer. Minimum thickness of one-half (½) inch is required.
7. Application shall be with low velocity, continuous flow equipment to prevent the adverse effects of rebound. A smooth trowel finish shall be applied.
8. The Contractor shall prohibit debris from entering the invert by either covering the invert or plugging during application.

E. Digital Photographs

1. The Contractor shall take a digital photograph of the interior of each manhole, before and after rehabilitation, in JPEG format. Filenames shall contain subarea and manhole designations (e.g. "G-05A-001"). Digital photographs shall have a minimum resolution of 10 megapixels.

3.05 FURNISH AND INSTALL MANHOLE FRAME AND COVER:

- A. Where manholes are being knocked down for liner installation, Contractor shall excavate, remove, and deliver existing frames and covers to Worcester DPW. When rebuilding manhole, the Contractor shall furnish and install new frames and covers at these locations. Manhole frame and cover shall be EJIW 1056Z frame and EJIW 1056A cover or LeBaron LC239/L23C-1. Non-bolted casting manhole covers shall be supplied with a closed pickhole and shall show the wording "Worcester, A Town June 14, 1722: A City February 29, 1848" cast into said cover.
- B. Frames shall be set concentric with the top of the concrete section and in a full bed of mortar so that the space between the top of the concrete section or brick headers and the bottom flange of the frame shall be completely filled and made watertight. A thick ring of mortar extending to the outer edge of the concrete shall be placed all around the bottom flange. The mortar shall be smoothly finished to be flush with the top of the flange and have a slight slope to shed water away from the frame.

3.06 RAISE MANHOLE FRAME AND COVER:

Manhole frame and cover shall be removed and courses of brick added to raise the manhole frame and cover two (2) feet above existing grade. The manhole frame and cover shall be secured on top of the new bricks creating a watertight seal. The exterior of the structure exposed above grade shall be covered with a minimum 2-inch coating of the LINER MIX. The liner mix shall be applied as described in Section 3.04 D, Interior Sealing.

3.07 BUILD MANHOLE BENCH AND INVERT:

- A. Existing manhole bench and invert (including debris, deteriorated brick, block, and mortar) shall be removed and disposed of.
- B. Bricks shall be moistened by suitable means, as required, until they are neither so dry as to absorb water from the mortar nor so wet as to be slippery when laid.
- C. Each brick shall be laid as a header in a full bed and joint of mortar without requiring subsequent grouting, flushing or filling, and shall be thoroughly bonded as required.
- D. Channels and shelves shall be constructed of brick and concrete as shown on the Drawings. The brick lined channels shall correspond in shape with the lower half of the pipe. The top of the shelf shall be set at the elevation of the crown of the highest pipe and shall be sloped 1 inch per foot to drain toward the flow through channel. Brick surfaces exposed to sewage flow shall be constructed with a nominal 2-inch by 8-inch face exposed (i.e. bricks on edge).
- E. Bench and invert shall be constructed to allow television inspection camera and rehabilitation equipment to be inserted into the adjacent sewers.

3.08 FIELD TESTING/INSPECTION:

- A. Prior to the expiration of the warranty period, the Contractor shall inspect each of the sewer manholes rehabilitated during this project in accordance with the Performance Specification Guideline for Manhole Rehabilitation (NASSCO) at a timetable to be approved by the Engineer. The Contractor shall repair any defects found until there are no visible leaks.
- B. If the groundwater level is not, in the opinion of the Engineer, high enough for an accurate visual inspection, the Contractor shall test a 50% sample of the original manhole rehabilitation work using exfiltration or vacuum methods as described in ASTM C-1244. The manholes in the test sample will be selected and approved by the Engineer and will consist of manholes from throughout the project area that are representative of the manhole rehabilitation work originally performed. Any manholes failing the warranty test

shall be sealed and retested until the test is passed and/or the results are satisfactory to the Engineer.

- C. If the initial failure rate of tested manholes is less than 5%, the work will be considered satisfactory and no further testing will required.
- D. If the failure rate in the initial test sample equals or exceeds 5%, an additional and equivalent test sample of the original manhole rehabilitation work will be selected and approved by the Engineer. Additional test samples shall be taken until the failure rate of less than 5% is met. No previously tested manholes can be included in a subsequent test sample.
- E. Should all of the manhole rehabilitation work fail to meet the less than 5% failure rate in each of the 50% test samples, the Contractor will be required to repeat the inspection procedure following resealing of the structures in question.
- F. All inspecting, testing, and reworking within the warranty period shall be provided at no additional cost to the Owner.

END OF SECTION

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SECTION 02440

SEWER CLEANING AND INSPECTION

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. This section covers cleaning, inspection, testing and sealing of pipelines as called for herein and on the drawings. The work includes furnishing all equipment, material and labor required to perform the services described herein. The sewer lines were previously cleaned and televised. The television inspection logs are included as Appendix A for reference.

1.02 RELATED WORK:

- A. Section 00331, TELEVISION AND MANHOLE INSPECTION LOGS
- B. Section 01014, SCOPE AND SEQUENCE OF WORK
- C. Section 01330, SUBMITTALS
- D. Section 01331, DOCUMENTATION
- D. Section 01535, TEMPORARY BYPASS PUMPING SYSTEM
- E. Section 01575, HANDLING EXISTING FLOWS
- F. Section 02428, CURED-IN-PLACE PIPE
- G. Section 02431, GEOPOLYMER LINING OF SANITARY SEWERS
- H. Section 02443, SERVICE CONNECTION REHABILITATION

1.03 QUALITY ASSURANCE:

- A. The work described herein shall be performed by a company with not less than five (5) years of experience in providing the required services, employing experienced workers and experienced supervisory personnel. Supervisory personnel shall have not less than three (3) years of experience in providing the required services and shall be present at the jobsite during all work related to the required services.

1.04 REFERENCES:

- A. The following standards form a part of this specification as referenced:

The National Association of Sewer Service Companies (NASSCO)

Suggested Standard Specification for Pressure Testing and Grouting of Sewer Joints,
Laterals and Lateral Connections (Using the Packer Method with Solution Grouts)

American Society of Testing and Materials (ASTM)

ASTM F2304 Standard Practice for Rehabilitation of Sewers Using Chemical
Grouting

1.05 SYSTEM DESCRIPTION:

- A. Unless otherwise indicated herein, the pipe cleaning, inspection, testing and sealing of the specified length of pipe shall be carried out in accordance with Section 3, Execution, of the latest edition of NASSCO Suggested Standard Specification for Pressure Testing and Grouting of Sewer Joints, Laterals and Lateral Connections (Using the Packer Method with Solution Grouts). Sewer flow control shall comply with Section 01575, HANDLING OF EXISTING FLOWS. Sealing materials shall comply with Part 2, Products, of the NASSCO Suggested Standard Specification for Pressure Testing and Grouting of Sewer Joints, Laterals and Lateral Connections (Using the Packer Method with Solution Grouts).
- B. The Contractor may propose alternative processes and/or products for review and approval by the Engineer.

1.06 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF SECTION 01330
SUBMITTALS, SUBMIT THE FOLLOWING:

- A. Prior to beginning work, submit the following:
 - 1. Qualifications of the firm/personnel who will perform the work.
 - 2. Description of system proposed for handling existing flows during the various procedures to be carried out.
 - 3. Description of the system and equipment proposed for cleaning the pipe.
 - 4. Description of the equipment and system proposed for inspecting the pipe after cleaning.
 - 5. Description of the equipment and system proposed for testing the joints.
 - 6. Description of the equipment, the sealing compound and the system proposed for sealing selected joints and circular cracks.
 - 7. Manufacturer's warranty.
 - 8. Submit MSDS for the sealing compound to be used.

- B. Refer to Section 01331, DOCUMENTATION for required documentation to be submitted.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

3.01 PIPE CLEANING:

- A. The Contractor may elect to use either high velocity jet, or mechanically powered equipment, as described in the NASSCO Suggested Standard Specification for Pressure Testing and Grouting of Sewer Joints, Laterals and Lateral Connections (Using the Packer Method with Solution Grouts). Selection of equipment shall be based upon field conditions such as access to manholes, quantity of debris, size of sewer, depth of flow, etc.
- B. All sludge, dirt, sand, rocks, grease, and other solid or semisolid material resulting from the cleaning operation shall be disposed of in accordance with all applicable regulations and in a method acceptable to the Owner. Pipe cleaning shall be performed in advance of pipe television inspection.
- C. The Contractor shall be responsible for the legal disposal of all debris removed from the sewers during the cleaning operation including any costs incurred. The Contractor shall not expect the Owner to provide a dump site.
- D. 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.

3.02 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. 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 components 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.
 - 1. Refer to Section 01331, DOCUMENTATION, in regard to external hard drives to be given to the Owner upon completion of project and before the project is accepted by the Owner.
- B. 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.

- C. Electronic video equipment shall be capable of displaying and recording during the entire inspection, as a minimum, the following data for each sewer reach videotaped:
 - 1. Project identification
 - 2. Date recorded
 - 3. Sewer reach identification (street location, MH to MH)
 - 4. Footage counter
- 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. Manual winches, power winches, television cable and powered rewinds or other devices that do not obstruct the camera view or interfere with proper documentation of the sewer conditions shall be used to move the camera through the sewer line. If, during the inspection operation the television camera will not pass through the entire sewer section, the Contractor shall re-set his equipment in a manner so that the inspection can be performed from the opposite manhole.
- E. Flow control shall be in accordance with Section 01535, TEMPORARY BYPASS PUMPING SYSTEM or Section 01575, HANDLING OF EXISTING FLOWS.
- F. 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.
- G. Removal of obstruction caused by protruding taps shall be in accordance with Section 02443, SERVICE CONNECTION REHABILITATION.
- H. Television inspection shall be performed in advance of pipe joint testing, sealing, pipe repair and pipe lining activities.

END OF SECTION

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SECTION 02443

SERVICE CONNECTION REHABILITATION

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. This Section covers the rehabilitation of service connections, including cutting of protruding services, television inspection and testing of services, and grouting of services as called for herein and on the drawings. The work includes furnishing all equipment, material and labor required to perform the services described herein.

1.02 RELATED WORK:

- A. Section 00331, TELEVISION AND MANHOLE INSPECTION LOGS
- B. Section 01014, SCOPE AND SEQUENCE OF WORK
- C. Section 01330, SUBMITTALS
- D. Section 01331, DOCUMENTATION
- E. Section 01575, HANDLING EXISTING FLOWS
- F. Section 02428, CURED-IN-PLACE PIPE
- G. Section 02440, SEWER CLEANING AND INSPECTION

1.03 QUALITY ASSURANCE:

- A. The work described herein shall be performed by a company with not less than five (5) years of experience in providing the required services, employing experienced workmen and experienced supervisory personnel. Supervisory personnel shall have not less than three (3) years of experience in providing the required services and shall be present at the jobsite during all work related to the required services.

1.04 REFERENCES:

- A. The following standards form a part of this specification as referenced:

The National Association of Sewer Service Companies (NASSCO)

Suggested Standard Specification for Pressure Testing and Grouting of Sewer Joints,
Laterals and Lateral Connections (Using the Packer Method with Solution Grouts)

American Society of Testing and Materials (ASTM)

ASTM F2454 Standard Practice for Sealing Lateral Connections and Lines from the Mainline Sewer Systems by the Lateral Packer Method, Using Chemical Grouting

1.05 SYSTEM DESCRIPTION:

- A. Unless otherwise indicated herein, service connection rehabilitation shall be carried out in accordance with Lateral Connection Sealing from the Mainline by Packer Injection Grouting, Section 3.10, of the NASSCO Suggested Standard Specification for Pressure Testing and Grouting of Sewer Joints, Laterals and Lateral Connections (Using the Packer Method with Solution Grouts).
- B. The Contractor may propose alternative processes and/or products for review and approval by the Engineer.
- C. The location of the service connection rehabilitations are indicated on the drawings.

1.06 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF SECTION 01330 SUBMITTALS, SUBMIT THE FOLLOWING:

- A. Prior to beginning the work, submit the following:
 - 1. Qualifications of the firm/personnel who will perform the work.
 - 2. Descriptions of system proposed for handling existing flows, if necessary, during the procedures to be carried out.
 - 3. Description of the system, equipment and material proposed for the service connection rehabilitations.
 - 4. Manufacturer's warranty.
 - 5. Submit MSDS Data Sheets for proposed chemicals to be used.
- B. Refer to Section 01331, DOCUMENTATION, for documentation required to be submitted.

1.07 WARRANTY:

- A. The service connection rehabilitations shall be warrantied against infiltration and faulty workmanship and materials for one year from the date the project is accepted by the Owner.

PART 2 - PRODUCTS

2.01 CHEMICAL GROUT:

- A. The Contractor shall use chemical grout which is environmentally safe for the sealing of sewers. The chemical sealing materials shall be used in accordance with Part 2, Products, of the latest edition of NASSCO Suggested Standard Specification for Pressure Testing and Grouting of Sewer Joints, Laterals and Lateral Connections (Using the Packer Method with Solution Grouts). All other products used for sealing, patching and cleaning of sewers shall also be environmentally safe.

PART 3 - EXECUTION

3.01 PIPE CLEANING AND INSPECTION:

- A. Pipe cleaning and inspection shall be carried out in accordance with Section 02440, SEWER CLEANING AND INSPECTION.

3.02 FLOW CONTROL:

- A. Flow control, if required, shall be in accordance with Section 01575, HANDLING EXISTING FLOWS.

3.03 CUTTING OF PROTRUDING SERVICE CONNECTIONS:

- A. The Contractor shall cut protruding service connections where called for on the drawings. The protruding services shall be cut flush with the wall of the sewer, using either a lateral cutter or grinder.
- B. After the protruding services are cut, the service connections shall be grouted in accordance with paragraph 3.06 of this Section. No additional payment shall be made for grouting service connections.

3.04 EQUIPMENT TESTING:

- A. The Contractor shall perform an above ground demonstration test in a test cylinder with the same diameter as the proposed pipe being tested to simulate a pipe leak. The setup shall have a valve and pressure gauge to simulate leaks and monitor pressure. The tests shall be performed in accordance with the latest edition of ASTM F2454, Standard Practice for Sealing Lateral Connections and Lines from the Mainline Sewer Systems by the Lateral Packer Method, Using Chemical Grouting, Section 11.3.3, Initial Testing.
- B. The pressure displayed by the testing equipment shall be within ± 0.5 psi of the gauge pressure to pass successfully. The void pressure should drop to within ± 0.5 psi of the pre-test pressure displayed by the testing equipment after the pressure is released to pass successfully. Test pressures shall be between 7 and 10 psi.

- C. If the demonstration test cannot be performed successfully, the Contractor shall repair or modify the equipment and perform the test again until the results are satisfactory to the Engineer.
- D. The Contractor shall perform the demonstration test for each chemical sealing unit prior to the equipment being used on the Project. Additional tests may be required by the Engineer at various times during the Project.

3.05 TELEVISION INSPECTION AND TESTING OF SERVICE CONNECTIONS:

- A. The Contractor shall television inspect and test service connections where called for on the drawings. Television inspection of services shall utilize a pan and tilt camera which shall inspect a minimum of 4 feet of the service connection from the main sewer.
- B. Pressure Testing: Air testing is accomplished by isolating the area to be tested with the packer and applying positive pressure into the isolated VOID area. VOID area shall include a minimum 3 feet of service connection pipe.
- C. Pressure testing shall be carried out in accordance with Section 3.7, Lateral Connection Testing Procedure, of the latest edition of NASSCO Suggested Standard Specification for Pressure Testing and Grouting of Sewer Joints, Laterals and Lateral Connections (Using the Packer Method with Solution Grouts).
- D. Pressure testing shall be equal to 0.5 psi per vertical foot of pipe depth plus 2 psi; however, test pressure shall not exceed 10 psi. Once the designated pressure in the isolated void is displayed on the meter of the control panel, the application of air pressure will be stopped and a 15 second waiting period will commence. If the void pressure drop is greater than 2.0 psi within 15 seconds, the lateral shall be considered to have failed the air test.
- E. The television inspection and testing equipment shall be capable of inspecting and testing 4-inch, 5-inch and 6-inch diameter service connections.
- F. If the service fails the pressure test, the service shall be grouted in accordance with paragraph 3.06 of this Section and retested.

3.06 GROUTING OF SERVICE CONNECTIONS:

- A. The Contractor shall grout service connections where indicated on the drawings or when a service fails the pressure test, as described in paragraph 3.05 of this Section. The Contractor shall grout all service connections reinstated as described in Section 02428, CURED-IN-PLACE PIPE, regardless of the results of the pressure test. Grouting of service connections shall be carried out in accordance with Section 3.10, Lateral Connection Sealing from the Mainline by Packer Injection Grouting, of the NASSCO Suggested Standard Specification for Pressure Testing and Grouting of Sewer Joints, Laterals and Lateral Connections (Using the Packer Method with Solution Grouts).

- B. When pumping grout commences, operate the pump until a minimum back pressure of 8 psi is achieved.
- C. The grouting equipment shall be capable of grouting 4-inch, 5-inch and 6-inch diameter service connections.
- D. The chemical sealing materials shall be as described in Part 2, Products of the latest edition of NASSCO Suggested Standard Specification for Pressure Testing and Grouting of Sewer Joints, Laterals and Lateral Connections (Using the Packer Method with Solution Grouts).
- E. If a service connection becomes clogged with grout, the Contractor shall clear the grout from the lateral. This work shall be done at no additional cost to the Owner.

3.07 FIELD TESTING/INSPECTION:

- A. Prior to the expiration of the warranty period, an initial test sample of approximately 10% of the original service connection rehabilitation work will be selected and approved by the Engineer. The test sample will consist of manhole sections from throughout the project area that are representative of the sealing work originally performed. The Contractor shall television inspect and test all previously grouted service connections within the initial test sample as specified in paragraph 3.05 of this Section. Any service connections failing the re-test shall be re-grouted as specified in paragraph 3.06 of this Section. If the failure rate in the initial test sample is less than 10%, the work will be considered satisfactory and no further testing will be required.
- B. If the failure rate in the initial test sample equals or exceeds 10%, an additional 15% test sample will be selected and approved by the Engineer. If the failure rate in the additional test sample is less than 10%, the work will be considered satisfactory and no further testing will be required. No previously tested service connection can be included in the additional test sample.
- C. If the failure rate in the additional test sample equals or exceeds 10%, the Contractor shall television inspect and test 100% of the service connections.
- D. Any remaining service connection rehabilitation work not television inspected and tested as part of a test sample shall be television inspected. The Contractor shall repair any defects found and shall re-grout the services until there are no visible leaks through television inspection.
- E. Television inspecting, testing, and re-grouting of service connections shall be performed prior to the expiration of the warranty period, during periods of high groundwater and at a time to be approved by the Engineer.

- F. All inspecting, re-testing, and re-grouting shall be provided at no additional cost to the Owner and shall be completed within the warranty re-test period.

END OF SECTION

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SECTION 02821

TEMPORARY CHAIN LINK FENCE

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. The Contractor shall provide all labor, materials and appurtenances necessary for the installation, maintenance and dismantling of 8-foot temporary fencing.
- B. The Contractor shall be responsible for securing the site from trespassers. Existing fencing exists on portions of the site as shown on the Contract Drawings; it will be at the discretion of the Contractor to determine whether the existing fence is suitable for site safety and security. The Contractor shall install temporary fencing across lengths of damaged/unsuitable fencing to secure the site and prevent trespassers.

1.02 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF SECTION 01330 SUBMITTALS, SUBMIT THE FOLLOWING:

- A. Manufacturer's literature of the materials specified herein.
- B. Shop drawings of the temporary fence and gates.
 - 1. Shop drawings shall indicate layout of temporary fencing, location and size of gates, existing pavement and roads, and other site-specific conditions. Prepare drawing after site observation and verification of existing conditions.

PART 2 - PRODUCTS

2.01 TEMPORARY CHAIN LINK FENCING:

- A. Unless otherwise indicated, type of 8-foot temporary chain link fencing shall be Contractor's option. Following types are acceptable:
 - 1. New materials or previously used salvaged chain link fencing in good condition.
 - 2. Posts: Galvanized steel pipe of diameter to provide rigidity. Post shall be suitable for setting in concrete footings, driving into ground, anchoring with base plates, or inserting in precast concrete blocks.
 - 3. 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.
 - 4. Temporary chain link fencing must be adequate to protect public safety and work areas.

B. Gates: Provide gates of the quantity and size indicated on the Contract Drawings or required for functional access to Site.

1. Fabricate of same material as used for fencing.
2. Vehicle gates:
 - a. Minimum width: 20 feet to allow access for emergency vehicles.
 - b. Capable of manual operation by one person.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. The fence and gates shall be erected by skilled mechanics in accordance with the recommendations of the manufacturer and these specifications. These specifications shall take precedence over the recommendations of the manufacturer if any discrepancy exists between them.

B. Posts

1. Maximum post spacing shall be 10-feet. Post spacing shall be uniform and posts shall be plumb.
2. Drive posts, set in holes and backfill, or anchor in precast concrete blocks.
3. For soft and unstable ground conditions, cast concrete plug around post.
4. Posts over pavement: Use steel post plates or precast concrete blocks.
5. Gate posts: Use bracing or concrete footings to provide rigidity for accommodating size of gate.
6. Temporary terminal posts shall be securely connected to existing fence posts to prevent site access/trespassing.

C. Securely attach wire fabric to posts. Maximum area of unbraced fence fabric shall not exceed 1,500 square feet.

D. Install with required hardware.

E. Fabric shall be stretched taut, with the bottom edge following the existing grade, and shall be a continuous mesh between terminal posts. Each span of fabric shall be attached independently at terminal posts. Where terminal posts do not have provisions for weaving fabric to posts, stretcher bars shall be placed through the end weave of the fabric and secured to the post with bar bands spaced not more than 15-inches apart on the post. Temporary terminal posts shall be secured to existing fence posts to prevent Site access/trespassing.

- F. Fabric shall be attached with ties to line posts at intervals of not more than 14-inches (and to the top railing and braces at intervals not exceeding 24-inches).
- G. The bottom tension wire shall be interlaced in the weave of the fabric, pulled taut and fastened to terminal posts.

3.02 MAINTENANCE AND REMOVAL:

- A. Maintain fencing in good condition. If damaged, immediately repair.
- B. Remove temporary fencing upon completion of Work or when no longer required for security or control. Backfill holes and compact. Holes in pavement shall be surfaced to match existing paving. Repair damage caused by installation of temporary fencing.

END OF SECTION

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SECTION 02920

LOAMING AND SEEDING

PART 1 - GENERAL

1.01 WORK INCLUDED:

This section covers all labor, materials, and equipment necessary to do all loaming, seeding and related work as indicated on the drawings and as herein specified. All lawns disturbed by the Contractor's operations shall be repaired as herein specified.

1.02 QUALITY ASSURANCE:

- A. For a particular source of loam, the Engineer may require the Contractor to send approximately 10 pounds of loam to an approved testing laboratory and have the following tests conducted:
 - 1. Organic concentration
 - 2. pH
 - 3. Nitrogen concentration
 - 4. Phosphorous concentration
 - 5. Potash concentration
- B. These tests shall be at the Contractor's expense. Test results, with soil conditioning and fertilizing recommendations, shall be forwarded to the Engineer.

1.03 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF SECTION 01330 SUBMITTALS, SUBMIT THE FOLLOWING:

- A. Information detailing the seed mixes, fertilizers, mulch material, slope protection material (if required) and origin of loam.
- B. Test results.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. LOAM:

- 1. Loam shall be a natural, fertile, friable soil, typical of productive soils in the vicinity, obtained from naturally well-drained areas, neither excessively acid nor alkaline, and containing no substances harmful to grass growth. Loam shall not be delivered to the site in frozen or muddy condition and shall be reasonably free of stumps, roots, heavy or stiff clay, stones larger than 1-inch in diameter, lumps, coarse sand, noxious weeds, sticks, brush or other litter.

2. The loam shall contain not less than 4 percent nor more than 20 percent organic matter as determined by the loss of weight by ignition of oven-dried samples. Test samples shall be oven-dried to a constant weight at a temperature of 230 degrees F.

B. LIME:

Lime shall be standard commercial ground limestone containing at least 50 percent total oxides (calcium oxide and magnesium oxide), and 50 percent of the material must pass through a No. 100 mesh sieve with 98 percent passing a No. 2 mesh sieve.

C. FERTILIZER:

Fertilizer shall be commercial fertilizer, 10-10-10 fertilizer mixture containing at least 40 percent of organic nitrogen. It shall be delivered to the site in the original sealed containers, each showing the manufacturer's guaranteed analysis. Fertilizer shall be stored so that when used it will be dry and free flowing. No fertilizer shall be used which has not been marketed in accordance with State and Federal Laws, relating to fertilizers.

D. MULCH:

1. Materials to be used in mulching shall conform to the following requirements:
2. Straw Mulch - Straw Mulch shall consist of stalks or stems of grain after threshing.
3. Wood Fibre Mulch - Wood Fibre Mulch shall consist of wood fibre produced from clean, whole uncooked wood, formed into resilient bundles having a high degree of internal friction and shall be dry when delivered to the project.

E. SEED:

1. Seed shall be of an approved mixture, the previous year's crop, clean, high in germinating value, a perennial variety, and low in weed seed. Seed shall be obtained from a reliable seed company and shall be accompanied by certificates relative to mixture purity and germinating value.
2. Grass seed for lawn areas shall conform to the following requirements:

	Proportion by Weight	Germination Purity	Purity Minimum
Chewing's Fescue	30%	70%	97%
Kentucky 31 Fescue	30%	90%	98%
Kentucky Blue Grass	20%	80%	85%
Domestic Rye Grass	20%	90%	98%

Grass seed for cross-country areas, slopes and other areas not normally mowed shall conform to the following requirements:

	Proportion by Weight	Germination Minimum	Purity Minimum
Creeping Red Fescue	50%	85%	95%
Kentucky 31	30%	85%	95%
Domestic Rye	10%	90%	98%
Red Top	5%	85%	92%
Ladino Clover	5%	85%	96%

F. TEMPORARY COVER CROP:

1. Temporary cover crop shall conform to the following requirements:

	% Weight	Germination Minimum
Winter Rye	80 min.	85%
Red Fescue (creeping)	4 min.	80%
Perennial Rye Grass	3 min.	90%
Red Clover	3 min.	90%
Other Crop Grass	0.5 max.	
Noxious Weed Seed	0.5 max.	
Inert Matter	1.0 max.	

G. SLOPE EROSION PROTECTION:

1. Erosion control blanket shall be 100% degradable plastic mesh with 100% degradable straw or straw/coconut fill. Fill shall be held together by degradable fastening. Weight shall be 0.50 lb/sq. yd. Erosion control blankets shall be applied parallel to direction of water flow. The erosion control blankets shall be by North American Green, Evansville, IN or approved equal. For slopes 2:1 or greater, Model SC150 shall be used. For slopes less than 2:1, Model S150 shall be used.
2. Six-inch wire staples shall be placed according to manufacturers recommendations to anchor the mesh material. Staples shall be designed to decompose.

PART 3 - EXECUTION

3.01 SURFACE PREPARATION:

- A. After approval of rough grading, loam shall be placed on areas affected by the Contractor's operations. Loam shall be at least 6-inches compacted thickness.

- B. Lime shall be applied to bring the pH to 6.5 or, without a soil test, at the rate of 2-3 tons of lime per acre.
- C. Fertilizer shall be applied according to the soil test, or without a soil test, at the rate of 1000 pounds per acre.
- D. Loam shall be worked a minimum of 3-inches deep, thoroughly incorporating the lime and fertilizer into the soil. The loam shall then be raked until the surface is finely pulverized and smooth and compacted with rollers, weighing not over 100 pounds per linear foot of tread, to an even surface conforming to the prescribed lines and grades. Minimum depth shall be 6-inches after completion.

3.02 SEEDING:

- A. Seeding shall be done when weather conditions are approved as suitable, in the periods between April 1 and May 30 or August 15 to October 1, unless otherwise approved.
- B. If there is a delay in seeding, during which weeds grow or soil is washed out, the Contractor shall remove the weeds or replace the soil before sowing the seed, without additional compensation. Immediately before seeding is begun, the soil shall be lightly raked.
- C. Seed shall be sown at the approved rate, on a calm day by machine.
- D. One half the seed shall be sown in one direction and the other half at right angles. Seed shall be raked lightly into the soil to a depth of 1/4-inch and rolled with a roller weighing not more than 100 pounds per linear foot of tread.
- E. The surface shall be kept moist by a fine spray until the grass shows uniform germination over the entire area. Wherever poor germination occurs in areas larger than 3 sq. ft., the Contractor shall reseed, roll, and water as necessary to obtain proper germination.
- F. The Contractor shall water, weed, cut and otherwise maintain and protect seeded areas as necessary to produce a dense, healthy growth of perennial lawn grass.
- G. If there is insufficient time in the planting season to complete the fertilizing and seeding, permanent seeding may be left until the following planting season, at the option of the Contractor or as required by the Engineer. In that event, a temporary cover crop shall be sown. This cover crop shall be cut and watered as necessary until the beginning of the following planting season, at which time it shall be plowed or harrowed into the soil, the area shall be fertilized and the permanent seed crop shall be sown as specified.

3.03 PLACING MULCH:

- A. Straw Mulch shall be loosely spread to a uniform depth over all areas designated on the plans, at the rate of 4-1/2 tons per acre, or as otherwise required.

- B. Straw Mulch may be applied by mechanical apparatus, if in the judgment of the Engineer the apparatus spreads the mulch uniformly and forms a suitable mat to control slope erosion. The apparatus shall be capable of spreading at least 80 percent of the hay or straw in lengths of 6-inches or more, otherwise it shall be spread by hand without additional compensation.
- C. Wood Fibre Mulch shall be uniformly spread over certain selected seeded areas at the minimum rate of 1,400 pounds per acre unless otherwise required. It shall be placed by spraying from an approved spraying machine having pressure sufficient to cover the entire area in one operation.

3.04 SEEDING AND MULCHING BY SPRAY MACHINE:

- A. The application of lime, fertilizer, grass seed and mulch may be accomplished in one operation by the use of an approved spraying machine. The materials shall be mixed with water in the machine and kept in an agitated state in order that the materials may be uniformly suspended in the water. The spraying equipment shall be so designed that when the solution is sprayed over an area, the resulting deposits of lime, fertilizer, grass seed and mulch shall be equal to the specified quantities.
- B. A certified statement shall be furnished, prior to start of work, to the Engineer by the Contractor as to the number of pounds of limestone, fertilizer, grass seed and mulch per 100 gallons of water.
- C. This statement should also specify the number of square yards of seeding that can be covered with the solution specified above. If the results of the spray operation are unsatisfactory, the Contractor will be required to abandon this method and to apply the lime, fertilizer, grass seed and mulch by other methods.

3.05 INSPECTION AND ACCEPTANCE:

At the beginning of the planting season following that in which the permanent grass crop is sown, the seeded areas will be inspected. Any section not showing dense, vigorous growth at that time shall be promptly reseeded by the Contractor at his own expense. The seeded areas shall be watered, weeded, cut and otherwise maintained by the Contractor until the end of that planting season, when they will be accepted if the sections show dense, vigorous growth.

END OF SECTION

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SECTION 03302

FIELD CONCRETE

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. This Section covers concrete and all related items necessary to place and finish the concrete work.
- B. Concrete thrust, and anchor blocks, to be provided at all water main bends, tees, plugs and wyes and at other locations required by the Engineer shall be installed in accordance with the details shown on the drawings and as specified in this section.
- C. Concrete encasement for piping with shallow cover and for encasement of telephone, and electrical duct bank when specified shall be installed in accordance with the details shown on the drawings and as specified in this section.

1.02 RELATED WORK:

- A. Section 02300, EARTHWORK

1.03 REFERENCES:

- A. The following standards form a part of this specification:

American Concrete Institute (ACI)

ACI 304	Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete.
ACI 305	Recommended Practice for Hot Weather Concreting
ACI 306	Recommended Practice for Cold Weather Concreting
ACI SP-66 ACI	Detailing Manual
ACI 318	Building Code Requirements for Reinforced Concrete

American Society for Testing and Materials (ASTM)

ASTM A615	Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM C33	Concrete Aggregates

ASTM C94	Ready-Mixed Concrete
ASTM C143	Test for Slump of Portland Cement Concrete
ASTM C150	Portland Cement
ASTM C260	Air Entraining Admixtures for Concrete
ASTM C494	Chemical Admixtures for Concrete

1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF SECTION 01330 SUBMITTALS, SUBMIT THE FOLLOWING:

Statement of materials constituting the design of mixes for each size aggregate as required by ASTM C94 shall be submitted to the Engineer within one week following award of the Contract.

PART 2 - PRODUCTS

2.01 CONCRETE:

- A. All concrete, reinforced or non-reinforced shall have a 28 day compressive strength of 3000 psi unless otherwise noted on the design drawings. A minimum of 5.5 sacks of cement per cubic yard and a maximum water cement ratio of 6.9 gallons per sack shall be used.
- B. Concrete shall conform to ASTM C94. The Contractor shall be responsible for the design of the concrete mixtures. Slump shall be a maximum of 4-inches and a minimum of 2-inches, determined in accordance with ASTM C143.
- C. Admixtures shall be as specified in subsection 2.05. No additional admixtures shall be used unless approved by the Engineer.
- D. No additional water, except for the amount indicated by the design mix shall be added to the concrete without the prior permission of the Engineer.

2.02 REINFORCING:

Reinforcing as shown on the plans or as required by the Engineer, shall conform to ACI 318 and ASTM A615 and shall be detailed in accordance with ACI SP-66. All Steel reinforcing bars shall be grade 60.

2.03 CEMENT:

The cement shall be an approved brand of American manufactured Portland Cement, Type II conforming to the applicable requirements of ASTM C150.

2.04 AGGREGATES

- A. Except as otherwise noted, aggregate shall conform to the requirements of ASTM C33.
- B. Maximum size aggregate shall be 3/4-inch.

2.05 ADMIXTURES:

- A. All concrete (unless otherwise directed) shall contain an air entraining agent. Air entrained concrete shall have air content by volume of 4 to 8 percent for 3/4-inch aggregate.
- B. Air entraining agent shall be in accordance with ASTM C260 and shall be Darex AEA, as manufactured by W.R. Grace & Company; Placewel (air entraining Type), as manufactured by Johns Manville; Sika AER as manufactured by Sika Chemical Company; or an approved equal product.
- C. Water reducing agent shall be WRDA, as manufactured by W.R. Grace & Company; Placewel (non-air entraining Type), as manufactured by Johns Manville; Sika Plastiment as manufactured by Sika Chemical Company; or an approved equal product.
- D. Water reducing agent-retarder shall be "Daratard," as manufactured by W.R. Grace & Company; Sika Plastiment as manufactured by Sika Chemical Company; or an approved equal product.

2.06 WATER:

- A. Water for concrete shall be potable, free of deleterious amounts of oil, acid, alkali, organic matter and other deleterious substances.

2.07 CONCRETE FORMS:

- A. 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 the prior approval of the Engineer.
- B. Form ties shall be cone type or equal, with waterstop, which leaves no metal closer than 2-inches to finished face of concrete.
- C. 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 such as EZ strip by L&M Construction Chemicals, Omaha, NB and "Magic Kote" by Symons Corp., Des Plaines, IL or approved equal.

- D. Where steel adjacent to vertical faces of forms cannot be otherwise secured, mortar doughnuts shall be used to prevent steel from lying too close to the finish vertical faces of the concrete

PART 3 - EXECUTION

3.01 PREPARATION:

- A. Before placing concrete, 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 the material which would tend to reduce the bond.
- B. Earth, concrete, masonry, or other water permeable material against which concrete is to be placed shall be thoroughly saturated with water immediately before concrete is placed.
- C. No concrete shall be placed until the consolidation of the ground and the arrangement and details of forms and reinforcing have been inspected and approved by the Engineer.

3.02 THRUST AND ANCHOR BLOCKS:

- A. Minimum bearing areas for thrust blocks and dimensions of anchor blocks shall be as shown on the drawings.
- B. Concrete for thrust and anchor blocks shall be placed against undisturbed earth, and wooden side forms shall be used to provide satisfactory lines and dimensions. Felt roofing paper shall be placed to protect joints. No concrete shall be placed so as to cover joints, bolts or nuts, or to interfere with the removal of the joints.

3.03 FILL CONCRETE:

- A. Fill concrete shall be placed in those locations as indicated on the design drawings. Fill concrete shall consist of materials as previously specified, with a minimum 28-day compressive strength of 3000 psi.
- B. Before fill concrete is placed, the following procedures shall be used to prepare surfaces; all dirt, scum and laitance shall be removed by chipping and washing. The clean, roughened base surface shall be saturated with water, but shall have no free water on the surface. A coat of 1:2 cement-sand grout, approximately 1/8-inch thick, shall be well scrubbed into the thoroughly dampened concrete base. The concrete fill shall be placed immediately, before grout has dried or set.
- C. Fill concrete shall be brought to lines and grades as shown on the design drawings.

3.04 CONCRETE PLACING DURING COLD WEATHER:

- A. Concrete shall not be placed on frozen ground, and no frozen material or material containing ice shall be used. Materials for concrete shall be heated when temperature is below 40°F, or is expected to fall to below 40°F, within 73 hours, and the concrete after placing shall be protected by covering, heat, or both.
- B. All details of Contractor's handling and protecting of concrete during freezing weather shall be subject to the approval of the Engineer. All procedures shall be in accordance with provisions of ACI 306.

3.05 CONCRETE PLACING DURING HOT WEATHER:

- A. Concrete just placed shall be protected from the direct rays of the sun and the forms and reinforcement just prior to placing, shall be sprinkled with cold water. The Contractor shall make every effort to minimize delays, which will result in excessive mixing of the concrete after arrival on the job.
- B. 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.

3.06 FIELD QUALITY CONTROL:

- A. Concrete inspection and testing shall be performed by the Engineer or by an inspection laboratory, designated by the Engineer, engaged and paid for by the Owner. Testing equipment shall be supplied by the laboratory, and the preparation of samples and all testing shall be performed by the laboratory personnel. Full assistance and cooperation, concrete for samples, and such auxiliary personnel and equipment as needed shall be provided by the Contractor.
- B. At least 4 standard compression test cylinders shall be made and tested and 1 slump test from each day's placement of concrete. A minimum of four compression test cylinders shall be made and tested for each 100 cubic yards of each type and design strength of concrete placed. One cylinder shall be tested at 7 days, and two at 28 days. The fourth cylinder from each set shall be kept until the 28 day test report on the second and third cylinders in the same set has been received. If the average compressive strength of the two 28 day cylinders do not achieve the required level, the Engineer may elect to test the fourth cylinder immediately or test it after 56 days. If job experience indicates additional cylinder tests or other tests are required for proper control or determination of concrete quality, such tests shall be made.

- C. The Engineer shall have the right to reject concrete represented by low strength tests. Rejected concrete shall be promptly removed and replaced with concrete conforming to the specification. The decision of the Engineer as to whether substandard concrete is to be accepted or rejected shall be final.

END OF SECTION

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APPENDIX A

TELEVISION INSPECTION LOGS
(NOT INCLUDED – FURNISHED UPON REQUEST)

APPENDIX B

TWIN MANHOLE PROTOCOL

Twin Manhole Inspection Procedure - General Observations

City of Worcester, Massachusetts

Twin Manholes:

The City of Worcester has a combination of sanitary manholes, storm drain manholes, and “twin manholes”.

A twin manhole is defined as a manhole that is shared by both the sanitary and storm drain systems. The manhole typically has two inverts. In a twin manhole, the majority of the sanitary inverts have been sealed with an aluminum plate and restraint. The plating system was installed to prevent storm water from entering the sanitary system. It is crucial that this system be in place to prevent surcharging of the sanitary system.

Manhole Inspection:

When accessing the City’s sanitary and storm drain systems, the CONTRACTOR or DPW PERSONNEL shall provide general observations regarding status at the time of the access. The City’s “Manhole Inspection Report” form shall be completed by the CONTRACTOR or DPW INSPECTOR. The CONTRACTOR or DPW PERSONNEL shall identify defects, damage, and/or missing manhole components and the type of corrective actions taken or to be taken.

As a minimum, CONTRACTOR’s or DPW PERSONNEL performing work within the City’s sanitary and storm drain systems shall inspect as follows:

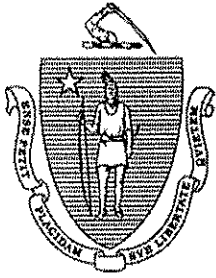
- Open manhole. Determine if the manhole is a Twin Manhole.
- If so, complete the “Manhole Inspection Report” form.
- Check the manholes aluminum plate and restraint system.
- Identify if the aluminum plate and restraint system is correctly installed and has all components present (plate and restraint).
- Indicate that the aluminum plate and restraint system was correctly re-installed following work (if not notify city, see below).

Defective or Missing Plating System:

- If the aluminum plate and restraint system was missing or unable to be re-installed correctly, the CONTRACTOR or DPW PERSONNEL will notify the Sewer Operations Division at (508) 799-1480.
- If the system is surcharged, notify DPW contact above.

APPENDIX C

COMMONWEALTH OF MASSACHUSETTS COVID-19 GUIDELINES AND PROCEDURES FOR ALL CONSTRUCTION SITES AND WORKERS AT ALL PUBLIC WORK



THE COMMONWEALTH OF MASSACHUSETTS
OFFICE OF THE GOVERNOR

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LAUREN GREENE PETRIGNO
DEPUTY LEGAL COUNSEL

March 25, 2020

Dear Municipal Chief Executive Officer:

I write to provide guidance regarding the effect of the Governor's March 23, 2020 Order "Assuring Continued Operation of Essential Services in the Commonwealth, Closing Certain Workplaces, and Prohibiting Gatherings of More than 10 People" insofar as the Order intersects with municipal efforts to address the COVID-19 crisis.

The Governor's Essential Services Order has two functions. First, the Order closes a broad range of public spaces, workplaces, and other establishments in order to reduce unnecessary movement of Commonwealth residents outside of the home and, in so doing, limit the spread of this highly contagious and potentially deadly virus. Second, the Order designates a range of critical services and functions as "COVID-19 Essential Services" to ensure their continued operation during the state of emergency in order to protect the public health and welfare of the Commonwealth and support community resilience and continuity of response efforts. Correspondingly, the Order designates workers engaged in delivering these critical services and functions as members of the "COVID-19 Essential Workforce." Taken together, these designations seek to ensure that COVID-19 Essential Services continue without interruption during the period of the declared emergency.

The Baker-Polito Administration recognizes the value of local decision making in most circumstances. Nevertheless, ensuring an effective response to the COVID-19 emergency requires the Administration to prioritize consistency and clarity of action. A key requirement of any effective, statewide response will be that public officials avoid conflicting directives and duplication of efforts. The Massachusetts Civil Defense Act, the authority under which the Governor issued the Order, reflects the necessity for unified statewide directives in a time of crisis. Section 8A of the Act provides that that any rule, regulation, ordinance or by-law issued by a municipality or other political subdivision of the Commonwealth "shall be inoperative" to the extent that such provision is inconsistent with any order issued by the Governor during the period of the emergency.

Accordingly, the Order the Governor signed on Monday includes the following provision to ensure unitary management of this crisis:

This Order supersedes and makes inoperative any order or rule issued by a municipality that will or might in any way impede or interfere with the achievement of the objectives of this Order. With respect to work and travel in particular, any order or rule issued by a municipality is hereby made inoperative to the extent: (1) such municipal order or rule will or might interfere with provisions of this Order ensuring the continued operation of COVID-19 Essential Services; or (2) such municipal order or rule will or might interfere with the free travel anywhere within the Commonwealth of any person who is a member of any COVID-19 Essential Workforce where such travel is made in connection with the ongoing operation of COVID-19 Essential Services.

One important area in which the potential for conflict has presented itself is in questions surrounding the continuing operation of construction projects. A number of municipalities have announced policies to address construction work during the state of emergency that conflict with the terms of the Order. Exhibit A of the Order contains two entries that designate construction projects as COVID-19 Essential Services and identify workers engaged in construction projects as included within the Order's COVID-19 Essential Workforce:

- Guidance: Workers – including contracted vendors – involved in the construction of critical or strategic infrastructure including public works construction, airport operations, water, sewer, gas, electrical, nuclear, oil refining and other critical energy services, roads and highways, public transportation, solid waste collection and removal, and internet, and telecommunications systems (including the provision of essential global, national, and local infrastructure for computing services)
- Guidance: Construction Workers who support the construction, operation, inspection, and maintenance of construction sites and construction projects (including housing construction)

Accordingly, the Order provides that all construction projects are to “continue operations during the state of emergency, but to do so with allowance for social distancing protocols consistent with guidance provided by the Department of Public Health.” Local policies, regulations, or directives that provide otherwise are in direct conflict with the Order and should be withdrawn.

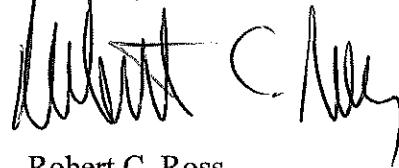
The Baker-Polito Administration is aware that cities and towns and local Boards of Health quite sensibly have raised questions about how to manage the health risks of COVID-19 in the context of an active construction site. In order to address these same concerns, Commonwealth agencies that undertake horizontal and vertical construction have adopted a detailed set of safety practices for all construction projects sponsored or managed by their agencies. The Commonwealth also plans to ensure that each project sponsored or managed by a state agency observes a “safety stand-down day” within the next week. This stand-down is

designed to ensure that all workers involved in the project are familiar with the health safety practices required for the continued operation of Commonwealth construction projects. I am attaching the Commonwealth's construction site safety policy to this guidance for your review. The Administration encourages all cities and towns to issue similar requirements for construction projects undertaken by private owners.

Unitary management in this crisis will be essential to ensuring an appropriate balance statewide between taking actions necessary to combat the spread of COVID-19 and avoiding unnecessary hardships to the public and supporting community resilience over the weeks and months it may take for this crisis to run its course. The economic disruption and interruption in critical services and functions that could result from halting construction projects abruptly would be felt statewide and not simply in the locality where a particular project sits. For these reasons, construction projects should continue as long as they observe social distancing protocols and otherwise can continue to operate safely.

The Baker-Polito Administration recognizes and values the unceasing efforts of local officials to support an effective statewide response to COVID-19. We will continue to work with cities and towns to ensure a consistent application of the Governor's Essential Services Order and to provide for effective enforcement of proper COVID-19 safety protocols at active construction sites.

Sincerely,

A handwritten signature in black ink, appearing to read 'Robert C. Ross', followed by a large, stylized 'C' and another signature.

Robert C. Ross
Chief Legal Counsel

Cc: Geoffrey Beckwith, Massachusetts Municipal Association

Enclosure



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 D

GEOTECHNICAL ENGINEERING REPORT

June 25, 2021

City of Worcester
c/o Ms. Kara D. Keleher, PE, ENV SP
Weston & Sampson Engineers, Inc.
55 Walkers Brook Drive
Reading, MA 01867

RE: Geotechnical Engineering Report
Cambridge Street Sewer Replacement
Worcester, Massachusetts
Weston & Sampson Project No. 2191051

INTRODUCTION

Weston & Sampson Engineers, Inc. (Weston & Sampson) is pleased to present this geotechnical engineering report for the proposed Cambridge Street Sewer Improvements project in Worcester, Massachusetts. Our project understanding is based on a July 2020 drawing entitled "Existing Utility Layout" and on correspondences with you.

EXISTING CONDITIONS

The project area includes an approximately 1,900 linear foot (LF) section along Cambridge Street (**Figure 1 – Site Plan**). The project area begins approximately 200 feet west of the Woodward Street intersection, near the existing railway line, and ends near the intersection of Washburn Street, as shown in **Figure 2 – Boring Location Plan**. The sewer alignment area is located in high traffic volume commercial areas, especially near the intersection of Cambridge Street and Southbridge Street. Within the limits of the proposed sewer alignment, Cambridge Street consists of a two lane (one lane in each direction) roadway with sidewalks on both sides of the roadway between Washburn Street and McKeon Street. The roadway widens near the intersection with Southbridge Street to include traffic turn lanes in both directions.

Ground surface elevations within the project limits increase east to west along Cambridge Street from approximately El. 449 to El. 477. Elevations provided herein are in feet and reference the North American Vertical Datum of 1988 (NAVD88) and are based on a May 2021 drawing entitled "Existing Utility Layout" by Weston & Sampson.

Existing subsurface utility pipes along this section of Cambridge Street include sanitary gravity sewer, water, stormwater drainage, gas, electric, and telecommunications. Based on information you provided, existing sewer pipe invert depths range from approximately 15 feet near Washburn Street to about 20 feet at Southbridge Street. The sewer pipes range in size from 48x72-inch along the western portion of the project site to 60x84-inch along the eastern portion of the site. The invert depths of other subsurface utilities were not provided on the Existing Utility Layout Plan.

PROJECT UNDERSTANDING

The proposed project includes replacement of approximately 650 linear feet of 60-inch-diameter pipe sewer pipe along Cambridge Street between the intersections of Southbridge Street and Washburn Street, installation

of approximately 1,250 linear feet of cured-in-place 48x72-inch pipe lining within the existing sewer pipe, and installation and replacement of five manholes. Construction will also include the installation of a sewer bypass manhole at the west end of the project site, and a temporary bypass sewer line extending the full length of the project area as part of construction means and methods.

We understand the proposed sewer alignments and depths will closely match the existing alignments and existing invert depths of 15 to 20 feet as noted in the previous section. The proposed manhole structure invert depths range from approximately 15 feet (at South Cambridge Street) to approximately 25.5 feet (west of the Southbridge Street intersection). Additional information regarding structure locations and depths were not available at the time of this report. Replacement of other existing subsurface utilities are not proposed as part of this project.

SUBSURFACE CONDITIONS

Geologic Setting

Information from the Massachusetts Office of Geographic Information (MassGIS) and the 2018 “Surficial Materials Map of the Worcester South Quadrangle” by B.D. Stone et. al., indicate surficial soils consist of coarse deposits of sand and gravel with finer layers of sand, silt, and clay, and thin deposits of till. The depths of surficial soils indicated on MassGIS ranged from 0 to 50 feet at the western end of the project site (west of Chelsea Street) and 50 to 100 feet east of Chelsea Street.

According to the 1983 “Bedrock Geologic Map of Massachusetts” by E-an Zen, bedrock at the site consists of slate and phyllite of the Worcester Formation. Bedrock outcrops are not mapped near the site and were not observed during our site reconnaissance.

Subsurface Exploration Program

Subsurface conditions were explored on May 4 through May 7, 2021 by advancing five borings (B-1 through B-5) at the approximate boring locations shown in **Figure 2- Boring Location Plan**. B-5 was terminated due to an unknown obstruction encountered at a depth of 6.6 feet. B-1 through B-4 were drilled to depths ranging from 20 to 25 feet. Two of the borings (B-1 and B-3) were completed as monitoring wells and the wells were developed by Weston & Sampson on June 4, 2021.

The borings were completed by Technical Drilling Services (TDS) of Sterling, MA. Vacuum excavations were performed at each of the borings in the upper 6 to 9 feet to pre-clear potentially existing utilities. Borings B-1 through B-4 were subsequently advanced using rotary wash drilling methods using 4-inch inside diameter (ID) casing. Standard penetration tests were conducted in each boring by driving a 24-inch long by 1-3/8-inch ID (2-inch outside diameter) split spoon sampler with blows from a 140-pound automatic hammer falling 30 inches per blow. Sampling intervals were generally every 2 to 5 feet.

Weston & Sampson geotechnical engineering staff monitored drilling activities in the field, measured boring locations relative to existing site features, and prepared logs for each boring. Subsurface conditions encountered in the borings are described in the following section.

Encountered Subsurface Conditions

Subsurface conditions encountered below the asphalt concrete pavement surface generally consisted of fill above native sand over glacial till. The native subsurface conditions encountered in the borings were generally consistent with mapped surficial geology.

Descriptions of the subsurface conditions encountered are included in the boring logs in **Attachment A**. The Unified Soil Classification System (USCS) designation of each soil layer is indicated in bold following the soil

description where appropriate. The major strata encountered in the borings are described below. Variations may occur and should be expected outside and between boring locations.

Asphalt Concrete Pavement – Each of the borings were completed within Cambridge Street. The asphalt concrete (AC) pavement surface at the boring locations was approximately 6 to 10-inches thick.

Fill – Fill was encountered below the AC pavement at each boring location and extended to depths ranging from 4.8 to 7.3 feet. The Fill generally consisted of sand with little to some non-plastic fines and little gravel (**SM**).

An unknown obstruction was encountered in the Fill at the western end of the project site in B-5 at a depth of 6.6 feet and the boring was terminated. Concrete was observed in the drilling wash water.

Native Sand – Native Sand was encountered below the Fill in borings B-1 through B-4. The deposit was generally coarse grained at the east end and fine grained at the west end of the project alignment. The coarse-grained sand deposits generally consisted of loose to dense sand and gravel with few to some non-plastic fines (**SW-SM**, **SP-SM**, **GW-GM**). The fine-grained sand deposits generally consisted of fine to medium sand with either little non-plastic fines or some low plasticity fines (**SM**, **SC**). Borings B-1 and B-2 were terminated in the Native Sand at depths of 25 feet and 20 feet, respectively. In borings B-3 and B-4, the Native Sand extended to depths of 10 and 12 feet, respectively.

Glacial Till – Very stiff to hard Glacial Till was encountered below the Native Sand in B-3 and B-4 which were terminated in this stratum at a depth of 20 feet. The Glacial Till was generally described as mostly non plastic to low plasticity fines with little to some fine sand and few to little gravel (**CL**, **ML**).

Groundwater – Groundwater was encountered during drilling in B-1, B-2, B-3, and B-4 at depths ranging from 10 to 13 feet. Based on well development data, groundwater was measured in the monitoring wells at depths of 11.3 (El. 438.7) and 14.1 (El. 443.4) feet in MW-1 (B-1) and MW-2 (B-3), respectively. We anticipate that groundwater levels will fluctuate with season, variations in precipitation, construction in the area, and other factors. Perched groundwater conditions could exist close to the ground surface, especially during and after extended periods of wet weather.

Geotechnical Laboratory Testing

Laboratory grain size determinations were completed in accordance with ASTM D6913 on five split-spoon samples to confirm field classifications and to evaluate re-use of existing materials as backfill. Laboratory test results are included in **Attachment B**.

GEOTECHNICAL DESIGN RECOMMENDATIONS

General

The primary geotechnical considerations for design and construction of the proposed project are the variable soil conditions across the site and the proximity of existing utilities along the project alignment. Excavations for the proposed new section of pipe will extend down to about 15 ft to 20 ft below existing grade, and about 4 ft to 6 ft below groundwater level.

Excavations for the new utility pipes and manhole structures are expected to extend through various materials including fill, native sand, and glacial till soils. Fine-grained soils were prominent on the west end of the site, including clayey sands and very stiff to hard clays and silts (glacial till).

The project alignment is located within an urban area with numerous existing utilities. Drilling refusal was encountered at the west end of the project site in B-5 at a depth of approximately 6.6 feet, indicating a shallow obstruction. Obstructions, including but not limited to, existing utilities, cobbles, and boulders, are likely present in other areas of the project site not explored by borings. Difficult excavations should be anticipated.

We recommend that the project budget and schedule include contingencies for variable subgrade conditions, debris removal, and over-excavation and stabilization of soft areas. Occasional cobbles, boulders, or obstructions will likely be encountered while excavating to proposed subgrade elevations.

Given that utility pipe and manhole construction are proposed along an existing urban street with numerous existing subsurface utilities, temporary excavation support will likely be required for the proposed construction to maintain safe excavations in accordance with OSHA requirements and to avoid undermining adjacent structures and the roadway surface.

Support of Utilities

The native sand and glacial till encountered in our borings are suitable to support the proposed sewer pipes and manhole structures. We understand that the new pipe and manholes will be constructed at the location of the existing utility; therefore, existing fill should be anticipated to greater depths within the excavation than encountered in the borings.

Granular, inorganic soils free of debris materials are considered suitable for support of the new utility pipes and manhole structures provided the soil subgrades are prepared as recommended herein. If organic or debris materials, or existing fill are encountered at proposed subgrade depths, these materials should be removed to expose granular, inorganic subgrades free of debris. Imported backfill will likely be required where an excessive amount of fines are encountered at proposed subgrade depths.

Structures bearing on subgrades prepared as described herein can be designed using an allowable bearing pressure of 4,000 psf.

Temporary Excavation Support and Dewatering

Based on the excavation depths required for the new sewer pipe and manhole structures, depth to groundwater, and proximity to existing utilities, we recommend temporary excavation support systems, such as trench boxes or internally braced timber sheeting be used.

Groundwater was encountered at depths ranging from approximately 10 to 14.1 feet. Depending on proposed utility pipe and manhole subgrade depths, dewatering to maintain dry excavations is likely required. The dewatering system should be designed in conjunction with the temporary excavation support system and may include a series of filtered sumps, temporary bypass pipes, or cofferdams for water cut-off. Dewatering discharge water should be fed to recharge pits located away from the utility and manhole excavations. Alternatively, it may be feasible to discharge dewatering water to the storm drain system; however, permits would be required.

In areas where utilities cross above the proposed pipe, the shoring system should be designed and constructed in a manner that prevents ground loss on the outside of the excavation and the potential for movement that may damage sensitive utilities.

Lateral Earth Pressures

Below-grade structures should be designed to resist lateral loads due to groundwater, earth pressures, and surcharge loads. Lateral earth pressures should be calculated using an equivalent fluid unit weight of 95 pcf, which assumes water at the ground surface, submerged backfill, a level backfill surface, and at-rest lateral earth pressures. A uniform lateral pressure of 150 pounds per square foot (psf) should be added and applied

over the full backfill height of all below grade structures. The 150 psf lateral pressure is intended to account for vertical surcharge pressures up to 300 psf at the ground surface. Additional lateral pressures equal to 0.5 times the additional surcharge pressure should be added to structures where surcharge pressures exceed 300 psf.

GEOTECHNICAL CONSTRUCTION CONSIDERATIONS

Excavation Considerations

Temporary excavation support will be required where excavation depths exceed 4 feet., where caving or seepage is present, and/or where sloped excavations are not possible. Excavations should not extend into the zone-of-influence (ZOI) of existing utilities or other structures without proper excavation support or underpinning. The ZOI is typically defined as a plane extending 2 feet horizontally from the edge of pipe and down and away at a 1H:1V slope to the intersection with native, medium dense or denser/medium stiff or stiffer soils.

The type and design of any temporary excavation support system should be the responsibility of the contractor, who is in the best position to choose a system that fits their overall plan of operation. Temporary excavation support systems should be designed by a structural engineer licensed in the Commonwealth of Massachusetts retained by the Contractor. All excavations should be made in accordance with applicable OSHA and local safety regulations.

We recommend installing utility monitoring points on existing gas mains (if any) within 10 ft of proposed excavation for the new pipe to check for movements during construction.

Dewatering

Groundwater is likely to be present above the new sewer pipe invert and manhole structure subgrade elevations, depending on excavation depths. All excavations, fill placement and compaction, and utility pipe, and manhole structure construction should occur in-the-dry. Dewatering will be necessary for all excavations below the groundwater table and where seepage is encountered. Flow rates for dewatering are likely to vary depending on location, soil type, and the season during which the excavations occur.

The dewatering system should be designed in conjunction with the temporary excavation support system and capable of lowering the groundwater table at least 2 feet below the anticipated excavation depths to prevent pumping of soil, migration of fines, disturbance of subgrades, and adverse effects such as settlement below existing site features. The dewatering system should be kept operational until fill placement and compaction, and utility pipe, and manhole structure construction has been completed to a level of at least 2 feet above the groundwater table elevation.

Design of dewatering systems should consider potential settlement and impact on nearby structures. A pre-construction condition survey should be completed to document the conditions prior to construction. A post construction survey will document any potential construction related damage and the surveys can provide protection to the Owner and Contractor against potential damage claims by the abutting property owners.

Subgrade Preparation, Protection, and Stabilization

Granular subgrades at subgrade utility pipe and manhole structure subgrade elevations should be proof compacted with at least four passes of a minimum 700-pound vibratory plate compactor, or equivalent effort. Fine-grained soils should not be directly proof compacted. Weston & Sampson should be contacted to evaluate the exposed subgrade prior to placement of overlying materials.

Saturated and unstable areas in the subgrade should be removed and replaced with either dry, compacted backfill (as discussed below) or with 1-1/2-inch crushed stone.

Installation of a non-woven geosynthetic (such as Mirafi 180N or approved equal) prior to placing backfill or stone may be recommended depending on the condition of the subgrade soils.

Soils at proposed subgrade depths are anticipated to contain a significant percentage of fine-grained materials. These soils are susceptible to softening and disturbance by construction activity and during wet or freezing weather. Subgrade protection is the responsibility of the contractor and special precautions and protective measures appropriate for the weather conditions during construction should be used during earthwork construction to preserve the integrity of subgrades.

Utility pipes, manholes structures, and fill should not be installed on frozen subgrades. If construction occurs during freezing conditions, insulating blankets, heaters, or other suitable measures should be employed to prevent subgrades from freezing.

Backfill Materials

Installation and grain size distribution characteristics of pipe bedding material should meet the requirements established by the pipe manufacturer.

We anticipate that it will be the intent of the proposed project to re-use soils removed from utility excavations to backfill utility trench excavations and manhole structures. The existing fill and native soils have a high fines content. Excavated granular materials containing less than approximately 20 percent fines, having a maximum particle size of approximately 6-inches, and free of topsoil, debris, organics, ice, snow, and other deleterious materials can be used to backfill utility trench excavations and manhole structures up to pavement subbase elevations.

Re-use of the native soils to backfill utility trench excavations and manhole structures up to pavement subbase elevations is possible provided the moisture content of these soils is within approximately 3 percent of optimum, as determined by ASTM Specification D-1557. Re-use and compaction of these materials to required densities, however, will be difficult if the moisture content exceeds 3 percent of optimum. Saturated materials, organic soils, and debris materials should not be re-used as backfill.

Imported backfill, where needed, should consist of MassDOT Gravel Borrow, type b (Item M1.03.0).

Backfill should be placed in maximum 10 in. thick lifts (measured prior to compaction), with each lift compacted to at least 92 percent of the materials maximum dry density as determined by ASTM Specification D1557 and to 95 percent within 2 ft. of finished grades.

LIMITATIONS

We have prepared this report for use by the City of Worcester and members of the design and construction team for the subject project and this site only. The data and report can be used for estimating purposes, but our report, conclusions, and interpretations should not be construed as a warranty of the subsurface conditions and are not applicable to other sites.

Subsurface conditions indicate soil conditions only at specific locations and only to the depths penetrated. They do not necessarily reflect subsurface conditions that may exist between exploration locations. If subsurface conditions differing from those described are noted during excavation and construction, reevaluation will be necessary.

Site development plans and design details were not finalized at the time this report was prepared. If changes are made in site grades, configuration, or type of construction, the conclusions and recommendations may not be applicable. We should be consulted to review final design drawings and specifications to see that our recommendations are suitably followed. If design changes are made, we should be retained to review our conclusions and recommendations and provide a written evaluation or modification. Additional geotechnical engineering analyses and explorations may be necessary.

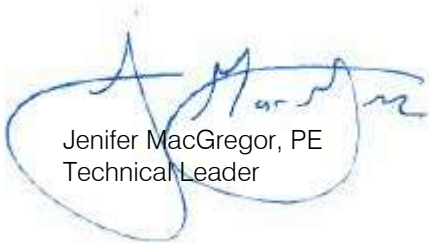
The recommendations in this report are preliminary as actual subsurface conditions may differ from those interpreted based on our subsurface explorations. In order for our recommendations to be considered final, we must be retained to observe the actual subsurface conditions encountered during construction. Our observations will allow us to interpret the actual conditions present during construction and adapt our recommendations if needed.

Within the limitations of scope, schedule, and budget, our services have been executed in accordance with generally accepted practices in this area at the time this report was prepared. No warranty or other conditions, expressed or implied, is given. For additional information about the use of this report, see the Geoprofessional Business Association, Inc. (GBA) documents included in **Attachment C**.

It has been a pleasure assisting you with this project and we look forward to our continued involvement. Please contact the undersigned if you have any questions.

Sincerely,

WESTON & SAMPSON ENGINEERS, INC.



Jenifer MacGregor, PE
Technical Leader



Carolyn Conlee, Ph.D., PE
Project Engineer

Attachments:

Figure 1 – Site Plan (1 page)

Figure 2 – Boring Location Plan (1 page)

Attachment A – Boring Logs (8 pages)

Attachment B – Laboratory Test Results (5 pages)

Attachment C – Important Information about This Geotechnical-Engineering Report (2 pages)

CTC:JACM:TF

FIGURES

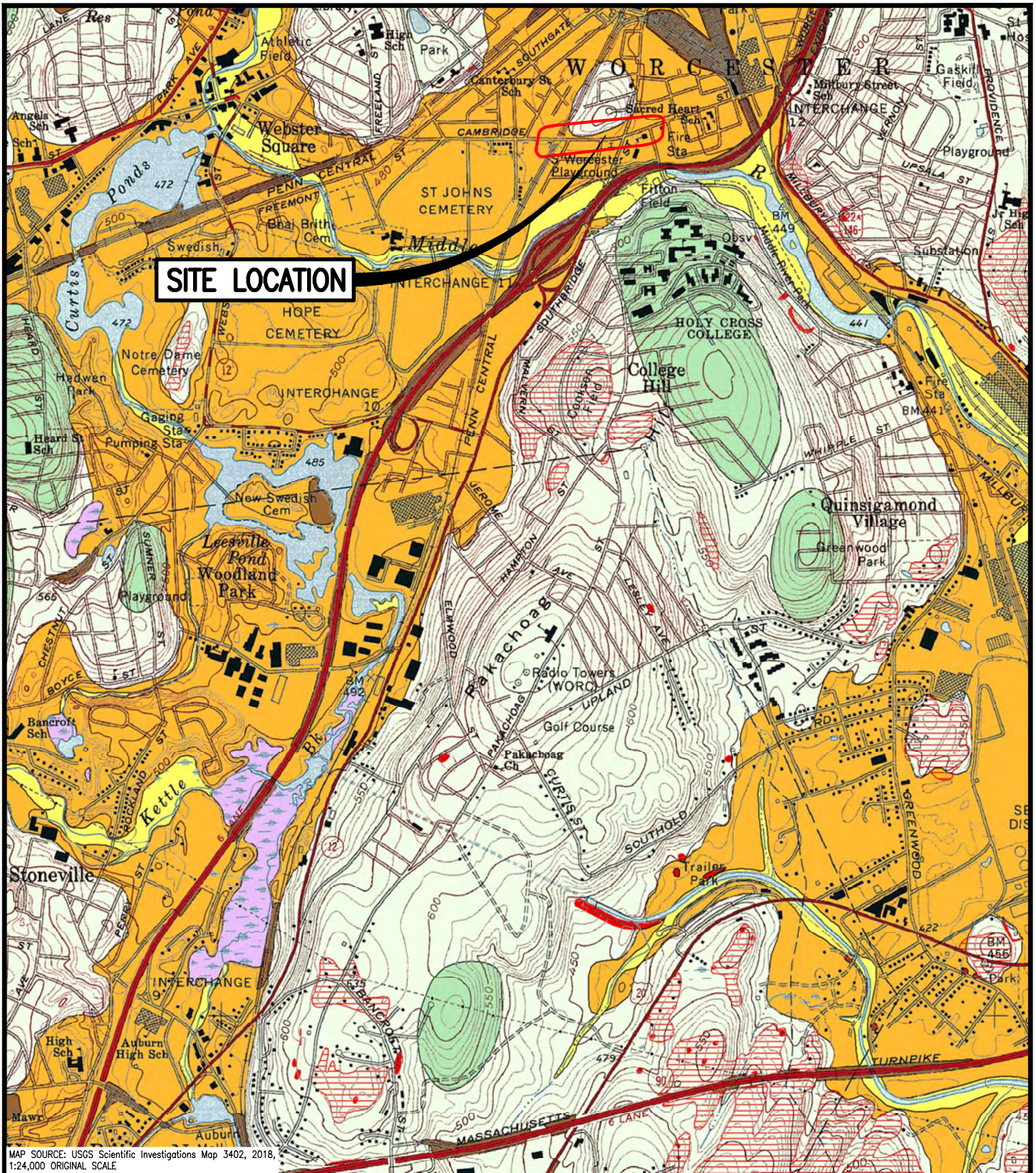
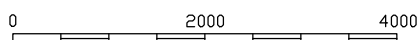
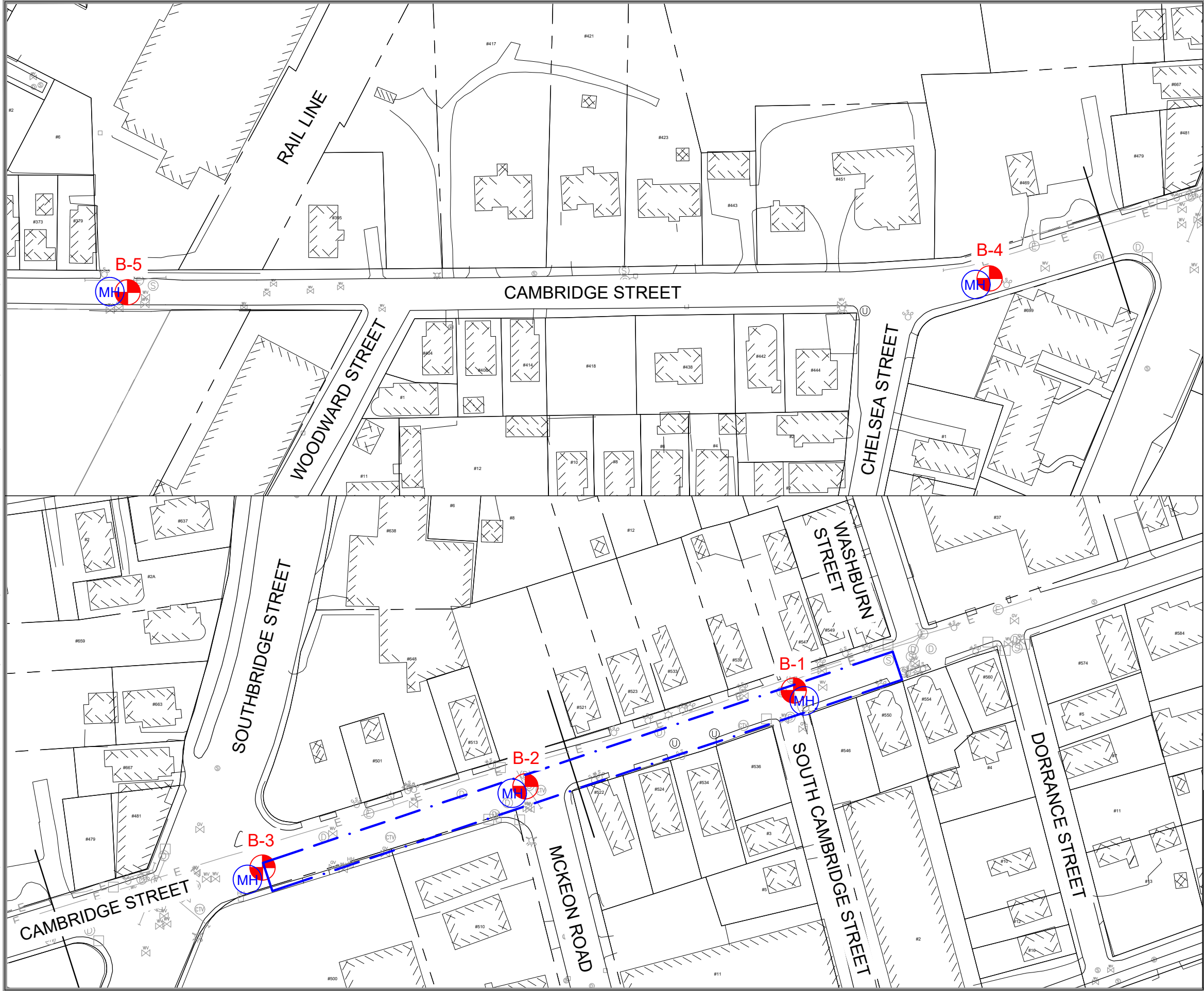


FIGURE 1
CAMBRIDGE STREET SEWER REPLACEMENT
WORCESTER, MA
LOCUS MAP

SCALE: 1"=2000'



\\wse03.local\\WSE\\Projects\\MA\\Worcester, MA\\2191051 Cambridge Street Design\\Geotechnical\\CAD\\Cambridge Street Boring Location Plan.dwg



NOTES:

1. THIS FIGURE IS BASED ON AN DRAWING ENTITLED "CAMBRIDGE STREET INTERCEPTOR REPLACEMENT" PREPARED BY WESTON & SAMPSON DATED MAY 14, 2021.
2. BORINGS COMPLETED BY TECHNICAL DRILLING SERVICES OF STERLING, MA AND OBSERVED BY WESTON & SAMPSON ENGINEERS, INC. ON MAY 4 THROUGH 7, 2021.
3. EXPLORATION LOCATIONS SHOWN ARE BASED ON FIELD MEASUREMENTS RELATIVE TO EXISTING SITE FEATURES.

LEGEND:

- B-#** - BORING LOCATION AND DESIGNATION
- MH** - APPROXIMATE LOCATION OF NEW MANHOLE
- []** - APPROXIMATE LIMITS OF NEW SEWER PIPE

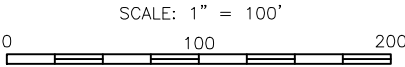
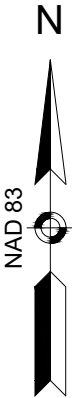


FIGURE 2

CAMBRIDGE STREET SEWER REPLACEMENT
WORCESTER, MA

BORING LOCATION PLAN

DESIGNED BY:	JW	CHECKED BY:	CC	DATE:	JUNE 2021

Weston & Sampson

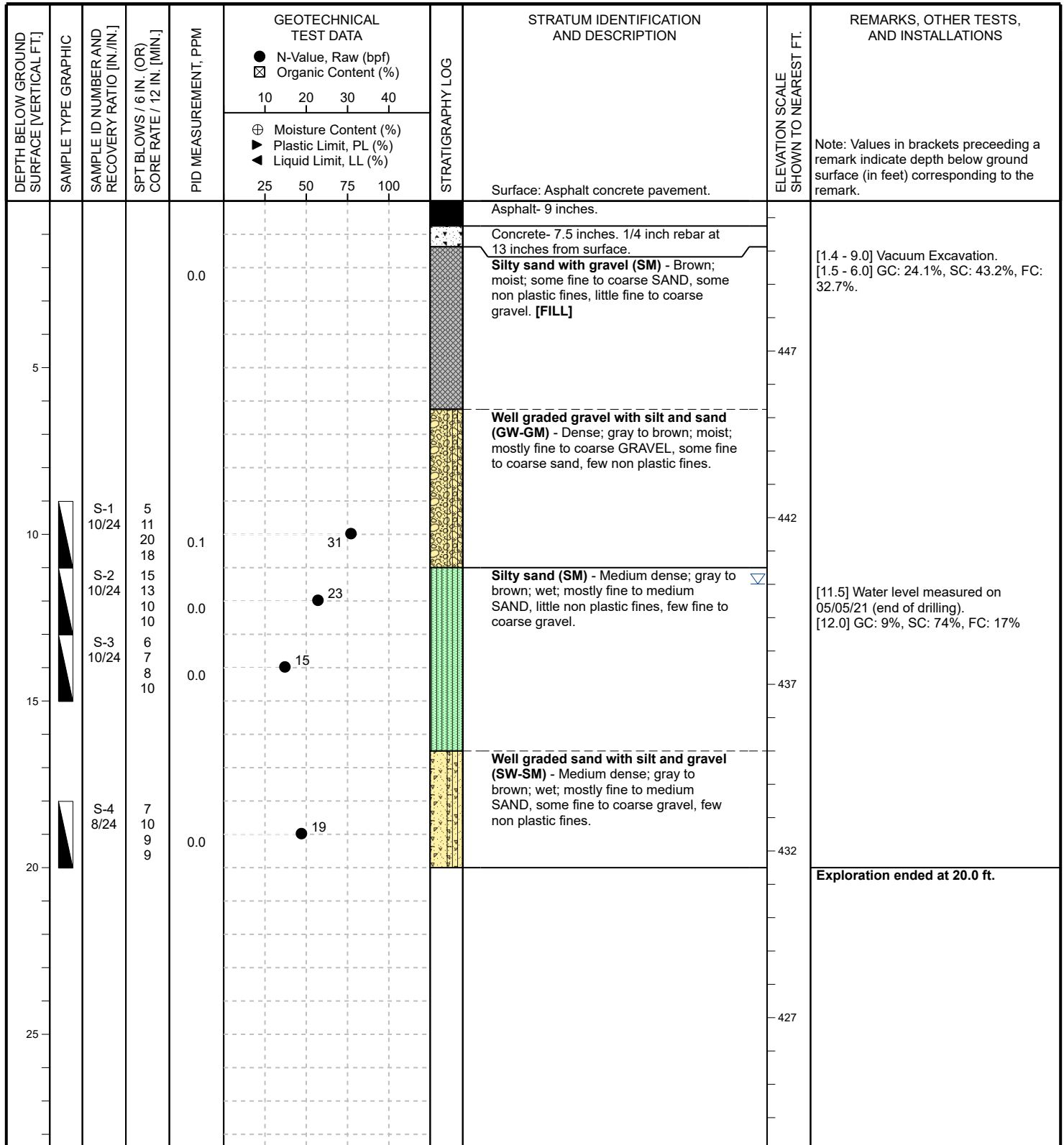
ATTACHMENT A

Boring Logs

CONTRACTOR:	Technical Drilling Services, Inc.	BORING LOCATION:	See Attached Figure	DATE START:	May 6, 2021
FOREMAN:	Darwin Newton	ADVANCE METHODOD:	Rotary Wash Drilling	DATE FINISH:	May 6, 2021
LOGGED BY:	A. Naslas	AUGER DIAMETER:	N/A	GROUND EL:	450.0 ± (NAVD88)
CHECKED BY:	C. Conlee, P.E.	SUPPORT CASING:	Driven Flush-Joint Casing (4" ID)	FINAL DEPTH:	25.0 ft.
EQUIPMENT:	CME 550, Truck Mounted	CORING METHODOD:	N/A	GRID COORDS:	N/A
SPT HAMMER:	Automatic (140-lb.)	BACKFILL MATERIAL:	Drill Cuttings and Asphalt Patch	GRID SYSTEM:	N/A

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	PID MEASUREMENT, PPM	SPT RESISTANCE, RQD, AND LABORATORY DATA				STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
					● N-Value, Raw (bpf)	⊕ Moisture Content (%)	▼ Plastic Limit (%)	▲ Liquid Limit (%)				
					10	20	30	40		Surface: Asphalt concrete pavement.		Note: Values in brackets preceding a remark indicate depth below ground surface (in feet) corresponding to the remark.
										Asphalt- 6 inches.		
										Concrete- 8 inches. 1/4 inch rebar at 12 inches from surface.		
				0.0						Silty sand with gravel (SM) - Brown; moist; some fine to coarse SAND, some non plastic fines, little fine to coarse gravel. [FILL]		[1.2 - 9.0] Vacuum Excavation.
5											445	
										Well graded sand with silt and gravel (SW-SM) - Loose to medium dense; brown; moist; mostly fine to coarse SAND, some fine to coarse gravel, few non plastic fines.		
10		S-1 0/24	9								440	
			10									
		S-2 9/24	4									
			3									
			3	0.0								
		S-3 6/24	3									
			4									
			3	0.0								
			2									
15		S-4 0/24	2								435	
			2									
			4									
			4									
			6									
		S-5 9/24	5									
			5									
			8	0.2								
			9									
20		S-6 18/24	6								430	
			10									
			11	0.1								
			12									
		S-7 9/24	6									
			7									
			9									
			9	0.0								
25											425	
												Exploration ended at 25.0 ft.

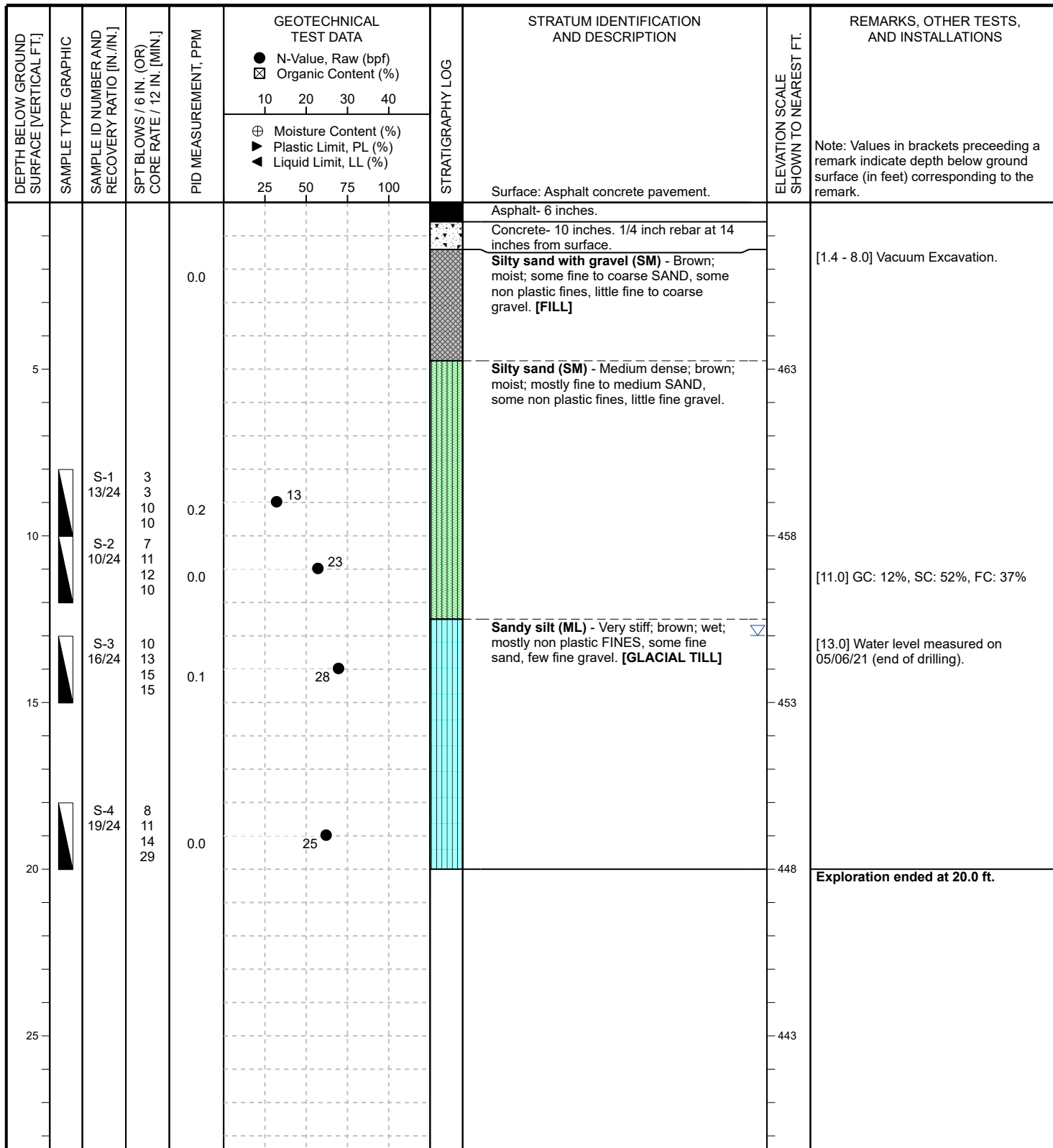
CONTRACTOR:	Technical Drilling Services, Inc.	BORING LOCATION:	See Attached Figure	DATE START:	May 5, 2021
FOREMAN:	Darwin Newton	ADVANCE METHOD:	Rotary Wash Drilling	DATE FINISH:	May 5, 2021
LOGGED BY:	A. Naslas	AUGER DIAMETER:	N/A	GROUND EL:	451.5 ± (NAVD88)
CHECKED BY:	C. Conlee, P.E.	SUPPORT CASING:	Driven Flush-Joint Casing (4" ID)	FINAL DEPTH:	20.0 ft.
EQUIPMENT:	CME 550, Truck Mounted	CORING METHOD:	N/A	GRID COORDS:	N/A
SPT HAMMER:	Automatic (140-lb.)	BACKFILL MATERIAL:	Drill Cuttings and Asphalt Patch	GRID SYSTEM:	N/A



CONTRACTOR:	Technical Drilling Services, Inc.	BORING LOCATION:	See Attached Figure	DATE START:	May 5, 2021
FOREMAN:	Darwin Newton	ADVANCE METHOD:	Rotary Wash Drilling	DATE FINISH:	May 5, 2021
LOGGED BY:	A. Naslas	AUGER DIAMETER:	N/A	GROUND EL:	457.5 ± (NAVD88)
CHECKED BY:	C. Conlee, P.E.	SUPPORT CASING:	Driven Flush-Joint Casing (4" ID)	FINAL DEPTH:	20.0 ft.
EQUIPMENT:	CME 550, Truck Mounted	CORING METHOD:	N/A	GRID COORDS:	N/A
SPT HAMMER:	Automatic (140-lb.)	BACKFILL MATERIAL:	Drill Cuttings and Asphalt Patch	GRID SYSTEM:	N/A

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	PID MEASUREMENT, PPM	SPT RESISTANCE, RQD, AND LABORATORY DATA	STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
					● N-Value, Raw (bpf) ⊕ Moisture Content (%) ▶ Plastic Limit (%) ▲ Liquid Limit (%) ☒ Organic Content (%)		Surface: Asphalt concrete pavement. Asphalt		
0.0							Silty sand with gravel (SM) - Dark brown to brown; moist; some fine to coarse SAND, some non plastic fines, little fine to coarse gravel. [FILL] Change to occasional cobbles. [FILL]	453	[1.0 - 8.0] Vacuum Excavation.
5							Clayey sand (SC) - Dense; gray to brown; moist; some fine SAND, some low plasticity fines, little fine to coarse gravel.		
10	S-1 12/24	17 19 21 21	0.0		40			448	[9.0] GC: 13%, SC: 43%, FC: 44%
	S-2 19/24	21 11 19 18	0.1		30		Sandy lean clay with gravel (CL) - Very stiff; gray to brown; moist to wet; mostly low plasticity FINES, some fine sand, little fine to coarse gravel. [GLACIAL TILL]		Water level measured at 11.0 ft. on 05/06/21 (well reading).
15	S-3 11/24	11 11 17 20	0.0		28			443	
20	S-4 15/24	19 17 17 14	0.0		34		Sandy silt with gravel (ML) - Hard; gray; wet; mostly non plastic FINES, little fine sand, little fine to coarse gravel. [GLACIAL TILL]	438	
25								433	Exploration ended at 20.0 ft.

CONTRACTOR:	Technical Drilling Services, Inc.	BORING LOCATION:	See Attached Figure	DATE START:	May 6, 2021
FOREMAN:	Darwin Newton	ADVANCE METHOD:	Rotary Wash Drilling	DATE FINISH:	May 6, 2021
LOGGED BY:	A. Naslas	AUGER DIAMETER:	N/A	GROUND EL:	468.0 ± (NAVD88)
CHECKED BY:	C. Conlee, P.E.	SUPPORT CASING:	Driven Flush-Joint Casing (4" ID)	FINAL DEPTH:	20.0 ft.
EQUIPMENT:	CME 550, Truck Mounted	CORING METHOD:	N/A	GRID COORDS:	N/A
SPT HAMMER:	Automatic (140-lb.)	BACKFILL MATERIAL:	Drill Cuttings and Asphalt Patch	GRID SYSTEM:	N/A



CONTRACTOR:	Technical Drilling Services, Inc.	BORING LOCATION:	See Attached Figure	DATE START:	May 6, 2021
FOREMAN:	Darwin Newton	ADVANCE METHOD:	Rotary Wash Drilling	DATE FINISH:	May 7, 2021
LOGGED BY:	A. Naslas	AUGER DIAMETER:	N/A	GROUND EL:	479.0 ± (NAVD88)
CHECKED BY:	C. Conlee, P.E.	SUPPORT CASING:	Driven Flush-Joint Casing (4" ID)	FINAL DEPTH:	6.6 ft.
EQUIPMENT:	CME 550, Truck Mounted	CORING METHOD:	N/A	GRID COORDS:	N/A
SPT HAMMER:	Automatic (140-lb.)	BACKFILL MATERIAL:	Drill Cuttings and Asphalt Patch	GRID SYSTEM:	N/A

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	PID MEASUREMENT, PPM	GEOTECHNICAL TEST DATA				STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS	
						10	20	30					40
					25	50	75	100					
Note: Values in brackets preceeding a remark indicate depth below ground surface (in feet) corresponding to the remark.													
				0.0						Asphalt- 10 inches.		[0.8 - 6.0] Vacuum Excavation.	
										Silty sand with gravel (SM) - Brown; moist; some fine to coarse SAND, some non plastic fines, little fine to coarse gravel. [FILL]	474	[5.5 - 6.5] Concrete in wash water.	
5												Abandon hole due to unknown obstruction. Exploration ended at 6.6 ft.	
10											469		
15											464		
20											459		
25											454		

GUIDE TO SUBSURFACE EXPLORATION LOGS



INDEX SHEET 1 GENERAL INFORMATION

GENERAL NOTES AND USE OF LOGS

- 1.) Explorations were made by ordinary and conventional methods and with care adequate for Weston & Sampson's study and/or design purposes. The exploration logs are part of a specific report prepared by Weston & Sampson for the referenced project and client, and are an integral part of that report. Information and interpretations are subject to the explanations and limitations stated in the report. Weston & Sampson is not responsible for any interpretations, assumptions, projections, or interpolations made by others.
- 2.) Exploration logs represent general conditions observed at the point of exploration on the date(s) stated. Boundary lines separating soil and rock layers (strata) represent approximate boundaries only and are shown as solid lines where observed and dashed lines where inferred based on drilling action. Actual transitions may be gradual and changes may occur over time.
- 3.) Soil and rock descriptions are based on visual-manual examination of recovered samples, direct observation in test pits (when permissible), and laboratory testing (when conducted).
- 4.) Water level observations were made at the times and under the conditions stated. Fluctuations should be expected to vary with seasons and other factors. Use of fluids during drilling may affect water level observations. The absence of water level observations does not necessarily mean the exploration was dry or that subsurface water will not be encountered during construction.
- 5.) Standard split spoon samplers may not recover particles with any dimension larger than 1-3/8 inches. Reported gravel conditions or poor sample recovery may not reflect actual in-situ conditions.
- 6.) Sections of this guide provide a general overview of Weston & Sampson's practices and procedures for *identifying* and *describing* soil and rock. These procedures are predominantly based on ASTM D2488, *Standard Practice for Description and Identification of Soils (Visual-Manual Procedures)*, the International Society of Rock Mechanics (ISRM) standards, and the *Engineering Geology Field Manual* published by the Bureau of Reclamation. Not all aspects of this guide relating to description and identification procedures of soil and rock may be applicable in all circumstances.

SAMPLER GRAPHICS

- Split Spoon (Standard)
2" OD, 1-3/8" ID
- Split Spoon (Oversize)
3" OD, 2-3/8" ID
- Shelby or Piston Tube
3" OD, 2-7/8" ID
- Double-Tube Rock Core Barrel
2" Core Diameter
- Direct Push with Acetate Liner
Various Liner Sizes
- Auger Sample
(from cuttings or hand auger)
- Grab Sample
(manual, from discrete point)
- Composite Sample
(multiple grab samples)

WELL GRAPHICS

- Cement concrete seal around casing or riser pipe
- Bentonite seal around casing or riser pipe
- Cement grout seal around casing or riser pipe
- Soil backfill around riser pipe or beneath screen
- Gravel backfill around screen or riser pipe
- Sand backfill around screen or riser pipe (filter sand)
- Solid-wall riser; Sch. 40 PVC, 1" ID unless noted otherwise
- Slotted screen; Sch. 40 PVC, 1" ID with machined slots

CAVING / SEEPAGE TERMS

The following caving and/or seepage terms may appear on a test pit log.

Caving Term	Criteria
Minor.....	less than 1 cubic ft.
Moderate.....	1 to 3 cubic ft.
Severe.....	greater than 3 cubic ft.

Seepage Term	Criteria
Slow.....	less than 1 gpm
Moderate.....	1 to 3 gpm
Fast.....	greater than 3 gpm

KEY TO WATER LEVELS

- Observed in exploration during advancement.
- Measured in exploration at completion, prior to backfilling or well installation.
- Measured in exploration after the stated stabilization period, prior to backfilling, or in well installation if noted.

DEFINITIONS OF COMMON TERMS

Sample Recovery Ratio - The length of material recovered in a drive or push type sampler over the length of sampler penetration, in inches (e.g. 18/24).

Standard Penetration Test (SPT) - An in-situ test where a standard split-spoon sampler is driven a distance of 12 or 18 inches (after an initial 6-inch seating interval) using a 140-lb. hammer falling 30 inches for each blow.

SPT Blows - The number of hammer blows required to drive a split-spoon sampler each consecutive 6-inch interval during a *Standard Penetration Test*. If no discernable advancement of a split spoon sampler is made after 50 consecutive hammer blows, 50/X indicates *sampler refusal* and is the number of blows required to drive the sampler X inches.

SPT N-Value (N) - The uncorrected blow count representation of a soil's penetration resistance over a 12-inch interval after an initial 6-in. seating interval, reported in blows per foot (bpf). The N-value is correlated to soil engineering properties.

Auger Refusal - No discernable advancement of the auger over a period of 5 minutes with full rig down pressure applied.

Casing Refusal (Driven) - Casing penetration of less than 6 inches after a minimum 50 blows of a drop hammer weighing 300 lbs. or a minimum 100 blows of a drop hammer weighing 140 lbs.

PID Measurement - A measurement (electronic reading) taken in the field using a photoionization detector (PID) to detect the presence of volatile organic compounds in a soil sample. Values are reported as benzene equivalent units in parts per million (ppm) unless noted otherwise.

Rock Quality Designation (RQD) - A qualitative index measure of the degree of jointing and fracture of a rock core taken from a borehole. The RQD is defined as the sum length of solid core pieces 4 inches or longer divided by the run (cored) length, expressed as a percentage. Higher RQD values may indicate fewer joints and fractures in the rock mass.

Fill (Made Ground) - A deposit of soil and/or artificial waste materials that has been placed or altered by human processes.

LABORATORY TESTS AND FIELD MEASUREMENTS

MC.....	Moisture Content	IC.....	1D Incremental Consolidation
OC.....	Organic Content	VS.....	Laboratory Vane Shear
PL.....	Plastic Limit	US.....	Unconfined Compression
LL.....	Liquid Limit	TC.....	Triaxial Compression
GC.....	Gravel Content	PP.....	Pocket (Hand) Penetrometer
SC.....	Sand Content	TV.....	Torvane (Hand Vane)
FC.....	Fines Content	PID.....	Photoionization Detector
DS.....	Direct Shear	FID.....	Flame Ionization Detector

BORING ADVANCEMENT METHODS

Hollow-Stem Auger Drilling - Utilizes continuous flight auger sections with hollow stems to advance the borehole. Drill rods and a plug are inserted into the auger stem to prevent the entrance of soil cuttings into the augers.

Rotary Wash Drilling - Utilizes downward pressure and rotary action applied to a non-coring bit while washing the cuttings to the surface using a circulating fluid injected down the drill rods. The borehole is supported with either steel casing or the drilling fluid. Where a casing is used, the borehole is advanced sequentially by driving the casing to the desired depth and then cleaning out the casing. The process of driving and cleaning the casing is commonly referred to as the 'drive-and-wash' technique.

Continuous Sampling - Includes a variety of methods and procedures during which the borehole is advanced via continuous recovery of soil samples. *Direct Push* sampling is a common method that uses static downward pressure combined with percussive energy to drive a steel mandrel into the ground at continuous intervals while recovering soil samples in disposable acetate liners.

Rock Coring - Utilizes downward pressure and rotary action applied to a core barrel equipped with a diamond-set or tungsten carbide coring bit. During conventional coring, the entire barrel is retrieved from the hole upon completion of a core run. Wireline coring allows for removal of the inner barrel assembly containing the actual core while the drill rods and outer barrel remain in the hole. Various types and sizes of core barrels and bits are used.

GUIDE TO SUBSURFACE EXPLORATION LOGS



INDEX SHEET 2 SOIL DESCRIPTION

SOIL CONSTITUENTS

Naturally occurring soils consist of one or more of the following matrix constituents defined in terms of particle size.

Constituent	U.S. Sieve Size	Observed Size (in.)
Gravel (Coarse)	3/4 in. - 3 in.	3/4 - 3
Gravel (Fine)	No. 4 - 3/4 in.	1/5 - 3/4
Sand (Coarse)	No. 10 - No. 40	1/16 - 1/5
Sand (Medium)	No. 40 - No. 10	1/64 - 1/16
Sand (Fine)	No. 200 - No. 40	1/300 - 1/64
Fines (Silt or Clay)	Smaller than No. 200	Less than 1/300

SOIL IDENTIFICATION

Soil identification refers to the grouping of soils with similar physical characteristics into a category defined by a **group name** and corresponding **group symbol** based on estimation of the matrix soil constituents to the nearest 5% and simple manual tests. Proportions of cobbles, boulders, and other non-matrix soil materials are not considered during this procedure but are included in the overall soil description if observed or thought to be present. Refer to the following descriptions and tables adapted from ASTM D2488.

Coarse-Grained Soil - Coarse-grained soils contain fewer than 50% fines and are identified based on the following table.

Primary Constituent	Fines Percent	Type of Fines and Gradation	Group Symbol	Group Name ⁽¹⁾
GRAVEL % gravel > 10% % sand	≤ 5%	well graded	GW	Well graded gravel
		poorly graded	GP	Poorly graded gravel
	15% to 45%	clayey well graded	GW-GC	Well graded gravel with clay
		clayey poorly graded	GP-GC	Poorly graded gravel with clay
		silty well graded	GW-GM	Well graded gravel with silt
		silty poorly graded	GP-GM	Poorly graded gravel with silt
SAND % sand ≥ 10% % gravel	≤ 5%	clay fines	GC	Clayey gravel
		silt fines	GM	Silty gravel
	15% to 45%	well graded	SW	Well graded sand
		poorly graded	SP	Poorly graded sand
		clayey well graded	SW-SC	Well graded sand with clay
		clayey poorly graded	SP-SC	Poorly graded sand with clay
		silty well graded	SW-SM	Well graded sand with silt
		silty poorly graded	SP-SM	Poorly graded sand with silt
	15% to 45%	clay fines	SC	Clayey sand
		silt fines	SM	Silty sand

⁽¹⁾ If soil is a gravel and contains 15% or more sand, add "with sand" to the group name. If soil is a sand and contains 15% of more gravel, add "with gravel" to the group name.

Inorganic Fine-Grained Soil - Fine-grained soils contain 50% or more fines and are identified based on the following table.

Plasticity Criteria	Dry Strength	Coarse Fraction S = Sand, G = Gravel	Group Symbol	Group Name ⁽¹⁾
Medium	Medium to high	< 15% S + G	CL	Lean clay
		≥ 30% % S ≥ % G	CL	Sandy lean clay
		S + G % S < % G	CL	Gravelly lean clay
Non-plastic	None to low	< 15% S + G	ML	Silt
		≥ 30% % S ≥ % G	ML	Sandy silt
		S + G % S < % G	ML	Gravelly silt
High	High to very high	< 15% S + G	CH	Fat clay
		≥ 30% % S ≥ % G	CH	Sandy fat clay
		S + G % S < % G	CH	Gravelly fat clay
Low to Medium	Low to medium	< 15% S + G	MH	Elastic silt
		≥ 30% % S ≥ % G	MH	Sandy elastic silt
		S + G % S < % G	MH	Gravelly elastic silt

⁽¹⁾ If soil contains 15% to 25% sand or gravel, add "with sand" or "with gravel" to the group name.

Organic Fine-Grained Soil - Fine-grained soils that contain enough organic particles to influence the soil properties are identified as Organic Soil and assigned the group symbol OL or OH.

Highly Organic Soil (Peat) - Soils composed primarily of plant remains in various stages of decomposition are identified as Peat and given the group symbol PT. Peat usually has an organic odor, a dark brown to black color, and a texture ranging from fibrous (original plant structure intact or mostly intact) to amorphous (plant structure decomposed to fine particles).

SOIL DESCRIPTION

Soils are described in the following general sequence. Deviations may occur in some instances.

Identification Components

(1) Group Name and Group Symbol

Description Components

- (2) Consistency (Fine-Grained) or Apparent Density (Coarse-Grained)
- (3) Color (*note, the term "to" may be used to indicate a gradational change*)
- (4) Soil Moisture
- (5) Matrix Soil Constituents (Gravel, Sand, Fines)
 - ↳ Proportion (*by weight*), particle size, plasticity of fines, angularity, etc.
- (6) Non-Matrix Soil Materials and Proportions (*by volume*)
- (7) Other Descriptive Information (Unusual Odor, Structure, Texture, etc.)
- (8) [Geologic Formation Name or Soil Survey Unit]

SPT N-VALUE CORRELATIONS

Consistency	SPT N-Value	Apparent Density	SPT N-Value
Very soft	0 - 2	Very loose	0 - 5
Soft	2 - 4	Loose	5 - 10
Medium stiff	4 - 8	Medium dense	10 - 30
Stiff	8 - 15	Dense	30 - 50
Very stiff	15 - 30	Very dense	> 50
Hard	> 30		

SOIL MOISTURE

Dry..... Apparent absence of moisture; dry to the touch.
Moist..... Damp but no visible water.
Wet..... Visible free water; saturated.

PROPORTIONS / PERCENTAGES

Proportions of gravel, sand, and fines (excluding cobbles, boulders, and other constituents) are stated in the following terms indicating a range of percentages by weight (to nearest 5%) of the minus 3-in. soil fraction and add up to 100%.

Proportions of cobbles, boulders, and other non-matrix soil materials including artificial debris, roots, plant fibers, etc. are stated in the following terms indicating a range of percentages by volume (to the nearest 5%) of the total soil.

Mostly	50% - 100%	Numerous	40% - 50%
Some	30% - 45%	Common	25% - 35%
Little	15% - 25%	Occasional	10% - 20%
Few	5% - 10%	Trace	Less than 5%
Trace	Less than 5%		

PLASTICITY (FINES ONLY)

Non-plastic..... Dry specimen ball falls apart easily. Cannot be rolled into thread at any moisture content.

Low..... Dry specimen ball easily crushed with fingers. Can be rolled into 1/8-in. thread with some difficulty.

Medium..... Difficult to crush dry specimen ball with fingers. Easily rolled into 1/8-in. thread.

High..... Cannot crush dry specimen ball with fingers. Easily rolled and re-rolled into 1/8-in. thread.

COBBLES AND BOULDERS

Cobbles - Particles of rock that will pass a 12-in. square opening and be retained on a 3-in. sieve.

Boulders - Particles of rock that will not pass a 12-in. square opening.

Note: Where the percentage (by volume) of cobbles and/or boulders cannot be accurately or reliably estimated, the terms "with cobbles", "with boulders", or "with cobbles and boulders" may be used to indicate observed or inferred presence.

GUIDE TO SUBSURFACE EXPLORATION LOGS



INDEX SHEET 3 ROCK DESCRIPTION

ROCK DEFINITION

Where reported on an exploration log, *rock* is defined as any naturally formed aggregate of mineral matter occurring in large masses or fragments. This definition of rock should not be taken as a replacement for any definitions relating to rock and/or rock excavation defined in construction documents. Intensely weathered or decomposed rock that is friable and can be reduced to gravel size particles or smaller by normal hand pressure is identified and described as soil. Poorly indurated formational materials which display both rock-like and soil-like properties are identified and described as rock followed by the soil description. In such cases, the term "poorly indurated" or "weakly cemented" is added to the rock name (e.g. weakly cemented sandstone).

ROCK IDENTIFICATION

Rock is identified by a combination of *rock type* (igneous, metamorphic, or sedimentary) followed by the *rock name* (e.g. granite, schist, sandstone).

ROCK DESCRIPTION

Rock descriptions are presented in the following general sequence. The detail of description is dictated by the complexity and objectives of the project.

Identification Components

(1) Rock Type and Name

Description Components

- (2) Rock Grain Size (*for clastic sedimentary rock*)
- (3) Crystal Size (*for igneous and metamorphic rock*)
- (4) Bedding Spacing (*for sedimentary rock*)
- (5) Color
- (6) Hardness and Weathering Descriptors
- (7) Fracture Density
- (8) [Geologic Formation Name]

ROCK QUALITY DESIGNATION

$$RQD (\%) = \frac{\sum \text{Length of intact core pieces} \geq 4 \text{ inches}}{\text{Total length of core run (inches)}} \times 100$$

The RQD should correlate with the fracture density in most cases. Higher RQD values generally indicate fewer joints and fractures.

GRAIN / CRYSTAL SIZE

Grain Size for Clastic Sedimentary Rock

The names of clastic sedimentary rocks are generally based on their predominant clast or grain size (e.g. fine sandstone, medium sandstone, coarse gravel conglomerate, cobble conglomerate, siltstone, claystone).

Crystal Size for Igneous and Metamorphic Rock

Grain Size Description	Average Crystal Size (in.)
Very coarse grained (pegmatitic)	Greater than or equal to 3/8
Coarse-grained	Between 3/16 and 3/8
Medium-grained	Between 1/32 and 3/16
Fine-grained	Between 1/250 and 1/32
Aphanitic	Less than or equal to 1/250

BEDDING SPACING

Bedding Description	Thickness / Spacing
Massive	Less than 10 ft.
Very thickly bedded	3 ft. to 10 ft.
Thickly bedded	1 ft. to 3 ft.
Moderately bedded	4 in. to 1 ft.
Thinly bedded	1 in. to 4 in.
Very thinly bedded	1/4 in. to 1 in.
Laminated	Less than 1/4 in.

Note: Bedding is generally only applicable to sedimentary or bedded volcanic rocks.

HARDNESS

Hardness	Criteria
Extremely hard	Cannot be scratched with a pocketknife or sharp pick. Can only be chipped with repeated heavy hammer blows.
Very hard	Cannot be scratched with a pocketknife or sharp pick with difficulty. Breaks with repeated heavy hammer blows.
Hard	Can be scratched with a pocketknife or sharp pick with difficulty. Breaks with heavy hammer blows.
Moderately hard	Can be scratched with a pocketknife or sharp pick with light or moderate pressure. Breaks with moderate hammer blows.
Moderately soft	Can be grooved 1/16 in. deep with a pocketknife or sharp pick with moderate or heavy pressure. Breaks with light hammer blow or heavy manual pressure.
Soft	Can be grooved or gouged easily with a pocketknife or sharp pick. Breaks with light to moderate manual pressure.
Very soft	Can be readily indented, grooved, or gouged with fingernail, or carved with a pocketknife. Breaks with light manual pressure.

WEATHERING (INTACT ROCK)

Weathering Description	Discoloration and/or Oxidation	General Characteristics
Fresh	Body of rock and fracture surfaces are not discolored or oxidized.	Rock texture unchanged. Hammer rings when crystalline rocks are struck.
Slightly weathered	Discoloration or oxidation limited to surface of, or short distance from, fractures. Most surfaces exhibit minor to complete discoloration.	Rock texture preserved. Hammer rings when crystalline rocks are struck. Body of rock not weakened.
Moderately weathered	Discoloration or oxidation extends usually throughout. Fe-Mg minerals appear rusty. All fracture surfaces are discolored or oxidized.	Rock texture generally preserved. Hammer does not ring when rock is struck. Body of rock slightly weakened.
Intensely weathered	Discoloration or oxidation throughout. Feldspar and Fe-Mg minerals altered to clay to some extent. All fracture surfaces are discolored or oxidized and friable.	Rock texture altered by chemical disintegration. Can usually be broken with moderate to heavy manual pressure or by light hammer blow. Body of rock is significantly weakened.
Decomposed	Discoloration or oxidation throughout but resistant minerals such as quartz may be unaltered. All feldspar and Fe-Mg minerals are completely altered to clay.	Resembles a soil; partial or complete remnant rock structure may be preserved. Can be granulated by hand. Resistant minerals may present as stringers or dikes.

FRACTURE DENSITY

Description	Observed Fracture Density
Unfractured	No fractures
Very slightly fractured	Core lengths greater than 3 ft.
Slightly fractured	Core lengths mostly from 1 ft. to 3 ft.
Moderately fractured	Core lengths mostly from 4 in. to 1 ft.
Intensely fractured	Core lengths mostly from 1 in. to 4 in.
Very intensely fractured	Mostly chips and fragments

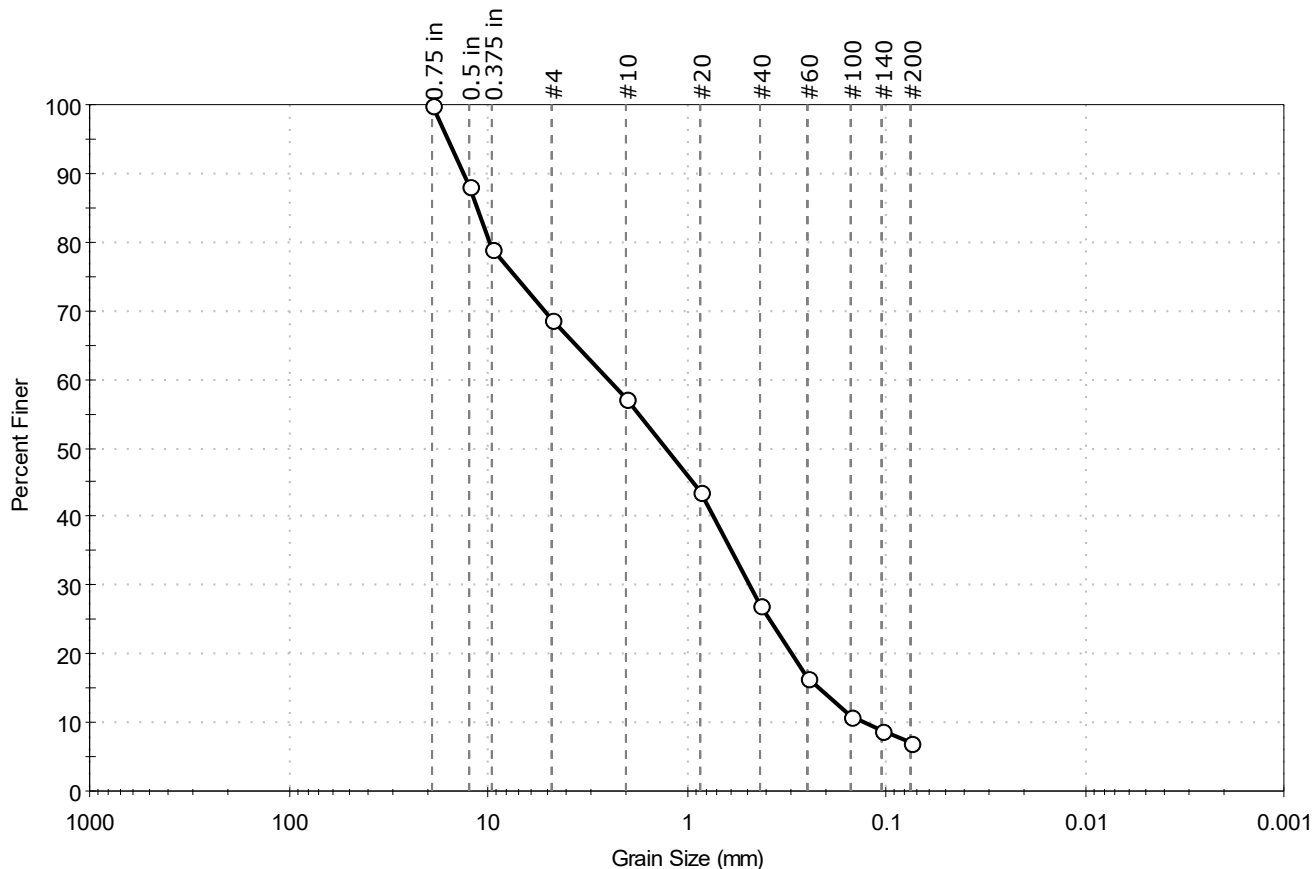
Note: Fracture density is based on the fracture spacing in recovered core, measured along the core axis (excluding mechanical breaks).

ATTACHMENT B

Laboratory Testing Results

Client:	Weston & Sampson Engineers		
Project:	Cambridge St Sewer Replacement		
Location:	Worcester, MA	Project No:	GTX-313795
Boring ID:	B-1	Sample Type:	jar
Sample ID:	S-2	Test Date:	06/16/21
Depth :	12 ft	Test Id:	621249
Test Comment:	---		
Visual Description:	Moist, light olive brown sand with silt and gravel		
Sample Comment:	---		

Particle Size Analysis - ASTM D6913



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	31.3	61.6	7.1

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	88		
0.375 in	9.50	79		
#4	4.75	69		
#10	2.00	57		
#20	0.85	44		
#40	0.42	27		
#60	0.25	16		
#100	0.15	11		
#140	0.11	9		
#200	0.075	7.1		

Coefficients

$D_{85} = 11.3200$ mm $D_{30} = 0.4787$ mm
 $D_{60} = 2.4677$ mm $D_{15} = 0.2198$ mm
 $D_{50} = 1.2716$ mm $D_{10} = 0.1287$ mm
 $C_u = 19.174$ $C_c = 0.722$

Classification

ASTM N/A

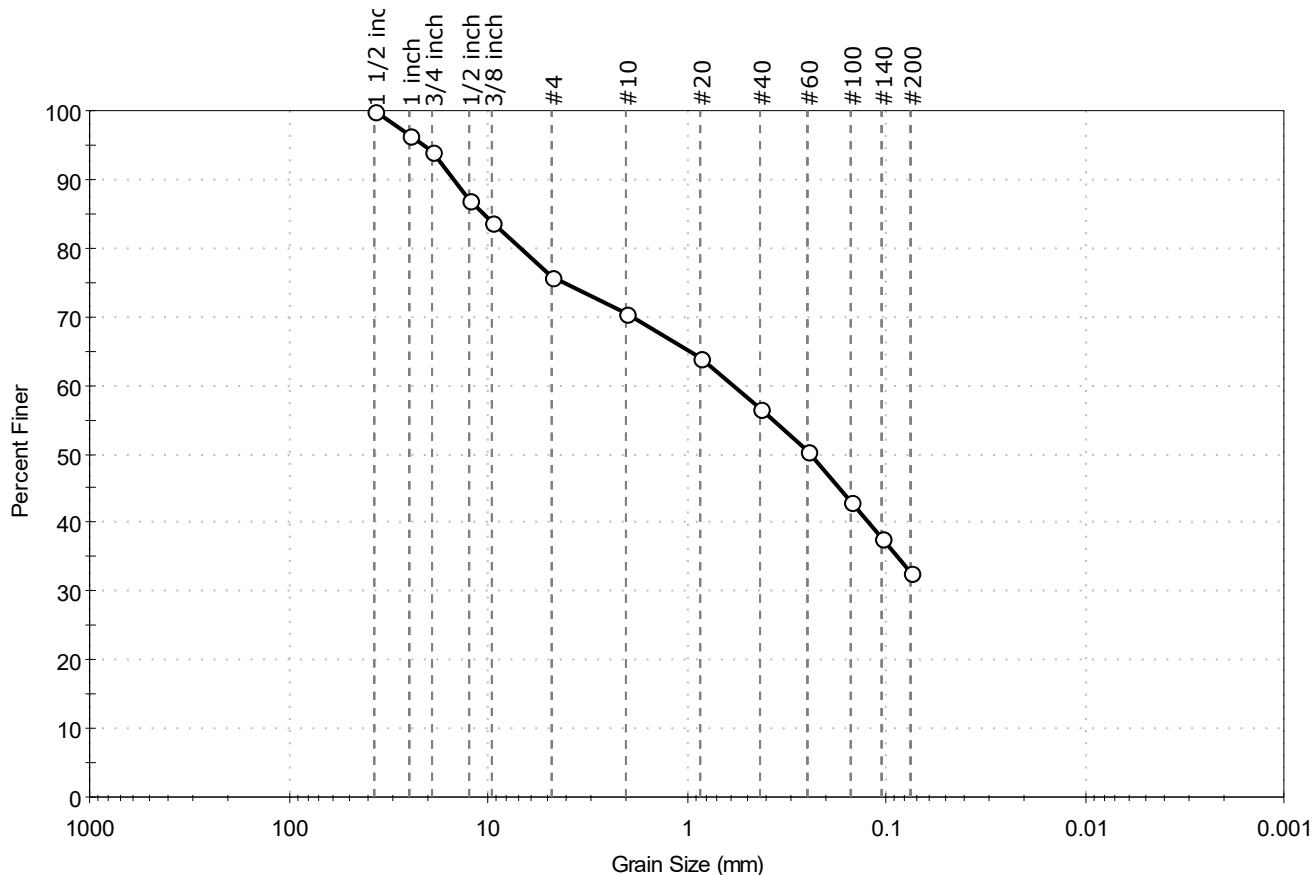
AASHTO Stone Fragments, Gravel and Sand (A-1-b (1))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR
 Sand/Gravel Hardness : HARD

Client:	Weston & Sampson Engineers		
Project:	Cambridge St Sewer Replacement		
Location:	Worcester, MA	Project No:	GTX-313795
Boring ID:	B-2	Sample Type:	bag
Sample ID:	G-1	Test Date:	06/16/21
Depth :	1.5-6 ft	Test Id:	621250
Test Comment:	---		
Visual Description:	Moist, brown silty sand with gravel		
Sample Comment:	---		

Particle Size Analysis - ASTM D6913



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	24.1	43.2	32.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 1/2 inch	37.50	100		
1 inch	25.00	97		
3/4 inch	19.00	94		
1/2 inch	12.50	87		
3/8 inch	9.50	84		
#4	4.75	76		
#10	2.00	70		
#20	0.85	64		
#40	0.42	57		
#60	0.25	50		
#100	0.15	43		
#140	0.11	38		
#200	0.075	33		

Coefficients

$D_{85} = 10.5112 \text{ mm}$ $D_{30} = \text{N/A}$
 $D_{60} = 0.5821 \text{ mm}$ $D_{15} = \text{N/A}$
 $D_{50} = 0.2444 \text{ mm}$ $D_{10} = \text{N/A}$
 $C_u = \text{N/A}$ $C_c = \text{N/A}$

Classification

ASTM N/A

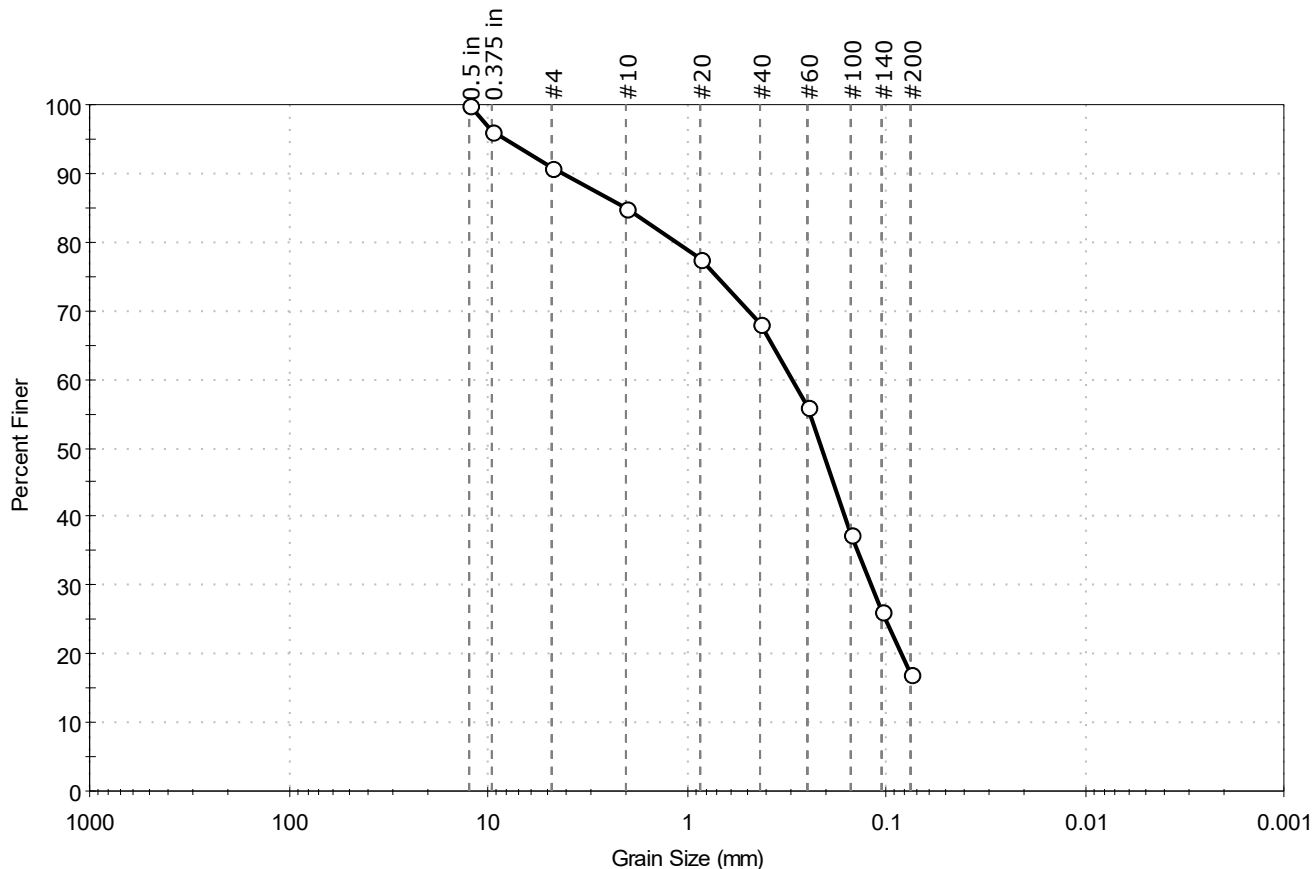
AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR
 Sand/Gravel Hardness : HARD

Client:	Weston & Sampson Engineers		
Project:	Cambridge St Sewer Replacement		
Location:	Worcester, MA	Project No:	GTX-313795
Boring ID:	B-2	Sample Type:	jar
Sample ID:	S-2	Test Date:	06/16/21
Depth :	12 ft	Test Id:	621251
Test Comment:	---		
Visual Description:	Moist, light yellowish brown silty sand		
Sample Comment:	---		

Particle Size Analysis - ASTM D6913



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	9.1	73.9	17.0

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.5 in	12.50	100		
0.375 in	9.50	96		
#4	4.75	91		
#10	2.00	85		
#20	0.85	78		
#40	0.42	68		
#60	0.25	56		
#100	0.15	37		
#140	0.11	26		
#200	0.075	17		

Coefficients

$D_{85} = 2.0217$ mm $D_{30} = 0.1193$ mm
 $D_{60} = 0.2978$ mm $D_{15} = \text{N/A}$
 $D_{50} = 0.2119$ mm $D_{10} = \text{N/A}$
 $C_u = \text{N/A}$ $C_c = \text{N/A}$

Classification

ASTM N/A

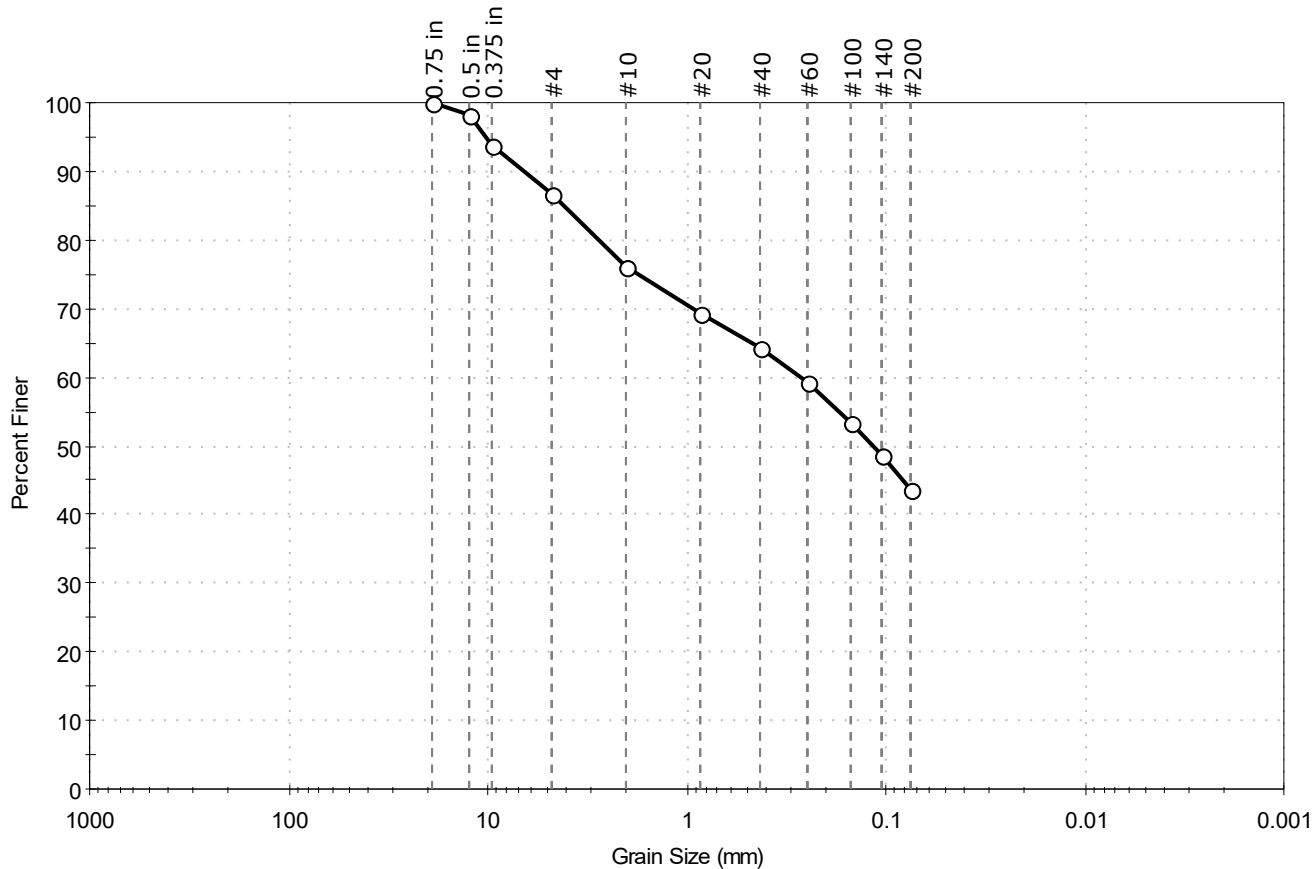
AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR
 Sand/Gravel Hardness : HARD

Client:	Weston & Sampson Engineers		
Project:	Cambridge St Sewer Replacement		
Location:	Worcester, MA	Project No:	GTX-313795
Boring ID:	B-3	Sample Type:	jar
Sample ID:	S-1	Test Date:	06/16/21
Depth :	9 ft	Test Id:	621252
Test Comment:	---		
Visual Description:	Moist, olive brown silty sand		
Sample Comment:	---		

Particle Size Analysis - ASTM D6913



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	13.1	43.3	43.6

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	98		
0.375 in	9.50	94		
#4	4.75	87		
#10	2.00	76		
#20	0.85	69		
#40	0.42	64		
#60	0.25	59		
#100	0.15	53		
#140	0.11	49		
#200	0.075	44		

Coefficients

D ₈₅ = 4.0813 mm	D ₃₀ = N/A
D ₆₀ = 0.2667 mm	D ₁₅ = N/A
D ₅₀ = 0.1169 mm	D ₁₀ = N/A
C _u = N/A	C _c = N/A

Classification

ASTM N/A

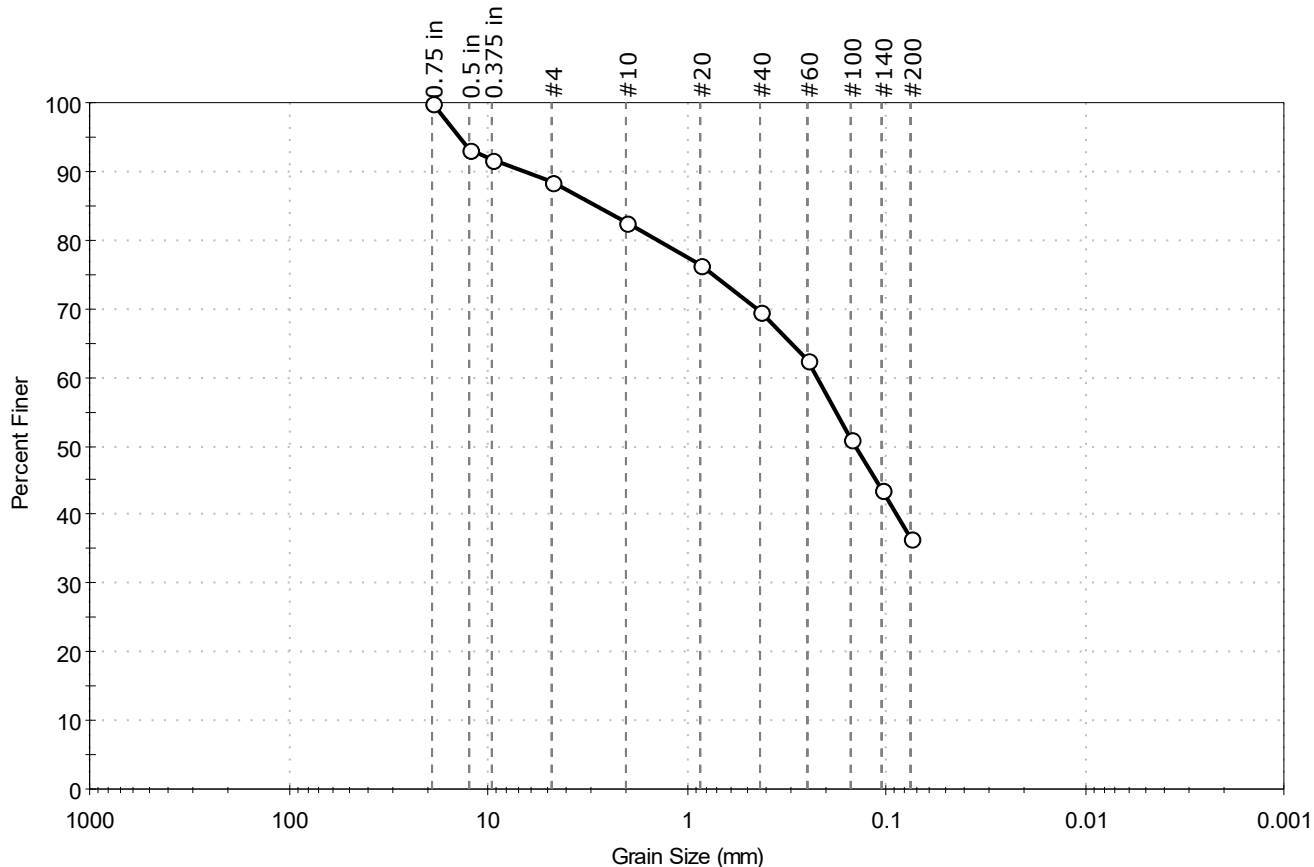
AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR
Sand/Gravel Hardness : HARD

Client:	Weston & Sampson Engineers		
Project:	Cambridge St Sewer Replacement		
Location:	Worcester, MA	Project No:	GTX-313795
Boring ID:	B-4	Sample Type:	jar
Sample ID:	S-2	Test Date:	06/16/21
Depth :	11 ft	Test Id:	621253
Test Comment:	---		
Visual Description:	Moist, light olive silty sand		
Sample Comment:	---		

Particle Size Analysis - ASTM D6913



% Cobble	% Gravel	% Sand	% Silt & Clay Size
—	11.6	51.7	36.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	93		
0.375 in	9.50	92		
#4	4.75	88		
#10	2.00	82		
#20	0.85	76		
#40	0.42	70		
#60	0.25	63		
#100	0.15	51		
#140	0.11	44		
#200	0.075	37		

Coefficients

D ₈₅ = 2.8989 mm	D ₃₀ = N/A
D ₆₀ = 0.2224 mm	D ₁₅ = N/A
D ₅₀ = 0.1425 mm	D ₁₀ = N/A
C _u = N/A	C _c = N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

Sand/Gravel Particle Shape : ANGULAR
Sand/Gravel Hardness : HARD

ATTACHMENT C

"Important Information about This Geotechnical-Engineering Report," by GBA, Inc.

Important Information about This Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, you can benefit from a lowered exposure to problems associated with subsurface conditions at project sites and development of them that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed herein, contact your GBA-member geotechnical engineer. Active engagement in GBA exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Understand the Geotechnical-Engineering Services Provided for this Report

Geotechnical-engineering services typically include the planning, collection, interpretation, and analysis of exploratory data from widely spaced borings and/or test pits. Field data are combined with results from laboratory tests of soil and rock samples obtained from field exploration (if applicable), observations made during site reconnaissance, and historical information to form one or more models of the expected subsurface conditions beneath the site. Local geology and alterations of the site surface and subsurface by previous and proposed construction are also important considerations. Geotechnical engineers apply their engineering training, experience, and judgment to adapt the requirements of the prospective project to the subsurface model(s). Estimates are made of the subsurface conditions that will likely be exposed during construction as well as the expected performance of foundations and other structures being planned and/or affected by construction activities.

The culmination of these geotechnical-engineering services is typically a geotechnical-engineering report providing the data obtained, a discussion of the subsurface model(s), the engineering and geologic engineering assessments and analyses made, and the recommendations developed to satisfy the given requirements of the project. These reports may be titled investigations, explorations, studies, assessments, or evaluations. Regardless of the title used, the geotechnical-engineering report is an engineering interpretation of the subsurface conditions within the context of the project and does not represent a close examination, systematic inquiry, or thorough investigation of all site and subsurface conditions.

Geotechnical-Engineering Services are Performed for Specific Purposes, Persons, and Projects, and At Specific Times

Geotechnical engineers structure their services to meet the specific needs, goals, and risk management preferences of their clients. A geotechnical-engineering study conducted for a given civil engineer

will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client.

Likewise, geotechnical-engineering services are performed for a specific project and purpose. For example, it is unlikely that a geotechnical-engineering study for a refrigerated warehouse will be the same as one prepared for a parking garage; and a few borings drilled during a preliminary study to evaluate site feasibility will not be adequate to develop geotechnical design recommendations for the project.

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project or purpose;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, the reliability of a geotechnical-engineering report can be affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If you are the least bit uncertain about the continued reliability of this report, contact your geotechnical engineer before applying the recommendations in it. A minor amount of additional testing or analysis after the passage of time – if any is required at all – could prevent major problems.*

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read the report in its entirety. Do not rely on an executive summary. Do not read selective elements only. *Read and refer to the report in full.*

You Need to Inform Your Geotechnical Engineer About Change

Your geotechnical engineer considered unique, project-specific factors when developing the scope of study behind this report and developing the confirmation-dependent recommendations the report conveys. Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the elevation, configuration, location, orientation, function or weight of the proposed structure and the desired performance criteria;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project or site changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept*

responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.

Most of the “Findings” Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site’s subsurface using various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing is performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgement to form opinions about subsurface conditions throughout the site. Actual site-wide subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team through project completion to obtain informed guidance quickly, whenever needed.

This Report’s Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, they are not final, because the geotechnical engineer who developed them relied heavily on judgement and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* exposed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals’ misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a continuing member of the design team, to:

- confer with other design-team members;
- help develop specifications;
- review pertinent elements of other design professionals’ plans and specifications; and
- be available whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction-phase observations.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note*

conspicuously that you’ve included the material for information purposes only. To avoid misunderstanding, you may also want to note that “informational purposes” means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. This happens in part because soil and rock on project sites are typically heterogeneous and not manufactured materials with well-defined engineering properties like steel and concrete. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled “limitations,” many of these provisions indicate where geotechnical engineers’ responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a “phase-one” or “phase-two” environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually provide environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not obtained your own environmental information about the project site, ask your geotechnical consultant for a recommendation on how to find environmental risk-management guidance.

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, the engineer’s services were not designed, conducted, or intended to prevent migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, *proper implementation of the geotechnical engineer’s recommendations will not of itself be sufficient to prevent moisture infiltration.* Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. *Geotechnical engineers are not building-envelope or mold specialists.*



GEOPROFESSIONAL
BUSINESS
ASSOCIATION

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e-mail: info@geoprofessional.org www.geoprofessional.org

APPENDIX E

ENVIRONMENTAL SUMMARY MEMORANDUM

MEMORANDUM

TO: Kara Keleher, PE – Weston & Sampson
Aaron Souza - Weston & Sampson
Frank Occhipinti, PE – Weston & Sampson

FROM: Sarah Ruizzo – Weston & Sampson
Sean Healey, LSP – Weston & Sampson

DATE: August 10, 2021

SUBJECT: Environmental Summary Memorandum
Cambridge Street Sewer Replacement Project – Worcester, Massachusetts

Weston & Sampson Engineers, Inc. (Weston & Sampson) has performed a review of available environmental reports and a limited subsurface investigation for the proposed Cambridge Street Sewer Replacement project in Worcester, Massachusetts (the project). The proposed project includes the replacement of approximately 650 linear feet of 60-inch diameter pipe sewer along Cambridge Street between Southbridge Street and Washburn Street, installation of approximately 1,250 linear feet of cured-in-place 48x72-inch pipe lining within the existing sewer pipe, and installation and replacement of five manholes. The project area begins approximately 200 feet west of the Woodward Street intersection, near the existing railway line, and ends near the intersection of Washburn Street, as shown in Figure 1 – Site Locus. The purpose of the subsurface investigation was to assess soil and groundwater conditions within the proposed project work area for potential environmental impacts which could be encountered during construction.

Initial Environmental Review

Weston & Sampson performed an environmental review of the project area in March 2021. The review included a review of Massachusetts Department of Environmental Protection (DEP) listed oil and/or hazardous release sites and storage facilities, and a review of available aerial images, topographic maps, Sanborn Fire Insurance maps, and city directories of the project area and adjacent properties. Historical records indicate that the project area was developed as a roadway prior to 1886. Review of the history of adjacent properties identified concerns including historic use as an automotive repair shop and drycleaner. Based on the findings of the review, it was recommended that design phase assessment be performed to assess soil and groundwater conditions for plans and specification for soil and groundwater management during construction. Weston & Sampson recommended that the assessment include the following:

- Assessment of potential fill in the vicinity of Verizon manhole 6408A located at intersection of Cambridge Street and Southbridge Street;
- Assessment of groundwater downgradient of the former automotive repair shop at 656 Southbridge Street and within project limits;
- Assessment of groundwater downgradient of the former dry cleaner at 500 Cambridge Street and within project limits; and

- Characterization of soil and groundwater for proper management.

Weston & Sampson's original scope of work (March 2019) included collecting soil samples from 5 geotechnical soil borings for field screening and laboratory analysis to evaluate potential impacts and develop surplus soil management options. It should be noted that a deviation from the scope occurred, and all soil samples submitted for laboratory analysis were collected from the 1 to 3 foot and 2 to 6 foot intervals.

Soil Boring / Monitoring Well Installation

Between May 4 and 7, 2021, soil sampling was performed during the advancement of geotechnical borings. A total of 5 soil borings (B-1 through B-5) were advanced within the project limits. Vacuum excavations were performed at each of the borings in the upper 6 to 9 feet to pre-clear for potential utilities. Soil samples were collected within the borings between 1 and 6 feet below grade by hand or with a post-hole digger. The samples were not collected from the vacator spoils. The borings were fully advanced via hollow stem auger drilling techniques and using rotary wash drilling methods. Boring locations are shown in Figure 2 (attached). Boring B-1 through B-4 were advanced to depths ranging from approximately 20 to 25 feet below grade. Boring B-5 was advanced to approximately 7 feet below grade where boring refusal was encountered. Two of the borings (B-1 and B-3) were completed as groundwater monitoring wells (MW-1 and MW-2). The monitoring wells were installed with a 2-inch diameter PVC screen and riser and finished with a flush-mounted road box.

The following explorations were performed to assess the areas of concern identified in the environmental review:

- B-1/MW-1, B-2, B-4, and B-5: The borings were advanced to assess overall characterization of soil and groundwater that will be managed as part of the project.
- B-3/MW-2: Advanced to assess potential fill in the vicinity of Verizon manhole 6408A, groundwater downgradient of the former automotive repair shop (656 Southbridge Street), and overall characterization of soil and groundwater that will be managed as part of the project.

A boring was not advanced to assess potential impacts from the historic drycleaner that was located at 500 Cambridge Street. The current project area is along Cambridge Street with pipe replacement on the eastern end and cured-in-Place-Pipe (CIPP) lining on the west end, therefore the boring proposed in Southbridge Street was not advanced. The drycleaner is expected to be hydraulically downgradient of the project area and therefore is not a concern.

Soil Sampling, Field Screening, and Analysis

Subsurface conditions encountered below the asphalt concrete pavement generally consisted of fill above native sand over glacial till. Fill was encountered below the concrete pavement at each boring location and extended to depths ranging from 4.8 to 7.3 feet below grade. The fill generally consisted of sand with little to some non-plastic fines and little gravel. Groundwater was encountered during drilling at depths ranging from 10 to 13 feet below grade. Boring logs are included in Attachment A.

Soil samples were logged by a Weston & Sampson geologist and field screened for visual and olfactory evidence of impacts. Visual and olfactory field screening did not identify impacts. Each soil sample was also field screened with a photoionization detector (PID) for total organic vapors (TOVs) using the jar headspace method. TOVs were not detected above 0.2 parts per million by volume (ppmv).

Soil samples were selected from the borings for laboratory analysis to evaluate potential impacts and develop surplus soil management options. The samples identified as B-1 (2-6'), B-2 (2-6'), B-3 (1-3'), B-4 (2-6'), and B-

5 (2-6') were submitted to ESS Laboratory for analysis of the DEP's COMM-97 disposal characterization parameters with Massachusetts Contingency Plan (MCP) 14 Metals. See Table 1 for a summary of soil analytical results.

As shown in Table 1, analysis of soil sample B-4 (2-6') identified total petroleum hydrocarbons (TPH) and semi-volatile organic compounds (SVOCs) (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, 2-methylnaphthalene, and phenanthrene) at concentrations above the applicable DEP Reportable Concentration (RCS-1) standards. TPH was also detected above In-State Massachusetts Unlined Landfill Reuse Criteria. Based on these results, soil sample B-4 (2-6') was submitted to ESS Laboratory for TPH Fingerprint analysis. Laboratory analytical results identified the detected petroleum as creosote or coal tar. The laboratory analytical report is included in Attachment B.

Groundwater Sampling and Analysis

On June 4, 2021, Weston & Sampson collected groundwater samples from newly installed monitoring wells MW-1 and MW-2. The samples were collected via low flow sampling techniques. The groundwater samples were submitted to ESS Laboratory for Environmental Protection Agency's (EPAs) Remediation General Permit (RGP) discharge parameters using the methods specified under the RGPs Appendix VII. See Table 2 for a summary of groundwater analytical results.

As shown in Table 2, chloride, phenols, dissolved iron, and total iron were detected above RGP parameters in monitoring well MW-1. Concentrations of chloride, total suspended solids (TSS), dissolved metals (iron, nickel, and zinc), and total metals (arsenic, chromium III, copper, iron, lead, nickel, and zinc) were detected in monitoring well MW-2 at concentrations above RGP parameters. All detections in monitoring wells MW-1 and MW-2 were below the applicable DEP Reportable Concentrations (RCGW-2) standards. The laboratory analytical report is included in Attachment B.

SUMMARY OF FINDINGS AND RECOMMENDATIONS

Based on the results of the subsurface investigation the following findings and recommendations are provided:

- TPH and SVOCs were detected in soil sample B-4 (2-6') at concentrations above RCS-1 criteria. No RCGW-2 exceedances were identified in groundwater. The soil will need to be managed under the Utility-Related Abatement Measure (URAM) provision of the MCP.
- TPH was detected in soil sample B-4 (2-6') above In-State Massachusetts Unlined Landfill Reuse Criteria. Site construction excavation may encounter residual petroleum impacted soil within project limits. Specifications for handling these soils should be included in project design.
- Chloride, phenols, TSS, dissolved metals, and total metals were detected at concentrations in groundwater above RGP parameters. Water that accumulates in on-Site excavations and trenches should be handled in accordance with state, local, and federal regulations.

Attachments:

Figures	Figure 1 – Site Locus
	Figure 2 – Boring Location Plan
Tables	Table 1 – Summary of Soil Analytical Results
	Table 2 – Summary of Groundwater Analytical Results
Attachment A	Boring and Monitoring Well Construction Logs
Attachment B	Laboratory Analytical Reports

Figures

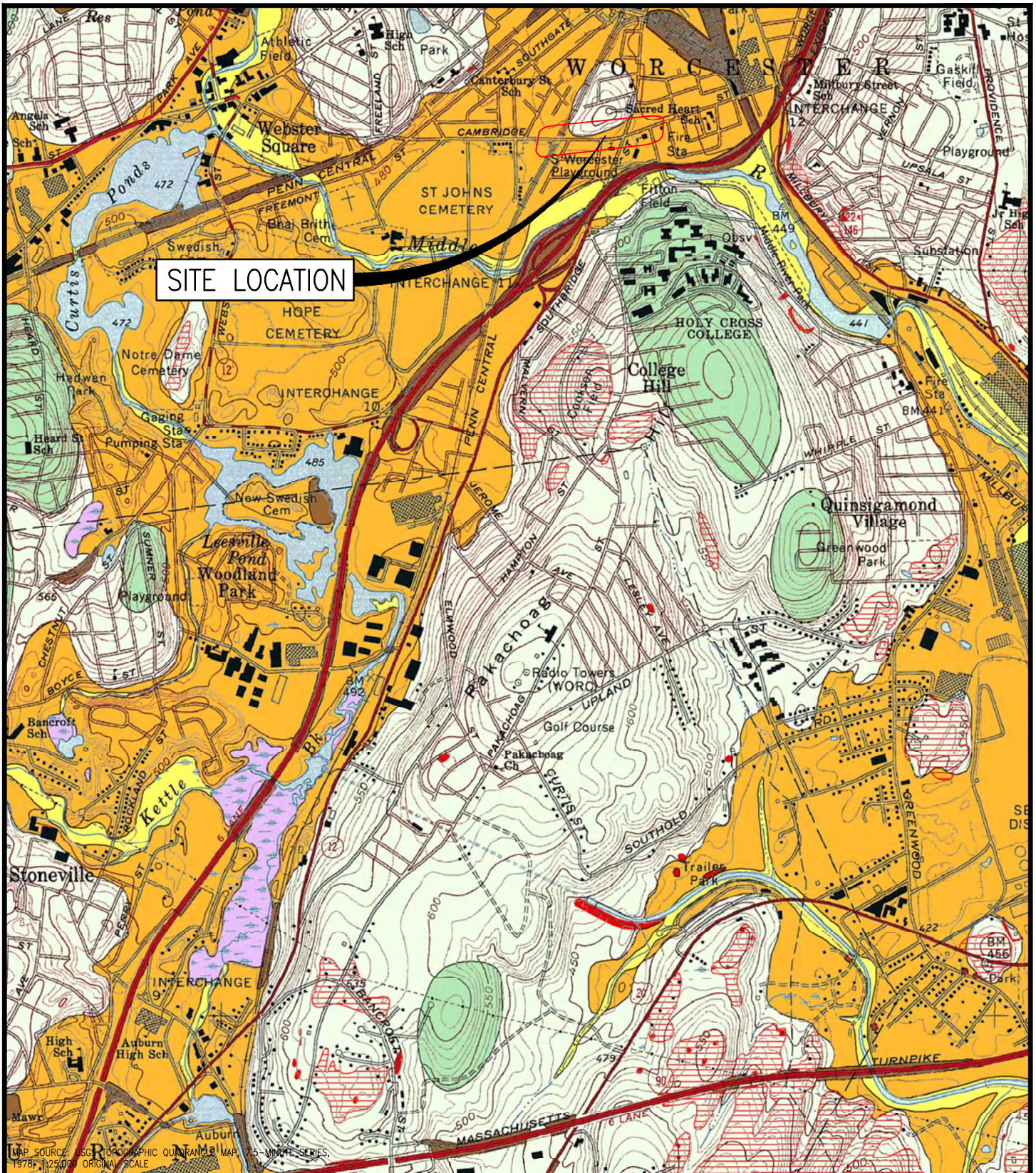
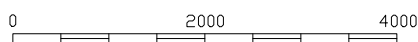
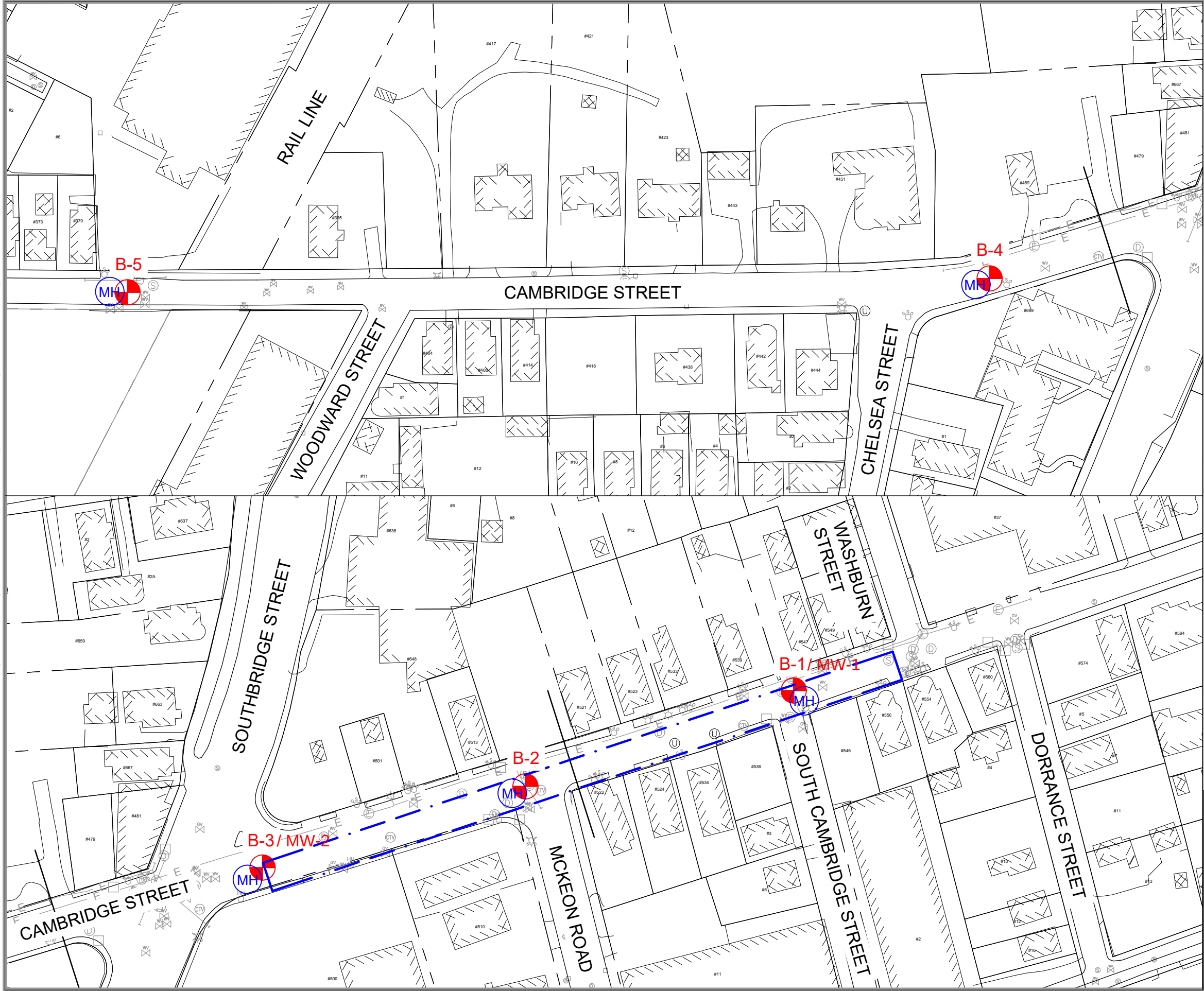


FIGURE 1
CAMBRIDGE STREET SEWER REPLACEMENT
WORCESTER, MA
LOCUS MAP

SCALE: 1"=2000'



\\wse03.local\WSE\Projects\MA\Worcester, MA\2191051 Cambridge Street Design\Geotechnical\CAD\Cambridge Street Boring Location Plan.dwg



- NOTES:**
1. THIS FIGURE IS BASED ON AN DRAWING ENTITLED "CAMBRIDGE STREET INTERCEPTOR REPLACEMENT" PREPARED BY WESTON & SAMPSON DATED MAY 14, 2021.
 2. BORINGS COMPLETED BY TECHNICAL DRILLING SERVICES OF STERLING, MA AND OBSERVED BY WESTON & SAMPSON ENGINEERS, INC. ON MAY 4 THROUGH 7, 2021.
 3. EXPLORATION LOCATIONS SHOWN ARE BASED ON FIELD MEASUREMENTS RELATIVE TO EXISTING SITE FEATURES.

- LEGEND:**
- B-#** - BORING LOCATION AND DESIGNATION
 - MH** - APPROXIMATE LOCATION OF NEW MANHOLE
 - []** - APPROXIMATE LIMITS OF NEW SEWER PIPE

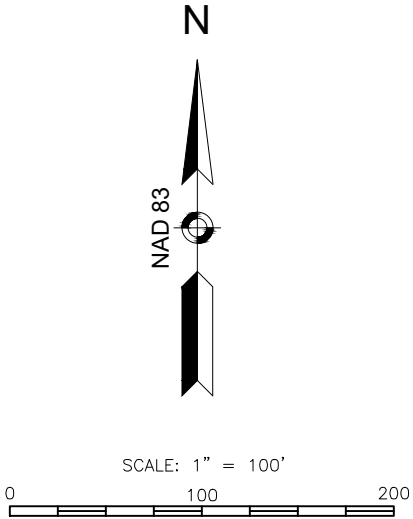


FIGURE 2			
CAMBRIDGE STREET SEWER REPLACEMENT WORCESTER, MA			
BORING LOCATION PLAN			
DESIGNED BY:	JW	CHECKED BY:	CC
DATE:	JUNE 2021		
Weston & Sampson			

Tables

Table 1
Summary of Soil Analytical Results
Cambridge Street Sewer Replacement Project
Worcester, MA

	Units	RCS-1	MCP Method 1 Cleanup Standards ¹			Landfill Resuse Levels		Sample Identification				
			S-1/GW-1	S-1/GW-2	S-1/GW-3	Lined	Unlined	B-1	B-2	B-3	B-4	B-5
								2-6'	2-6'	1-3'	2-6'	2-6'
								5/6/2021	5/6/2021	5/4/2021	5/6/2021	5/7/2021
TPH - ETPH												
Total Petroleum Hydrocarbons	mg/kg	1,000	1,000	1,000	1,000	5,000	2,500	21.4	117	114	3,000 D	62.1
VOCs												
Acetone	mg/kg	6	6	50	50	NS	NS	<0.0435	<0.0463	<0.0391	0.0568	<0.0458
Naphthalene	mg/kg	4	4	20	500	NS	NS	<0.0044	<0.0046	<0.0039	0.0209	<0.0046
Total VOCs	mg/kg	NS	NS	NS	NS	10	4	ND	ND	ND	0.0777	ND
SVOCs												
Acenaphthene	mg/kg	4	4	1,000	1,000	NS	NS	<0.362	<0.416	<0.691 D	3.92	<0.357
Acenaphthylene	mg/kg	1	1	600	10	NS	NS	0.395	<0.416	<0.691 D	0.59	<0.357
Anthracene	mg/kg	1,000	1,000	1,000	1,000	NS	NS	<0.362	<0.416	<0.691 D	13 D	<0.357
Benzo(a)anthracene	mg/kg	7	7	7	7	NS	NS	1.34	0.535	<0.691 D	17.8 D	<0.357
Benzo(a)pyrene	mg/kg	2	2	2	2	NS	NS	1.61	0.694	<0.691 D	15.1 D	0.307
Benzo(b)fluoranthene	mg/kg	7	7	7	7	NS	NS	1.26	0.556	<0.691 D	10.1 D	<0.357
Benzo(g,h,i)perylene	mg/kg	1,000	1,000	1,000	1,000	NS	NS	1.22	0.573	<0.691 D	6.06	<0.357
Benzo(k)fluoranthene	mg/kg	70	70	70	70	NS	NS	1.16	0.454	<0.691 D	5.61	<0.357
Bis(2-Ethylhexyl)phthalate	mg/kg	90	90	90	90	NS	NS	0.38	<0.416	<0.691 D	<0.369	<0.357
Chrysene	mg/kg	70	70	70	70	NS	NS	1.22	0.462	<0.347 D	14.9 D	0.267
Dibenzo(a,h)anthracene	mg/kg	0.7	0.7	0.7	0.7	NS	NS	0.247	<0.209	<0.347 D	1.23	<0.179
Dibenzofuran	mg/kg	100	NE	NE	NE	NS	NS	<0.362	<0.416	<0.691 D	4.85	<0.357
Fluoranthene	mg/kg	1,000	1,000	1,000	1,000	NS	NS	1.88	0.796	<0.691 D	42 D	0.478
Fluorene	mg/kg	1,000	1,000	1,000	1,000	NS	NS	<0.362	<0.416	<0.691 D	5.07	<0.357
Indeno(1,2,3-cd)pyrene	mg/kg	7	7	7	7	NS	NS	1.19	0.556	<0.691 D	7.81	<0.357
2-Methylnaphthalene	mg/kg	0.7	1	80	300	NS	NS	<0.362	<0.416	<0.691 D	2.01	<0.357
Naphthalene	mg/kg	4	4	20	500	NS	NS	<0.362	<0.416	<0.691 D	1.76	<0.357
Phenanthrene	mg/kg	10	10	500	500	NS	NS	0.516	<0.416	<0.691 D	39.8 D	<0.357
Pyrene	mg/kg	1,000	1,000	1,000	1,000	NS	NS	1.81	0.663	<0.691 D	35.8 D	0.442
Total SVOCs	mg/kg	NS	NS	NS	NS	100	100	14.2	5.29	ND	38.9	1.49
PCBs												
Total PCBs	mg/kg	1	1	1	1	<2	<2	ND	ND	ND	ND	ND
Total Metals												
Arsenic	mg/kg	20	20	20	20	40	40	14.1	11	18.1	13	16.2
Barium	mg/kg	1,000	1,000	1,000	1,000	NS	NS	29.7	28.4	22.3	33.5	38.2
Beryllium	mg/kg	90	90	90	90	NS	NS	0.26	0.29	0.36	0.24	0.25
Chromium	mg/kg	100	100	100	100	1,000	1,000	18.8	16.7	19.3	19.1	24.8
Lead	mg/kg	200	200	200	200	2,000	2,000	8.42	13.2	15.3	9.02	23.7
Mercury	mg/kg	20	20	20	20	10	10	<0.031	0.076	<0.029	<0.033	0.042
Nickel	mg/kg	600	600	600	600	NS	NS	12.5	11.6	18.4	13.6	17.5
Vanadium	mg/kg	400	400	400	400	NS	NS	14.6	14.3	17.8	16	17.6
Zinc	mg/kg	1,000	1,000	1,000	1,000	NS	NS	23.5	23.5	36.1	26.7	34.2
General Chemistry												
Conductivity	umhos/cm	NS	NS	NS	NS	8,000	4,000	1,080 WL	958 WL	1,100 WL	102 WL	1,630 WL
Corrosivity (pH)	S.U.	NS	NS	NS	NS	NS	NS	9.25	8.29	6.27	7.37	7.25
Flashpoint	°F	NS	NS	NS	NS	NS	NS	>200	>200	>200	>200	>200
Reactive Cyanide	mg/kg	NS	NS	NS	NS	NS	NS	<2	<2	<2	<2	<2
Reactive Sulfide	mg/kg	NS	NS	NS	NS	NS	NS	<2	<2	<2	<2	<2

QC by AGH

Abbreviations:

mg/kg = milligrams per kilogram
ND = Not Detected
NS = No Standard
D = Diluted

Notes:

< = Parameter not detected above laboratory method reporting limit, shown.

BOLD Parameter detected above laboratory detection limit

BOLD Parameter detected above MCP Reportable Concentration RCS-1 and Method 1 Cleanup Standards

BOLD Parameter detected above Unlined Landfill Resuse Levels.

¹ = Standards are from Massachusetts Contingency Plan (MCP), 310 CMR 40, April 2014.

Table 2
Summary of Groundwater Analytical Results
Cambridge Street Sewer Replacement Project
Worcester, MA

	Units	Reportable Concentration RCGW-2 ¹	MCP Method 1 Cleanup Standards ¹		RGP Parameters	Sample Identification	
			GW-2	GW-3		MW-1	MW-2
						6/4/2021	6/4/2021
EDB Method 504.1							
1,2-Dibromo-3-Chloropropane	ug/L	1,000	NS	NS	NS	<0.015	<0.015
1,2-Dibromoethane	ug/L	2	NS	NS	NS	<0.015	<0.015
VOCs							
1,1,1-Trichloroethane	ug/L	4,000	4,000	20,000	0.5	<0.5	<0.5
1,1,2-Trichloroethane	ug/L	900	900	50,000	0.5	<0.5	<0.5
1,1-Dichloroethane	ug/L	2,000	2,000	20,000	0.5	<0.5	<0.5
1,1-Dichloroethene	ug/L	80	80	30,000	0.5	<0.5	<0.5
1,2-Dichlorobenzene	ug/L	2,000	8,000	2,000	0.5	<0.5	<0.5
1,2-Dichloroethane	ug/L	5	5	20,000	0.5	<0.5	<0.5
1,3-Dichlorobenzene	ug/L	6,000	6,000	50,000	0.5	<0.5	<0.5
1,4-Dichlorobenzene	ug/L	60	60	8,000	0.5	<0.5	<0.5
Acetone	ug/L	50,000	50,000	50,000	10	<5	<5
Benzene	ug/L	1,000	1,000	10,000	0.5	<0.5	<0.5
Carbon Tetrachloride	ug/L	2	2	5,000	0.5	<0.3	<0.3
cis-1,2-Dichloroethene	ug/L	NS	20	50,000	0.5	<0.5	<0.5
Ethylbenzene	ug/L	5,000	20,000	5,000	NS	<0.5	<0.5
Methyl tert-Butyl Ether	ug/L	5,000	50,000	50,000	10	0.8	<0.5
Methylene Chloride	ug/L	2,000	NS	NS	0.5	<0.5	<0.5
Naphthalene	ug/L	700	700	20,000	0.5	<0.5	<0.5
Tertiary-amyl methyl ether	ug/L	NS	NS	NS	10	<1	<1
Tertiary-butyl Alcohol	ug/L	NS	NS	NS	10	<25	<25
Tetrachloroethene	ug/L	50	50	30,000	0.5	<0.5	<0.5
Toluene	ug/L	40,000	50,000	40,000	NS	<0.5	<0.5
Trichloroethene	ug/L	5	5	5,000	0.5	<0.5	<0.5
Vinyl Chloride	ug/L	2	2	50,000	0.5	<0.2	<0.2
Xylene O	ug/L	3,000	3,000	5,000	NS	<0.5	<0.5
Xylene P,M	ug/L	3,000	3,000	5,000	NS	<0.5	<0.5
PCBs							
Aroclor 1016	ug/L	NS	NS	NS	NS	<0.09	<0.09
Aroclor 1221	ug/L	NS	NS	NS	NS	<0.09	<0.09
Aroclor 1232	ug/L	NS	NS	NS	NS	<0.09	<0.09
Aroclor 1242	ug/L	NS	NS	NS	NS	<0.09	<0.09
Aroclor 1248	ug/L	NS	NS	NS	NS	<0.09	<0.09
Aroclor 1254	ug/L	NS	NS	NS	NS	<0.09	<0.09
Aroclor 1260	ug/L	NS	NS	NS	NS	<0.09	<0.09
Aroclor 1262	ug/L	NS	NS	NS	NS	<0.09	<0.09
Aroclor 1268	ug/L	NS	NS	NS	NS	<0.09	<0.09
Total PCBs	ug/L	5	5	10	0.5	<0.09	<0.09
SVOCs							
Acenaphthene	ug/L	10	NS	10,000	NS	<0.19	<0.19
Acenaphthylene	ug/L	0.04	10,000	40	NS	<0.19	<0.19
Anthracene	ug/L	30	NS	30	NS	<0.19	<0.19
Benzo(a)anthracene	ug/L	1,000	NS	1,000	0.5	<0.05	<0.05
Benzo(a)pyrene	ug/L	500	NS	500	0.5	<0.05	<0.05
Benzo(b)fluoranthene	ug/L	400	NS	400	0.5	<0.05	<0.05
Benzo(g,h,i)perylene	ug/L	20	NS	20	NS	<0.19	<0.19
Benzo(k)fluoranthene	ug/L	200	NS	100	0.5	<0.05	<0.05
bis(2-Ethylhexyl)phthalate	ug/L	50,000	NS	50,000	NS	<2.36	<2.34
Butylbenzylphthalate	ug/L	NS	NS	NS	NS	<2.36	<2.34
Chrysene	ug/L	70	NS	70	0.5	<0.05	<0.05
Dibenzo(a,h)Anthracene	ug/L	40	NS	40	0.5	<0.05	<0.05
Diethylphthalate	ug/L	9,000	50,000	9,000	NS	<2.36	<2.34
Dimethylphthalate	ug/L	50,000	50,000	50,000	NS	<2.36	<2.34
Di-n-butylphthalate	ug/L	5,000	NS	NS	NS	<2.36	<2.34
Di-n-octylphthalate	ug/L	100,000	NS	NS	NS	<2.36	<2.34
Fluoranthene	ug/L	200	NS	200	NS	<0.19	<0.19
Fluorene	ug/L	40	NS	40	NS	<0.19	<0.19
Indeno(1,2,3-cd)Pyrene	ug/L	100	NS	100	0.5	<0.05	<0.05
Naphthalene	ug/L	700	700	20,000	0.5	<0.19	0.19
Pentachlorophenol	ug/L	200	NS	200	5	<0.85	<0.84
Phenanthrene	ug/L	10,000	NS	10,000	NS	<0.19	<0.19
Pyrene	ug/L	20	NS	20	NS	<0.19	<0.19
1,4-Dioxane	ug/L	6,000	NS	20	5	<0.25	<0.25
Alcohol Scan by GC/FID							
Ethanol	mg/L	10,000	NS	NS	NS	<10	<10
General Chemistry							
Ammonia as N	mg/L	NS	NS	NS	10	<0.1	0.33
Chloride	mg/L	NS	NS	NS	100	385	1,760
Hexavalent Chromium	ug/L	300	NS	300	10	<10	<10
pH	S.U.	NS	NS	NS	NS	6.45	6.16
pH Sample Temp	S.U.	NS	NS	NS	NS	16.4 °C	17.1 °C
Phenols	ug/L	2,000	50,000	2,000	2	102	<50
Total Cyanide	ug/L	30	NS	30	5	<5	76.7
Total Petroleum Hydrocarbon	mg/L	5,000	5,000	5,000	5,000	<5	<5
Total Residual Chlorine	ug/L	NS	NS	NS	200	<20	<20
Total Suspended Solids	mg/L	NS	NS	NS	5,000	16	6,950
Dissolved Metals							
Antimony	ug/L	8,000	NS	8,000	20	<15	<15
Arsenic	ug/L	900	NS	900	20	<2.5	<2.5
Cadmium	ug/L	4	NS	4	10	<3	<3
Chromium	ug/L	300	NS	300	NS	<6	<6
Copper	ug/L	100,000	NS	NS	20	<6	<6
Iron	ug/L	NS	NS	NS	40	51.9	62.7
Lead	ug/L	10	NS	10	20	<6	<6
Mercury	ug/L	20	NS	20	0.2	<0.2	<0.2
Nickel	ug/L	200	NS	200	20	<15	20.5
Selenium	ug/L	100	NS	100	40	<5	<5
Silver	ug/L	7	NS	7	10	<3	<3
Zinc	ug/L	900	NS	900	15	<15	20.3
Total Metals							
Antimony	ug/L	NS	NS	NS	20	<15	<15
Arsenic	ug/L	NS	NS	NS	20	<2.5	22.1
Cadmium	ug/L	NS	NS	NS	10	<3	<3
Chromium	ug/L	NS	NS	NS	NS	<6	122
Chromium III	ug/L	NS	NS	NS	20	<10	122
Copper	ug/L	NS	NS	NS	20	<6	64.7
Iron	ug/L	NS	NS	NS	40	356	27,000
Lead	ug/L	NS	NS	NS	20	<6	45
Mercury	ug/L	NS	NS	NS	0.2	<0.2	<0.2
Nickel	ug/L	NS	NS	NS	20	<15	54.6
Selenium	ug/L	NS	NS	NS	40	<5	<5
Silver	ug/L	NS	NS	NS	10	<3	<3
Total Hardness	ug/L	NS	NS	NS	NS	162,000	689,000
Zinc	ug/L	NS	NS	NS	15	<15	159

QC by MLR 6/18/2021

Abbreviations:

ug/l = micrograms per liter

mg/l = milligrams per liter

S.U. = standard unit

NS = No Standard

Notes:

< = Parameter not detected above laboratory method reporting limit, shown.

BOLD Parameter detected above laboratory detection limit

BOLD Parameter detected above MCP Reportable Concentration RCGW-2 and Method 1 Cleanup Standards

BOLD Parameter detected above RGP parameters

1 = Standards are from Massachusetts Contingency Plan (MCP), 310 CMR 40, April 2014.

Reportable Concentrations and Method 1 Cleanup Standards are only available for dissolved metals, not total metal:

Attachment A

Boring and Monitoring Well Construction Logs

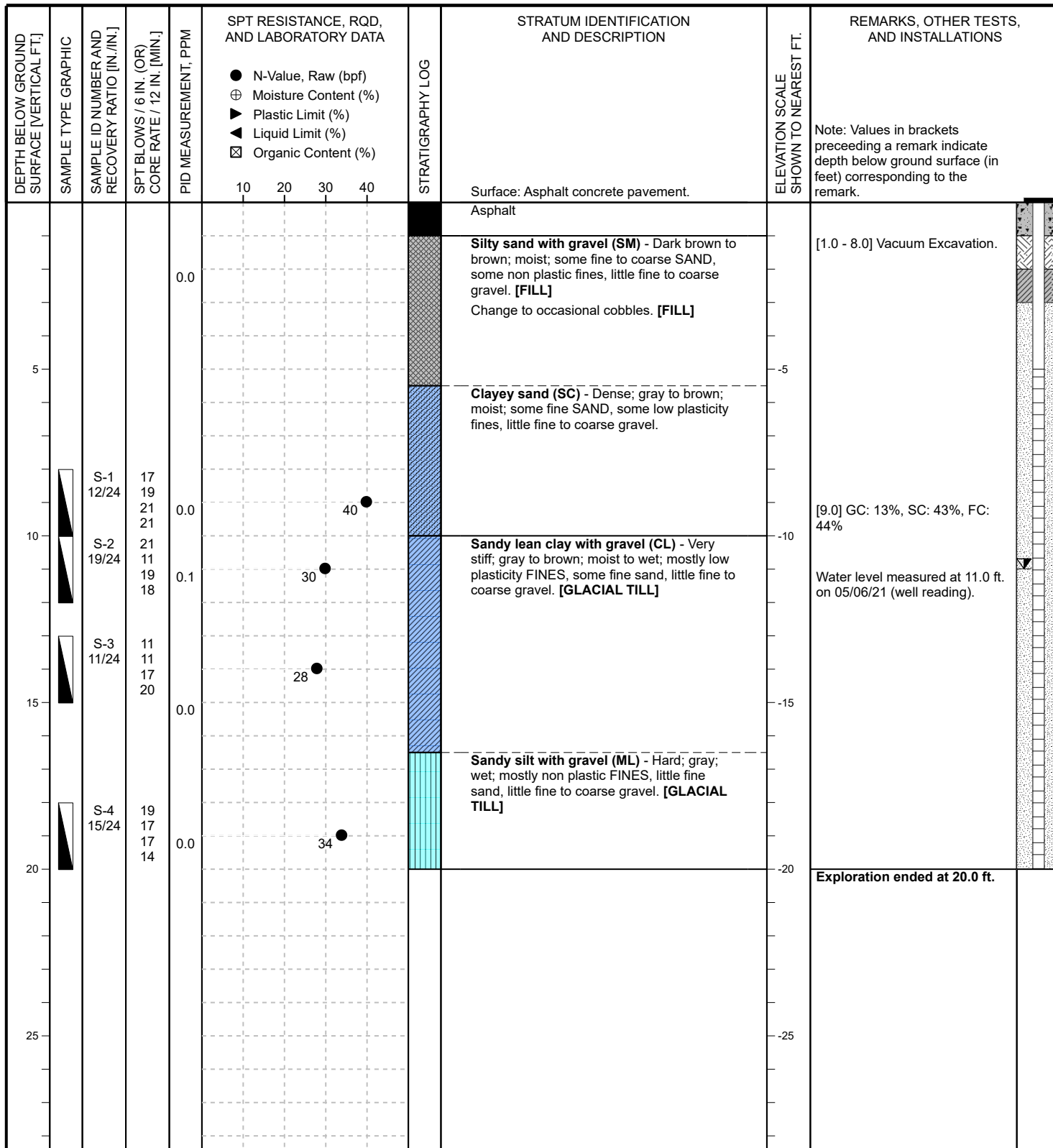
CONTRACTOR:	Technical Drilling Services, Inc.	BORING LOCATION:	See Attached Figure	DATE START:	May 6, 2021
FOREMAN:	Darwin Newton	ADVANCE METHODOD:	Rotary Wash Drilling	DATE FINISH:	May 6, 2021
LOGGED BY:	A. Nasias	AUGER DIAMETER:	N/A	GROUND DEPT:	Not Available
CHECKED BY:	C. Conlee, P.E.	SUPPORT CASING:	Driven Flush-Joint Casing (4" ID)	FINAL DEPTH:	25.0 ft.
EQUIPMENT:	CME 550, Truck Mounted	CORING METHODOD:	N/A	GRID COORDS:	N/A
SPT HAMMER:	Automatic (140-lb.)	BACKFILL MATERIAL:	Drill Cuttings and Asphalt Patch	GRID SYSTEM:	N/A

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	PID MEASUREMENT, PPM	SPT RESISTANCE, RQD, AND LABORATORY DATA				STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	ELEVATION SCALE SHOWN TO NEAREST FT.	REMARKS, OTHER TESTS, AND INSTALLATIONS
									</			

CONTRACTOR:	Technical Drilling Services, Inc.	BORING LOCATION:	See Attached Figure	DATE START:	May 5, 2021
FOREMAN:	Darwin Newton	ADVANCE METHOD:	Rotary Wash Drilling	DATE FINISH:	May 5, 2021
LOGGED BY:	A. Naslas	AUGER DIAMETER:	N/A	GROUND EL:	Not Available
CHECKED BY:	C. Conlee, P.E.	SUPPORT CASING:	Driven Flush-Joint Casing (4" ID)	FINAL DEPTH:	20.0 ft.
EQUIPMENT:	CME 550, Truck Mounted	CORING METHOD:	N/A	GRID COORDS:	N/A
SPT HAMMER:	Automatic (140-lb.)	BACKFILL MATERIAL:	Drill Cuttings and Asphalt Patch	GRID SYSTEM:	N/A

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	PID MEASUREMENT, PPM	GEOTECHNICAL TEST DATA				STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	REMARKS, OTHER TESTS, AND INSTALLATIONS
					● N-Value, Raw (bpf)	☒ Organic Content (%)	⊕ Moisture Content (%)	▲ Plastic Limit, PL (%)			
					10	20	30	40			
					25	50	75	100			
										Surface: Asphalt concrete pavement.	Note: Values in brackets preceeding a remark indicate depth below ground surface (in feet) corresponding to the remark.
										Asphalt- 9 inches.	
				0.0						Concrete- 7.5 inches. 1/4 inch rebar at 13 inches from surface.	[1.4 - 9.0] Vacuum Excavation. [1.5 - 6.0] GC: 24.1%, SC: 43.2%, FC: 32.7%. [11.5] Water level measured on 05/05/21 (end of drilling). [12.0] GC: 9%, SC: 74%, FC: 17%
										Silty sand with gravel (SM) - Brown; moist; some fine to coarse SAND, some non plastic fines, little fine to coarse gravel. [FILL]	
										Well graded gravel with silt and sand (GW-GM) - Dense; gray to brown; moist; mostly fine to coarse GRAVEL, some fine to coarse sand, few non plastic fines.	
										Silty sand (SM) - Medium dense; gray to brown; wet; mostly fine to medium SAND, little non plastic fines, few fine to coarse gravel.	
		S-1 10/24	5								Exploration ended at 20.0 ft.
			11								
			20								
			18	0.1	31						
		S-2 10/24	15								Exploration ended at 20.0 ft.
			13								
			10	0.0	23						
			10								
		S-3 10/24	6								Exploration ended at 20.0 ft.
			7								
			8	0.0	15						
			10								
											Exploration ended at 20.0 ft.
		S-4 8/24	7								
			10								
			9	0.0	19						
			9								
											Exploration ended at 20.0 ft.

CONTRACTOR:	Technical Drilling Services, Inc.	BORING LOCATION:	See Attached Figure	DATE START:	May 5, 2021
FOREMAN:	Darwin Newton	ADVANCE METHOD:	Rotary Wash Drilling	DATE FINISH:	May 5, 2021
LOGGED BY:	A. Naslas	AUGER DIAMETER:	N/A	GROUND EL:	Not Available
CHECKED BY:	C. Conlee, P.E.	SUPPORT CASING:	Driven Flush-Joint Casing (4" ID)	FINAL DEPTH:	20.0 ft.
EQUIPMENT:	CME 550, Truck Mounted	CORING METHOD:	N/A	GRID COORDS:	N/A
SPT HAMMER:	Automatic (140-lb.)	BACKFILL MATERIAL:	Drill Cuttings and Asphalt Patch	GRID SYSTEM:	N/A



CONTRACTOR:	Technical Drilling Services, Inc.	BORING LOCATION:	See Attached Figure	DATE START:	May 6, 2021
FOREMAN:	Darwin Newton	ADVANCE METHOD:	Rotary Wash Drilling	DATE FINISH:	May 6, 2021
LOGGED BY:	A. Naslas	AUGER DIAMETER:	N/A	GROUND EL:	Not Available
CHECKED BY:	C. Conlee, P.E.	SUPPORT CASING:	Driven Flush-Joint Casing (4" ID)	FINAL DEPTH:	20.0 ft.
EQUIPMENT:	CME 550, Truck Mounted	CORING METHOD:	N/A	GRID COORDS:	N/A
SPT HAMMER:	Automatic (140-lb.)	BACKFILL MATERIAL:	Drill Cuttings and Asphalt Patch	GRID SYSTEM:	N/A

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	PID MEASUREMENT, PPM	GEOTECHNICAL TEST DATA				STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	REMARKS, OTHER TESTS, AND INSTALLATIONS		
					● N-Value, Raw (bpf)	☒ Organic Content (%)	10	20	30	40		Surface: Asphalt concrete pavement.	Note: Values in brackets preceeding a remark indicate depth below ground surface (in feet) corresponding to the remark.
					⊕ Moisture Content (%)	▶ Plastic Limit, PL (%)	25	50	75	100		Asphalt- 6 inches.	
												Concrete- 10 inches. 1/4 inch rebar at 14 inches from surface.	
												Silty sand with gravel (SM) - Brown; moist; some fine to coarse SAND, some non plastic fines, little fine to coarse gravel. [FILL]	
5												Silty sand (SM) - Medium dense; brown; moist; mostly fine to medium SAND, some non plastic fines, little fine gravel.	[1.4 - 8.0] Vacuum Excavation.
		S-1 13/24	3 3 10 10	0.2	13								
10		S-2 10/24	7 11 12 10	0.0	23								[11.0] GC: 12%, SC: 52%, FC: 37%
		S-3 16/24	10 13 15 15	0.1	28								[13.0] Water level measured on 05/06/21 (end of drilling).
15													
		S-4 19/24	8 11 14 29	0.0	25								
20													Exploration ended at 20.0 ft.
25													

CONTRACTOR:	Technical Drilling Services, Inc.	BORING LOCATION:	See Attached Figure	DATE START:	May 6, 2021
FOREMAN:	Darwin Newton	ADVANCE METHOD:	Rotary Wash Drilling	DATE FINISH:	May 7, 2021
LOGGED BY:	A. Naslas	AUGER DIAMETER:	N/A	GROUND EL:	Not Available
CHECKED BY:	C. Conlee, P.E.	SUPPORT CASING:	Driven Flush-Joint Casing (4" ID)	FINAL DEPTH:	6.6 ft.
EQUIPMENT:	CME 550, Truck Mounted	CORING METHOD:	N/A	GRID COORDS:	N/A
SPT HAMMER:	Automatic (140-lb.)	BACKFILL MATERIAL:	Drill Cuttings and Asphalt Patch	GRID SYSTEM:	N/A

DEPTH BELOW GROUND SURFACE [VERTICAL FT.]	SAMPLE TYPE GRAPHIC	SAMPLE ID NUMBER AND RECOVERY RATIO [IN./IN.]	SPT BLOWS / 6 IN. (OR) CORE RATE / 12 IN. [MIN.]	PID MEASUREMENT, PPM	GEOTECHNICAL TEST DATA				STRATIGRAPHY LOG	STRATUM IDENTIFICATION AND DESCRIPTION	REMARKS, OTHER TESTS, AND INSTALLATIONS
					● N-Value, Raw (bpf) ☒ Organic Content (%) 10 20 30 40 ⊕ Moisture Content (%) ▴ Plastic Limit, PL (%) ▾ Liquid Limit, LL (%) 25 50 75 100		Surface: Asphalt concrete pavement.	Note: Values in brackets preceeding a remark indicate depth below ground surface (in feet) corresponding to the remark.			
				0.0					Asphalt- 10 inches.		[0.8 - 6.0] Vacuum Excavation.
											[5.5 - 6.5] Concrete in wash water.
											Abandon hole due to unknown obstruction.
											Exploration ended at 6.6 ft.
	</										

GUIDE TO SUBSURFACE EXPLORATION LOGS



INDEX SHEET 1 GENERAL INFORMATION

GENERAL NOTES AND USE OF LOGS

- 1.) Explorations were made by ordinary and conventional methods and with care adequate for Weston & Sampson's study and/or design purposes. The exploration logs are part of a specific report prepared by Weston & Sampson for the referenced project and client, and are an integral part of that report. Information and interpretations are subject to the explanations and limitations stated in the report. Weston & Sampson is not responsible for any interpretations, assumptions, projections, or interpolations made by others.
- 2.) Exploration logs represent general conditions observed at the point of exploration on the date(s) stated. Boundary lines separating soil and rock layers (strata) represent approximate boundaries only and are shown as solid lines where observed and dashed lines where inferred based on drilling action. Actual transitions may be gradual and changes may occur over time.
- 3.) Soil and rock descriptions are based on visual-manual examination of recovered samples, direct observation in test pits (when permissible), and laboratory testing (when conducted).
- 4.) Water level observations were made at the times and under the conditions stated. Fluctuations should be expected to vary with seasons and other factors. Use of fluids during drilling may affect water level observations. The absence of water level observations does not necessarily mean the exploration was dry or that subsurface water will not be encountered during construction.
- 5.) Standard split spoon samplers may not recover particles with any dimension larger than 1-3/8 inches. Reported gravel conditions or poor sample recovery may not reflect actual in-situ conditions.
- 6.) Sections of this guide provide a general overview of Weston & Sampson's practices and procedures for *identifying* and *describing* soil and rock. These procedures are predominantly based on ASTM D2488, *Standard Practice for Description and Identification of Soils (Visual-Manual Procedures)*, the International Society of Rock Mechanics (ISRM) standards, and the *Engineering Geology Field Manual* published by the Bureau of Reclamation. Not all aspects of this guide relating to description and identification procedures of soil and rock may be applicable in all circumstances.

SAMPLER GRAPHICS

- Split Spoon (Standard)
2" OD, 1-3/8" ID
- Split Spoon (Oversize)
3" OD, 2-3/8" ID
- Shelby or Piston Tube
3" OD, 2-7/8" ID
- Double-Tube Rock Core Barrel
2" Core Diameter
- Direct Push with Acetate Liner
Various Liner Sizes
- Auger Sample
(from cuttings or hand auger)
- Grab Sample
(manual, from discrete point)
- Composite Sample
(multiple grab samples)

WELL GRAPHICS

- Cement concrete seal around casing or riser pipe
- Bentonite seal around casing or riser pipe
- Cement grout seal around casing or riser pipe
- Soil backfill around riser pipe or beneath screen
- Gravel backfill around screen or riser pipe
- Sand backfill around screen or riser pipe (filter sand)
- Solid-wall riser; Sch. 40 PVC, 1" ID unless noted otherwise
- Slotted screen; Sch. 40 PVC, 1" ID with machined slots

CAVING / SEEPAGE TERMS

The following caving and/or seepage terms may appear on a test pit log.

Caving Term	Criteria
Minor.....	less than 1 cubic ft.
Moderate.....	1 to 3 cubic ft.
Severe.....	greater than 3 cubic ft.

Seepage Term	Criteria
Slow.....	less than 1 gpm
Moderate.....	1 to 3 gpm
Fast.....	greater than 3 gpm

KEY TO WATER LEVELS

- Observed in exploration during advancement.
- Measured in exploration at completion, prior to backfilling or well installation.
- Measured in exploration after the stated stabilization period, prior to backfilling, or in well installation if noted.

DEFINITIONS OF COMMON TERMS

Sample Recovery Ratio - The length of material recovered in a drive or push type sampler over the length of sampler penetration, in inches (e.g. 18/24).

Standard Penetration Test (SPT) - An in-situ test where a standard split-spoon sampler is driven a distance of 12 or 18 inches (after an initial 6-inch seating interval) using a 140-lb. hammer falling 30 inches for each blow.

SPT Blows - The number of hammer blows required to drive a split-spoon sampler each consecutive 6-inch interval during a *Standard Penetration Test*. If no discernable advancement of a split spoon sampler is made after 50 consecutive hammer blows, 50/X indicates *sampler refusal* and is the number of blows required to drive the sampler X inches.

SPT N-Value (N) - The uncorrected blow count representation of a soil's penetration resistance over a 12-inch interval after an initial 6-in. seating interval, reported in blows per foot (bpf). The N-value is correlated to soil engineering properties.

Auger Refusal - No discernable advancement of the auger over a period of 5 minutes with full rig down pressure applied.

Casing Refusal (Driven) - Casing penetration of less than 6 inches after a minimum 50 blows of a drop hammer weighing 300 lbs. or a minimum 100 blows of a drop hammer weighing 140 lbs.

PID Measurement - A measurement (electronic reading) taken in the field using a photoionization detector (PID) to detect the presence of volatile organic compounds in a soil sample. Values are reported as benzene equivalent units in parts per million (ppm) unless noted otherwise.

Rock Quality Designation (RQD) - A qualitative index measure of the degree of jointing and fracture of a rock core taken from a borehole. The RQD is defined as the sum length of solid core pieces 4 inches or longer divided by the run (cored) length, expressed as a percentage. Higher RQD values may indicate fewer joints and fractures in the rock mass.

Fill (Made Ground) - A deposit of soil and/or artificial waste materials that has been placed or altered by human processes.

LABORATORY TESTS AND FIELD MEASUREMENTS

MC.....	Moisture Content	IC.....	1D Incremental Consolidation
OC.....	Organic Content	VS.....	Laboratory Vane Shear
PL.....	Plastic Limit	US.....	Unconfined Compression
LL.....	Liquid Limit	TC.....	Triaxial Compression
GC.....	Gravel Content	PP.....	Pocket (Hand) Penetrometer
SC.....	Sand Content	TV.....	Torvane (Hand Vane)
FC.....	Fines Content	PID.....	Photoionization Detector
DS.....	Direct Shear	FID.....	Flame Ionization Detector

BORING ADVANCEMENT METHODS

Hollow-Stem Auger Drilling - Utilizes continuous flight auger sections with hollow stems to advance the borehole. Drill rods and a plug are inserted into the auger stem to prevent the entrance of soil cuttings into the augers.

Rotary Wash Drilling - Utilizes downward pressure and rotary action applied to a non-coring bit while washing the cuttings to the surface using a circulating fluid injected down the drill rods. The borehole is supported with either steel casing or the drilling fluid. Where a casing is used, the borehole is advanced sequentially by driving the casing to the desired depth and then cleaning out the casing. The process of driving and cleaning the casing is commonly referred to as the 'drive-and-wash' technique.

Continuous Sampling - Includes a variety of methods and procedures during which the borehole is advanced via continuous recovery of soil samples. *Direct Push* sampling is a common method that uses static downward pressure combined with percussive energy to drive a steel mandrel into the ground at continuous intervals while recovering soil samples in disposable acetate liners.

Rock Coring - Utilizes downward pressure and rotary action applied to a core barrel equipped with a diamond-set or tungsten carbide coring bit. During conventional coring, the entire barrel is retrieved from the hole upon completion of a core run. Wireline coring allows for removal of the inner barrel assembly containing the actual core while the drill rods and outer barrel remain in the hole. Various types and sizes of core barrels and bits are used.

GUIDE TO SUBSURFACE EXPLORATION LOGS



INDEX SHEET 2 SOIL DESCRIPTION

SOIL CONSTITUENTS

Naturally occurring soils consist of one or more of the following matrix constituents defined in terms of particle size.

Constituent	U.S. Sieve Size	Observed Size (in.)
Gravel (Coarse)	3/4 in. - 3 in.	3/4 - 3
Gravel (Fine)	No. 4 - 3/4 in.	1/5 - 3/4
Sand (Coarse)	No. 10 - No. 40	1/16 - 1/5
Sand (Medium)	No. 40 - No. 10	1/64 - 1/16
Sand (Fine)	No. 200 - No. 40	1/300 - 1/64
Fines (Silt or Clay)	Smaller than No. 200	Less than 1/300

SOIL IDENTIFICATION

Soil identification refers to the grouping of soils with similar physical characteristics into a category defined by a **group name** and corresponding **group symbol** based on estimation of the matrix soil constituents to the nearest 5% and simple manual tests. Proportions of cobbles, boulders, and other non-matrix soil materials are not considered during this procedure but are included in the overall soil description if observed or thought to be present. Refer to the following descriptions and tables adapted from ASTM D2488.

Coarse-Grained Soil - Coarse-grained soils contain fewer than 50% fines and are identified based on the following table.

Primary Constituent	Fines Percent	Type of Fines and Gradation	Group Symbol	Group Name ⁽¹⁾
GRAVEL % gravel > 10% % sand	≤ 5%	well graded	GW	Well graded gravel
		poorly graded	GP	Poorly graded gravel
	10% to 45%	clayey well graded	GW-GC	Well graded gravel with clay
		clayey poorly graded	GP-GC	Poorly graded gravel with clay
		silty well graded	GW-GM	Well graded gravel with silt
		silty poorly graded	GP-GM	Poorly graded gravel with silt
SAND % sand ≥ 10% % gravel	≤ 5%	clay fines	GC	Clayey gravel
		silt fines	GM	Silty gravel
	10% to 45%	well graded	SW	Well graded sand
		poorly graded	SP	Poorly graded sand
		clayey well graded	SW-SC	Well graded sand with clay
		clayey poorly graded	SP-SC	Poorly graded sand with clay
		silty well graded	SW-SM	Well graded sand with silt
		silty poorly graded	SP-SM	Poorly graded sand with silt
	15% to 45%	clay fines	SC	Clayey sand
		silt fines	SM	Silty sand

⁽¹⁾ If soil is a gravel and contains 15% or more sand, add "with sand" to the group name. If soil is a sand and contains 15% of more gravel, add "with gravel" to the group name.

Inorganic Fine-Grained Soil - Fine-grained soils contain 50% or more fines and are identified based on the following table.

Plasticity Criteria	Dry Strength	Coarse Fraction S = Sand, G = Gravel	Group Symbol	Group Name ⁽¹⁾
Medium	Medium to high	< 15% S + G	CL	Lean clay
		≥ 30% % S ≥ % G	CL	Sandy lean clay
		S + G % S < % G	CL	Gravelly lean clay
Non-plastic	None to low	< 15% S + G	ML	Silt
		≥ 30% % S ≥ % G	ML	Sandy silt
		S + G % S < % G	ML	Gravelly silt
High	High to very high	< 15% S + G	CH	Fat clay
		≥ 30% % S ≥ % G	CH	Sandy fat clay
		S + G % S < % G	CH	Gravelly fat clay
Low to Medium	Low to medium	< 15% S + G	MH	Elastic silt
		≥ 30% % S ≥ % G	MH	Sandy elastic silt
		S + G % S < % G	MH	Gravelly elastic silt

⁽¹⁾ If soil contains 15% to 25% sand or gravel, add "with sand" or "with gravel" to the group name.

Organic Fine-Grained Soil - Fine-grained soils that contain enough organic particles to influence the soil properties are identified as Organic Soil and assigned the group symbol OL or OH.

Highly Organic Soil (Peat) - Soils composed primarily of plant remains in various stages of decomposition are identified as Peat and given the group symbol PT. Peat usually has an organic odor, a dark brown to black color, and a texture ranging from fibrous (original plant structure intact or mostly intact) to amorphous (plant structure decomposed to fine particles).

SOIL DESCRIPTION

Soils are *described* in the following general sequence. Deviations may occur in some instances.

Identification Components

(1) Group Name and Group Symbol

Description Components

- (2) Consistency (Fine-Grained) or Apparent Density (Coarse-Grained)
- (3) Color (*note, the term "to" may be used to indicate a gradational change*)
- (4) Soil Moisture
- (5) Matrix Soil Constituents (Gravel, Sand, Fines)
 - ↳ Proportion (*by weight*), particle size, plasticity of fines, angularity, etc.
- (6) Non-Matrix Soil Materials and Proportions (*by volume*)
- (7) Other Descriptive Information (Unusual Odor, Structure, Texture, etc.)
- (8) [Geologic Formation Name or Soil Survey Unit]

SPT N-VALUE CORRELATIONS

Consistency	SPT N-Value	Apparent Density	SPT N-Value
Very soft	0 - 2	Very loose	0 - 5
Soft	2 - 4	Loose	5 - 10
Medium stiff	4 - 8	Medium dense	10 - 30
Stiff	8 - 15	Dense	30 - 50
Very stiff	15 - 30	Very dense	> 50
Hard	> 30		

SOIL MOISTURE

Dry..... Apparent absence of moisture; dry to the touch.
Moist..... Damp but no visible water.
Wet..... Visible free water; saturated.

PROPORTIONS / PERCENTAGES

Proportions of gravel, sand, and fines (excluding cobbles, boulders, and other constituents) are stated in the following terms indicating a range of percentages by weight (to nearest 5%) of the minus 3-in. soil fraction and add up to 100%.

Proportions of cobbles, boulders, and other non-matrix soil materials including artificial debris, roots, plant fibers, etc. are stated in the following terms indicating a range of percentages by volume (to the nearest 5%) of the total soil.

Mostly 50% - 100%
Some 30% - 45%
Little 15% - 25%
Few 5% - 10%
Trace..... Less than 5%

Numerous 40% - 50%
Common 25% - 35%
Occasional 10% - 20%
Trace..... Less than 5%

PLASTICITY (FINES ONLY)

Non-plastic..... Dry specimen ball falls apart easily. Cannot be rolled into thread at any moisture content.
Low..... Dry specimen ball easily crushed with fingers. Can be rolled into 1/8-in. thread with some difficulty.
Medium..... Difficult to crush dry specimen ball with fingers. Easily rolled into 1/8-in. thread.
High..... Cannot crush dry specimen ball with fingers. Easily rolled and re-rolled into 1/8-in. thread.

COBBLES AND BOULDERS

Cobbles - Particles of rock that will pass a 12-in. square opening and be retained on a 3-in. sieve.

Boulders - Particles of rock that will not pass a 12-in. square opening.

Note: Where the percentage (by volume) of cobbles and/or boulders cannot be accurately or reliably estimated, the terms "with cobbles", "with boulders", or "with cobbles and boulders" may be used to indicate observed or inferred presence.

GUIDE TO SUBSURFACE EXPLORATION LOGS



INDEX SHEET 3 ROCK DESCRIPTION

ROCK DEFINITION

Where reported on an exploration log, *rock* is defined as any naturally formed aggregate of mineral matter occurring in large masses or fragments. This definition of rock should not be taken as a replacement for any definitions relating to rock and/or rock excavation defined in construction documents. Intensely weathered or decomposed rock that is friable and can be reduced to gravel size particles or smaller by normal hand pressure is identified and described as soil. Poorly indurated formational materials which display both rock-like and soil-like properties are identified and described as rock followed by the soil description. In such cases, the term "poorly indurated" or "weakly cemented" is added to the rock name (e.g. weakly cemented sandstone).

ROCK IDENTIFICATION

Rock is identified by a combination of *rock type* (igneous, metamorphic, or sedimentary) followed by the *rock name* (e.g. granite, schist, sandstone).

ROCK DESCRIPTION

Rock descriptions are presented in the following general sequence. The detail of description is dictated by the complexity and objectives of the project.

Identification Components

(1) Rock Type and Name

Description Components

- (2) Rock Grain Size (*for clastic sedimentary rock*)
- (3) Crystal Size (*for igneous and metamorphic rock*)
- (4) Bedding Spacing (*for sedimentary rock*)
- (5) Color
- (6) Hardness and Weathering Descriptors
- (7) Fracture Density
- (8) [Geologic Formation Name]

ROCK QUALITY DESIGNATION

$$RQD (\%) = \frac{\sum \text{Length of intact core pieces} \geq 4 \text{ inches}}{\text{Total length of core run (inches)}} \times 100$$

The RQD should correlate with the fracture density in most cases. Higher RQD values generally indicate fewer joints and fractures.

GRAIN / CRYSTAL SIZE

Grain Size for Clastic Sedimentary Rock

The names of clastic sedimentary rocks are generally based on their predominant clast or grain size (e.g. fine sandstone, medium sandstone, coarse gravel conglomerate, cobble conglomerate, siltstone, claystone).

Crystal Size for Igneous and Metamorphic Rock

Grain Size Description	Average Crystal Size (in.)
Very coarse grained (pegmatitic)	Greater than or equal to 3/8
Coarse-grained	Between 3/16 and 3/8
Medium-grained	Between 1/32 and 3/16
Fine-grained	Between 1/250 and 1/32
Aphanitic	Less than or equal to 1/250

BEDDING SPACING

Bedding Description	Thickness / Spacing
Massive	Less than 10 ft.
Very thickly bedded	3 ft. to 10 ft.
Thickly bedded	1 ft. to 3 ft.
Moderately bedded	4 in. to 1 ft.
Thinly bedded	1 in. to 4 in.
Very thinly bedded	1/4 in. to 1 in.
Laminated	Less than 1/4 in.

Note: Bedding is generally only applicable to sedimentary or bedded volcanic rocks.

HARDNESS

Hardness	Criteria
Extremely hard	Cannot be scratched with a pocketknife or sharp pick. Can only be chipped with repeated heavy hammer blows.
Very hard	Cannot be scratched with a pocketknife or sharp pick with difficulty. Breaks with repeated heavy hammer blows.
Hard	Can be scratched with a pocketknife or sharp pick with difficulty. Breaks with heavy hammer blows.
Moderately hard	Can be scratched with a pocketknife or sharp pick with light or moderate pressure. Breaks with moderate hammer blows.
Moderately soft	Can be grooved 1/16 in. deep with a pocketknife or sharp pick with moderate or heavy pressure. Breaks with light hammer blow or heavy manual pressure.
Soft	Can be grooved or gouged easily with a pocketknife or sharp pick. Breaks with light to moderate manual pressure.
Very soft	Can be readily indented, grooved, or gouged with fingernail, or carved with a pocketknife. Breaks with light manual pressure.

WEATHERING (INTACT ROCK)

Weathering Description	Discoloration and/or Oxidation	General Characteristics
Fresh	Body of rock and fracture surfaces are not discolored or oxidized.	Rock texture unchanged. Hammer rings when crystalline rocks are struck.
Slightly weathered	Discoloration or oxidation limited to surface of, or short distance from, fractures. Most surfaces exhibit minor to complete discoloration.	Rock texture preserved. Hammer rings when crystalline rocks are struck. Body of rock not weakened.
Moderately weathered	Discoloration or oxidation extends usually throughout. Fe-Mg minerals appear rusty. All fracture surfaces are discolored or oxidized.	Rock texture generally preserved. Hammer does not ring when rock is struck. Body of rock slightly weakened.
Intensely weathered	Discoloration or oxidation throughout. Feldspar and Fe-Mg minerals altered to clay to some extent. All fracture surfaces are discolored or oxidized and friable.	Rock texture altered by chemical disintegration. Can usually be broken with moderate to heavy manual pressure or by light hammer blow. Body of rock is significantly weakened.
Decomposed	Discoloration or oxidation throughout but resistant minerals such as quartz may be unaltered. All feldspar and Fe-Mg minerals are completely altered to clay.	Resembles a soil; partial or complete remnant rock structure may be preserved. Can be granulated by hand. Resistant minerals may present as stringers or dikes.

FRACTURE DENSITY

Description	Observed Fracture Density
Unfractured	No fractures
Very slightly fractured	Core lengths greater than 3 ft.
Slightly fractured	Core lengths mostly from 1 ft. to 3 ft.
Moderately fractured	Core lengths mostly from 4 in. to 1 ft.
Intensely fractured	Core lengths mostly from 1 in. to 4 in.
Very intensely fractured	Mostly chips and fragments

Note: Fracture density is based on the fracture spacing in recovered core, measured along the core axis (excluding mechanical breaks).

Attachment B
Laboratory Analytical Reports

CERTIFICATE OF ANALYSIS

Sarah Ruizzo
Weston and Sampson Engineers, Inc.
5 Centennial Drive
Peabody, MA 01960

RE: Cambridge St Worcester MA (2191051)
ESS Laboratory Work Order Number: 21E0122

This signed Certificate of Analysis is our approved release of your analytical results. These results are only representative of sample aliquots received at the laboratory. ESS Laboratory expects its clients to follow all regulatory sampling guidelines. Beginning with this page, the entire report has been paginated. This report should not be copied except in full without the approval of the laboratory. Samples will be disposed of thirty days after the final report has been delivered. If you have any questions or concerns, please feel free to call our Customer Service Department.



Laurel Stoddard
Laboratory Director

REVIEWED

By ESS Laboratory at 6:01 pm, May 17, 2021

Analytical Summary

The project as described above has been analyzed in accordance with the ESS Quality Assurance Plan. This plan utilizes the following methodologies: US EPA SW-846, US EPA Methods for Chemical Analysis of Water and Wastes per 40 CFR Part 136, APHA Standard Methods for the Examination of Water and Wastewater, American Society for Testing and Materials (ASTM), and other recognized methodologies. The analyses with these noted observations are in conformance to the Quality Assurance Plan. In chromatographic analysis, manual integration is frequently used instead of automated integration because it produces more accurate results.

The test results present in this report are in compliance with TNI and relative state standards, and/or client Quality Assurance Project Plans (QAPP). The laboratory has reviewed the following: Sample Preservations, Hold Times, Initial Calibrations, Continuing Calibrations, Method Blanks, Blank Spikes, Blank Spike Duplicates, Duplicates, Matrix Spikes, Matrix Spike Duplicates, Surrogates and Internal Standards. Any results which were found to be outside of the recommended ranges stated in our SOPs will be noted in the Project Narrative.



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge St Worcester MA

ESS Laboratory Work Order: 21E0122

SAMPLE RECEIPT

The following samples were received on May 05, 2021 for the analyses specified on the enclosed Chain of Custody Record.

To achieve CAM compliance for MCP data, ESS Laboratory has reviewed all QA/QC Requirements and Performance Standards listed in each method. Holding times and preservation have also been reviewed. All CAM requirements have been performed and achieved unless noted in the project narrative.

Each method has been set-up in the laboratory to reach required MCP standards. The methods for aqueous VOA and Soil Methanol VOA have known limitations for certain analytes. The regulatory standards may not be achieved due to these limitations. In addition, for all methods, matrix interferences, dilutions, and %Solids may elevate method reporting limits above regulatory standards. ESS Laboratory can provide, upon request, a Limit Checker (regulatory standard comparison spreadsheet) electronic deliverable which will highlight these exceedances.

Low Level VOA vials were frozen by ESS Laboratory on May 5, 2021 at 15:21.

Question I: All samples for EPH were analyzed for a subset of the required MCP list per the client's request.

Lab Number	Sample Name	Matrix	Analysis
21E0122-01	B-3	Soil	1010A, 6010C, 6020A, 7.3.3.2, 7.3.4.1, 7471B, 8082A, 8100M, 8260B Low, 8270D, 9045, 9050A



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge St Worcester MA

ESS Laboratory Work Order: 21E0122

PROJECT NARRATIVE

5035/8260B Volatile Organic Compounds / Low Level

D1E0106-CCV1 Continuing Calibration %Diff/Drift is above control limit (CD+).
1,2-Dibromo-3-Chloropropane (28% @ 20%), 2,2-Dichloropropane (21% @ 20%), 4-Methyl-2-Pentanone (21% @ 20%), Bromodichloromethane (21% @ 20%), Bromoform (23% @ 20%), Carbon Tetrachloride (26% @ 20%), Dichlorodifluoromethane (41% @ 20%), Tetrahydrofuran (22% @ 20%)

8270D Semi-Volatile Organic Compounds

21E0122-01 Elevated Method Reporting Limits due to sample matrix (EL).
D1E0064-CCV1 Calibration required quadratic regression (Q).
2,4-Dinitrophenol (87% @ 80-120%), Pentachlorophenol (110% @ 80-120%)

No other observations noted.

End of Project Narrative.

DATA USABILITY LINKS

To ensure you are viewing the most current version of the documents below, please clear your internet cookies for www.ESSLaboratory.com. Consult your IT Support personnel for information on how to clear your internet cookies.

[Definitions of Quality Control Parameters](#)

[Semivolatile Organics Internal Standard Information](#)

[Semivolatile Organics Surrogate Information](#)

[Volatile Organics Internal Standard Information](#)

[Volatile Organics Surrogate Information](#)

[EPH and VPH Alkane Lists](#)



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge St Worcester MA

ESS Laboratory Work Order: 21E0122

CURRENT SW-846 METHODOLOGY VERSIONS

Analytical Methods

1010A - Flashpoint
6010C - ICP
6020A - ICP MS
7010 - Graphite Furnace
7196A - Hexavalent Chromium
7470A - Aqueous Mercury
7471B - Solid Mercury
8011 - EDB/DBCP/TCP
8015C - GRO/DRO
8081B - Pesticides
8082A - PCB
8100M - TPH
8151A - Herbicides
8260B - VOA
8270D - SVOA
8270D SIM - SVOA Low Level
9014 - Cyanide
9038 - Sulfate
9040C - Aqueous pH
9045D - Solid pH (Corrosivity)
9050A - Specific Conductance
9056A - Anions (IC)
9060A - TOC
9095B - Paint Filter
MADEP 04-1.1 - EPH
MADEP 18-2.1 - VPH

Prep Methods

3005A - Aqueous ICP Digestion
3020A - Aqueous Graphite Furnace / ICP MS Digestion
3050B - Solid ICP / Graphite Furnace / ICP MS Digestion
3060A - Solid Hexavalent Chromium Digestion
3510C - Separatory Funnel Extraction
3520C - Liquid / Liquid Extraction
3540C - Manual Soxhlet Extraction
3541 - Automated Soxhlet Extraction
3546 - Microwave Extraction
3580A - Waste Dilution
5030B - Aqueous Purge and Trap
5030C - Aqueous Purge and Trap
5035A - Solid Purge and Trap

SW846 Reactivity Methods 7.3.3.2 (Reactive Cyanide) and 7.3.4.1 (Reactive Sulfide) have been withdrawn by EPA. These methods are reported per client request and are not NELAP accredited.



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge St Worcester MA

ESS Laboratory Work Order: 21E0122

MassDEP Analytical Protocol Certification Form

MADEP RTN: _____

This form provides certification for the following data set: **21E0122-01**

Matrices: ☐ Ground Water/Surface Water ☒ Soil/Sediment ☐ Drinking Water ☐ Air ☐ Other: _____

CAM Protocol (check all that apply below):

☒ 8260 VOC CAM II A	☒ 7470/7471 Hg CAM III B	☐ MassDEP VPH (GC/PID/FID) CAM IV A	☒ 8082 PCB CAM V A	☐ 9014 Total Cyanide/PAC CAM VI A	☐ 6860 Perchlorate CAM VIII B
☒ 8270 SVOC CAM II B	☐ 7010 Metals CAM III C	☐ MassDEP VPH (GC/MS) CAM IV C	☐ 8081 Pesticides CAM V B	☐ 7196 Hex Cr CAM VI B	☐ MassDEP APH CAM IX A
☒ 6010 Metals CAM III A	☒ 6020 Metals CAM III D	☒ MassDEP EPH CAM IV B	☐ 8151 Herbicides CAM V C	☐ Explosives CAM VIII A	☐ TO-15 VOC CAM IX B

Affirmative responses to questions A through F are required for "Presumptive Certainty" status

A	Were all samples received in a condition consistent with those described on the Chain-of-Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding times?	Yes ☒ No ☐
B	Were the analytical method(s) and all associated QC requirements specified in the selected CAM protocol(s) followed?	Yes ☒ No ☐
C	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?	Yes ☒ No ☐
D	Does the laboratory report comply with all the reporting requirements specified in the CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data"?	Yes ☒ No ☐
E	VPH, EPH, APH and TO-15 only: a. Was each method conducted without significant modification(s)? (Refer to the individual method(s) for a list of significant modifications). b. APH and TO-15 Methods only: Was the complete analyte list reported for each method?	Yes ☒ No ☐ Yes ☐ No ☐
F	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all "No" responses to Questions A through E)?	Yes ☒ No ☐

Responses to Questions G, H and I below are required for "Presumptive Certainty" status

G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocols(s)? Data User Note: Data that achieve "Presumptive Certainty" status may not necessarily meet the data usability and representativeness requirements described in 310 CMR 40. 1056 (2)(k) and WSC-07-350.	Yes ☐ No ☒
H	Were all QC performance standards specified in the CAM protocol(s) achieved?	Yes ☐ No ☒
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?	Yes ☐ No ☒

***All negative responses must be addressed in an attached laboratory narrative.**

I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this analytical report is, to the best of my knowledge and belief, accurate and complete.

Signature: Laurel Stoddard
Printed Name: Laurel Stoddard

Date: May 17, 2021
Position: Laboratory Director



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge St Worcester MA
Client Sample ID: B-3
Date Sampled: 05/04/21 12:15
Percent Solids: 93

ESS Laboratory Work Order: 21E0122
ESS Laboratory Sample ID: 21E0122-01
Sample Matrix: Soil
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Antimony	ND (4.98)		6010C		1	KJK	05/07/21 23:55	2.17	100	DE10627
Arsenic	18.1 (2.49)		6010C		1	KJK	05/07/21 23:55	2.17	100	DE10627
Barium	22.3 (2.49)		6010C		1	KJK	05/07/21 23:55	2.17	100	DE10627
Beryllium	0.36 (0.11)		6010C		1	KJK	05/08/21 15:17	2.17	100	DE10627
Cadmium	ND (0.50)		6010C		1	KJK	05/07/21 23:55	2.17	100	DE10627
Chromium	19.3 (1.00)		6010C		1	KJK	05/07/21 23:55	2.17	100	DE10627
Lead	15.3 (4.98)		6010C		1	KJK	05/08/21 15:17	2.17	100	DE10627
Mercury	ND (0.029)		7471B		1	JRB	05/10/21 16:27	0.73	40	DE10626
Nickel	18.4 (2.49)		6010C		1	KJK	05/07/21 23:55	2.17	100	DE10627
Selenium	ND (1.00)		6020A		1	BJV	05/10/21 19:59	2.17	100	DE10627
Silver	ND (0.50)		6010C		1	KJK	05/07/21 23:55	2.17	100	DE10627
Thallium	ND (4.98)		6010C		1	KJK	05/07/21 23:55	2.17	100	DE10627
Vanadium	17.8 (1.00)		6010C		1	KJK	05/08/21 15:17	2.17	100	DE10627
Zinc	36.1 (2.49)		6010C		1	KJK	05/08/21 15:17	2.17	100	DE10627



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge St Worcester MA
Client Sample ID: B-3
Date Sampled: 05/04/21 12:15
Percent Solids: 93
Initial Volume: 6.9
Final Volume: 10
Extraction Method: 5035

ESS Laboratory Work Order: 21E0122
ESS Laboratory Sample ID: 21E0122-01
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
1,1,1,2-Tetrachloroethane	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
1,1,1-Trichloroethane	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
1,1,2,2-Tetrachloroethane	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
1,1,2-Trichloroethane	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
1,1-Dichloroethane	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
1,1-Dichloroethene	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
1,1-Dichloropropene	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
1,2,3-Trichlorobenzene	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
1,2,3-Trichloropropane	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
1,2,4-Trichlorobenzene	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
1,2,4-Trimethylbenzene	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
1,2-Dibromo-3-Chloropropane	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
1,2-Dibromoethane	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
1,2-Dichlorobenzene	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
1,2-Dichloroethane	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
1,2-Dichloropropane	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
1,3,5-Trimethylbenzene	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
1,3-Dichlorobenzene	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
1,3-Dichloropropane	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
1,4-Dichlorobenzene	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
1,4-Dioxane	ND (0.0626)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
2,2-Dichloropropane	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
2-Butanone	ND (0.0391)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
2-Chlorotoluene	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
2-Hexanone	ND (0.0391)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
4-Chlorotoluene	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
4-Isopropyltoluene	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
4-Methyl-2-Pentanone	ND (0.0391)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
Acetone	ND (0.0391)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
Benzene	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
Bromobenzene	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
Bromochloromethane	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge St Worcester MA
Client Sample ID: B-3
Date Sampled: 05/04/21 12:15
Percent Solids: 93
Initial Volume: 6.9
Final Volume: 10
Extraction Method: 5035

ESS Laboratory Work Order: 21E0122
ESS Laboratory Sample ID: 21E0122-01
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Bromodichloromethane	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
Bromoform	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
Bromomethane	ND (0.0078)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
Carbon Disulfide	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
Carbon Tetrachloride	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
Chlorobenzene	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
Chloroethane	ND (0.0078)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
Chloroform	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
Chloromethane	ND (0.0078)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
cis-1,2-Dichloroethene	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
cis-1,3-Dichloropropene	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
Dibromochloromethane	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
Dibromomethane	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
Dichlorodifluoromethane	ND (0.0078)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
Diethyl Ether	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
Di-isopropyl ether	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
Ethyl tertiary-butyl ether	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
Ethylbenzene	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
Hexachlorobutadiene	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
Isopropylbenzene	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
Methyl tert-Butyl Ether	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
Methylene Chloride	ND (0.0196)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
Naphthalene	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
n-Butylbenzene	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
n-Propylbenzene	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
sec-Butylbenzene	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
Styrene	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
tert-Butylbenzene	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
Tertiary-amyl methyl ether	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
Tetrachloroethene	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
Tetrahydrofuran	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
Toluene	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge St Worcester MA
Client Sample ID: B-3
Date Sampled: 05/04/21 12:15
Percent Solids: 93
Initial Volume: 6.9
Final Volume: 10
Extraction Method: 5035

ESS Laboratory Work Order: 21E0122
ESS Laboratory Sample ID: 21E0122-01
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
trans-1,2-Dichloroethene	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
trans-1,3-Dichloropropene	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
Trichloroethene	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
Trichlorofluoromethane	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
Vinyl Chloride	ND (0.0078)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
Xylene O	ND (0.0039)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
Xylene P,M	ND (0.0078)		8260B Low		1	05/06/21 13:57	D1E0106	DE10633
Xylenes (Total)	ND (0.00782)		8260B Low		1	05/06/21 13:57		[CALC]

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>120 %</i>		<i>70-130</i>
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>98 %</i>		<i>70-130</i>
<i>Surrogate: Dibromofluoromethane</i>	<i>110 %</i>		<i>70-130</i>
<i>Surrogate: Toluene-d8</i>	<i>98 %</i>		<i>70-130</i>



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge St Worcester MA
Client Sample ID: B-3
Date Sampled: 05/04/21 12:15
Percent Solids: 93
Initial Volume: 19.6
Final Volume: 10
Extraction Method: 3540C

ESS Laboratory Work Order: 21E0122
ESS Laboratory Sample ID: 21E0122-01
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MJV
Prepared: 5/5/21 17:30

8082A Polychlorinated Biphenyls (PCB)

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Aroclor 1016	ND (0.06)		8082A		1	05/06/21 16:21		DE10513
Aroclor 1221	ND (0.06)		8082A		1	05/06/21 16:21		DE10513
Aroclor 1232	ND (0.06)		8082A		1	05/06/21 16:21		DE10513
Aroclor 1242	ND (0.06)		8082A		1	05/06/21 16:21		DE10513
Aroclor 1248	ND (0.06)		8082A		1	05/06/21 16:21		DE10513
Aroclor 1254	ND (0.06)		8082A		1	05/06/21 16:21		DE10513
Aroclor 1260	ND (0.06)		8082A		1	05/06/21 16:21		DE10513
Aroclor 1262	ND (0.06)		8082A		1	05/06/21 16:21		DE10513
Aroclor 1268	ND (0.06)		8082A		1	05/06/21 16:21		DE10513

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: Decachlorobiphenyl</i>	69 %		30-150
<i>Surrogate: Decachlorobiphenyl [2C]</i>	58 %		30-150
<i>Surrogate: Tetrachloro-m-xylene</i>	98 %		30-150
<i>Surrogate: Tetrachloro-m-xylene [2C]</i>	101 %		30-150



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge St Worcester MA
Client Sample ID: B-3
Date Sampled: 05/04/21 12:15
Percent Solids: 93
Initial Volume: 20
Final Volume: 1
Extraction Method: 3546

ESS Laboratory Work Order: 21E0122
ESS Laboratory Sample ID: 21E0122-01
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TLW
Prepared: 5/5/21 20:00

8100M Total Petroleum Hydrocarbons

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Total Petroleum Hydrocarbons	114 (10.8)		8100M		1	05/06/21 20:12	D1E0087	DE10537
		<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				
Surrogate: O-Terphenyl		95 %		40-140				



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge St Worcester MA
Client Sample ID: B-3
Date Sampled: 05/04/21 12:15
Percent Solids: 93
Initial Volume: 15.6
Final Volume: 0.5
Extraction Method: 3546

ESS Laboratory Work Order: 21E0122
ESS Laboratory Sample ID: 21E0122-01
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TJ
Prepared: 5/5/21 16:20

8270D Semi-Volatile Organic Compounds

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
1,2,4-Trichlorobenzene	ND (0.691)		8270D		2	05/06/21 4:27	D1E0064	DE10516
1,2-Dichlorobenzene	ND (0.691)		8270D		2	05/06/21 4:27	D1E0064	DE10516
1,3-Dichlorobenzene	ND (0.691)		8270D		2	05/06/21 4:27	D1E0064	DE10516
1,4-Dichlorobenzene	ND (0.691)		8270D		2	05/06/21 4:27	D1E0064	DE10516
2,4,5-Trichlorophenol	ND (0.691)		8270D		2	05/06/21 4:27	D1E0064	DE10516
2,4,6-Trichlorophenol	ND (0.691)		8270D		2	05/06/21 4:27	D1E0064	DE10516
2,4-Dichlorophenol	ND (0.691)		8270D		2	05/06/21 4:27	D1E0064	DE10516
2,4-Dimethylphenol	ND (0.691)		8270D		2	05/06/21 4:27	D1E0064	DE10516
2,4-Dinitrophenol	ND (1.38)		8270D		2	05/06/21 4:27	D1E0064	DE10516
2,4-Dinitrotoluene	ND (0.691)		8270D		2	05/06/21 4:27	D1E0064	DE10516
2,6-Dinitrotoluene	ND (0.691)		8270D		2	05/06/21 4:27	D1E0064	DE10516
2-Chloronaphthalene	ND (0.691)		8270D		2	05/06/21 4:27	D1E0064	DE10516
2-Chlorophenol	ND (0.691)		8270D		2	05/06/21 4:27	D1E0064	DE10516
2-Methylnaphthalene	ND (0.691)		8270D		2	05/06/21 4:27	D1E0064	DE10516
2-Methylphenol	ND (0.691)		8270D		2	05/06/21 4:27	D1E0064	DE10516
2-Nitrophenol	ND (0.691)		8270D		2	05/06/21 4:27	D1E0064	DE10516
3,3'-Dichlorobenzidine	ND (0.691)		8270D		2	05/06/21 4:27	D1E0064	DE10516
3+4-Methylphenol	ND (1.38)		8270D		2	05/06/21 4:27	D1E0064	DE10516
4-Bromophenyl-phenylether	ND (0.691)		8270D		2	05/06/21 4:27	D1E0064	DE10516
4-Chloroaniline	ND (0.691)		8270D		2	05/06/21 4:27	D1E0064	DE10516
4-Nitrophenol	ND (3.47)		8270D		2	05/06/21 4:27	D1E0064	DE10516
Acenaphthene	ND (0.691)		8270D		2	05/06/21 4:27	D1E0064	DE10516
Acenaphthylene	ND (0.691)		8270D		2	05/06/21 4:27	D1E0064	DE10516
Acetophenone	ND (1.38)		8270D		2	05/06/21 4:27	D1E0064	DE10516
Aniline	ND (3.47)		8270D		2	05/06/21 4:27	D1E0064	DE10516
Anthracene	ND (0.691)		8270D		2	05/06/21 4:27	D1E0064	DE10516
Azobenzene	ND (0.691)		8270D		2	05/06/21 4:27	D1E0064	DE10516
Benzo(a)anthracene	ND (0.691)		8270D		2	05/06/21 4:27	D1E0064	DE10516
Benzo(a)pyrene	ND (0.347)		8270D		2	05/06/21 4:27	D1E0064	DE10516
Benzo(b)fluoranthene	ND (0.691)		8270D		2	05/06/21 4:27	D1E0064	DE10516
Benzo(g,h,i)perylene	ND (0.691)		8270D		2	05/06/21 4:27	D1E0064	DE10516
Benzo(k)fluoranthene	ND (0.691)		8270D		2	05/06/21 4:27	D1E0064	DE10516



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge St Worcester MA
Client Sample ID: B-3
Date Sampled: 05/04/21 12:15
Percent Solids: 93
Initial Volume: 15.6
Final Volume: 0.5
Extraction Method: 3546

ESS Laboratory Work Order: 21E0122
ESS Laboratory Sample ID: 21E0122-01
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TJ
Prepared: 5/5/21 16:20

8270D Semi-Volatile Organic Compounds

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
bis(2-Chloroethoxy)methane	ND (0.691)		8270D		2	05/06/21 4:27	D1E0064	DE10516
bis(2-Chloroethyl)ether	ND (0.691)		8270D		2	05/06/21 4:27	D1E0064	DE10516
bis(2-chloroisopropyl)Ether	ND (0.691)		8270D		2	05/06/21 4:27	D1E0064	DE10516
bis(2-Ethylhexyl)phthalate	ND (0.691)		8270D		2	05/06/21 4:27	D1E0064	DE10516
Butylbenzylphthalate	ND (0.691)		8270D		2	05/06/21 4:27	D1E0064	DE10516
Chrysene	ND (0.347)		8270D		2	05/06/21 4:27	D1E0064	DE10516
Dibenzo(a,h)Anthracene	ND (0.347)		8270D		2	05/06/21 4:27	D1E0064	DE10516
Dibenzofuran	ND (0.691)		8270D		2	05/06/21 4:27	D1E0064	DE10516
Diethylphthalate	ND (0.691)		8270D		2	05/06/21 4:27	D1E0064	DE10516
Dimethylphthalate	ND (0.691)		8270D		2	05/06/21 4:27	D1E0064	DE10516
Di-n-butylphthalate	ND (0.691)		8270D		2	05/06/21 4:27	D1E0064	DE10516
Di-n-octylphthalate	ND (0.691)		8270D		2	05/06/21 4:27	D1E0064	DE10516
Fluoranthene	ND (0.691)		8270D		2	05/06/21 4:27	D1E0064	DE10516
Fluorene	ND (0.691)		8270D		2	05/06/21 4:27	D1E0064	DE10516
Hexachlorobenzene	ND (0.691)		8270D		2	05/06/21 4:27	D1E0064	DE10516
Hexachlorobutadiene	ND (0.691)		8270D		2	05/06/21 4:27	D1E0064	DE10516
Hexachloroethane	ND (0.691)		8270D		2	05/06/21 4:27	D1E0064	DE10516
Indeno(1,2,3-cd)Pyrene	ND (0.691)		8270D		2	05/06/21 4:27	D1E0064	DE10516
Isophorone	ND (0.691)		8270D		2	05/06/21 4:27	D1E0064	DE10516
Naphthalene	ND (0.691)		8270D		2	05/06/21 4:27	D1E0064	DE10516
Nitrobenzene	ND (0.691)		8270D		2	05/06/21 4:27	D1E0064	DE10516
N-Nitrosodimethylamine	ND (0.691)		8270D		2	05/06/21 4:27	D1E0064	DE10516
Pentachlorophenol	ND (1.38)		8270D		2	05/06/21 4:27	D1E0064	DE10516
Phenanthrene	ND (0.691)		8270D		2	05/06/21 4:27	D1E0064	DE10516
Phenol	ND (0.691)		8270D		2	05/06/21 4:27	D1E0064	DE10516
Pyrene	ND (0.691)		8270D		2	05/06/21 4:27	D1E0064	DE10516

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
Surrogate: 1,2-Dichlorobenzene-d4	75 %		30-130
Surrogate: 2,4,6-Tribromophenol	82 %		30-130
Surrogate: 2-Chlorophenol-d4	84 %		30-130
Surrogate: 2-Fluorobiphenyl	79 %		30-130



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge St Worcester MA
Client Sample ID: B-3
Date Sampled: 05/04/21 12:15
Percent Solids: 93
Initial Volume: 15.6
Final Volume: 0.5
Extraction Method: 3546

ESS Laboratory Work Order: 21E0122
ESS Laboratory Sample ID: 21E0122-01
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TJ
Prepared: 5/5/21 16:20

8270D Semi-Volatile Organic Compounds

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Surrogate: 2-Fluorophenol		84 %		30-130				
Surrogate: Nitrobenzene-d5		78 %		30-130				
Surrogate: Phenol-d6		85 %		30-130				
Surrogate: p-Terphenyl-d14		96 %		30-130				



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge St Worcester MA
Client Sample ID: B-3
Date Sampled: 05/04/21 12:15
Percent Solids: 93

ESS Laboratory Work Order: 21E0122
ESS Laboratory Sample ID: 21E0122-01
Sample Matrix: Soil

Classical Chemistry

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Conductivity	WL 1100 (5)		9050A		1	EAM	05/10/21 17:57	umhos/cm	DE11039
Corrosivity (pH)	6.27 (N/A)		9045		1	EAM	05/05/21 20:38	S.U.	DE10565
Corrosivity (pH) Sample Temp	Soil pH measured in water at 21.0 °C.								
Flashpoint	> 200 (N/A)		1010A		1	CCP	05/07/21 14:43	°F	DE10730
Reactive Cyanide	ND (2.0)		7.3.3.2		1	JLK	05/07/21 15:30	mg/kg	DE10733
Reactive Sulfide	ND (2.0)		7.3.4.1		1	JLK	05/07/21 15:30	mg/kg	DE10733



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge St Worcester MA

ESS Laboratory Work Order: 21E0122

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Total Metals										
Batch DE10626 - 7471A										
Blank										
Mercury	ND	0.033	mg/kg wet							
LCS										
Mercury	22.2	3.19	mg/kg wet	21.60		103	80-120			
LCS Dup										
Mercury	21.7	2.87	mg/kg wet	21.60		100	80-120	2	20	
Batch DE10627 - 3050B										
Blank										
Antimony	ND	5.00	mg/kg wet							
Arsenic	ND	2.50	mg/kg wet							
Barium	ND	2.50	mg/kg wet							
Beryllium	ND	0.11	mg/kg wet							
Cadmium	ND	0.50	mg/kg wet							
Chromium	ND	1.00	mg/kg wet							
Lead	ND	5.00	mg/kg wet							
Nickel	ND	2.50	mg/kg wet							
Silver	ND	0.50	mg/kg wet							
Thallium	ND	5.00	mg/kg wet							
Vanadium	ND	1.00	mg/kg wet							
Zinc	ND	2.50	mg/kg wet							
Blank										
Selenium	ND	1.00	mg/kg wet							
LCS										
Antimony	26.1	15.4	mg/kg wet	42.00		62	40-160			
Arsenic	31.5	7.69	mg/kg wet	43.10		73	63-136			
Barium	475	7.69	mg/kg wet	597.0		80	80-120			
Beryllium	101	0.34	mg/kg wet	117.0		86	80-120			
Cadmium	93.2	1.54	mg/kg wet	118.0		79	69-130			
Chromium	251	3.08	mg/kg wet	299.0		84	80-120			
Lead	124	15.4	mg/kg wet	144.0		86	80-120			
Nickel	148	7.69	mg/kg wet	171.0		86	80-120			
Silver	61.9	1.54	mg/kg wet	73.50		84	80-120			
Vanadium	226	3.08	mg/kg wet	259.0		87	80-120			
Zinc	697	7.69	mg/kg wet	874.0		80	80-120			
LCS										
Thallium	97.1	14.9	mg/kg wet	121.0		80	80-120			
LCS										
Selenium	46.5	5.00	mg/kg wet	50.05		93	80-120			
LCS Dup										
Antimony	27.7	15.6	mg/kg wet	42.00		66	40-160	6	20	
Arsenic	31.8	7.81	mg/kg wet	43.10		74	63-136	0.8	20	
Barium	549	7.81	mg/kg wet	597.0		92	80-120	14	20	
Beryllium	102	0.34	mg/kg wet	117.0		87	80-120	1	20	



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge St Worcester MA

ESS Laboratory Work Order: 21E0122

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier

Total Metals

Batch DE10627 - 3050B

Cadmium	94.8	1.56	mg/kg wet	118.0		80	69-130	2	20	
Chromium	256	3.12	mg/kg wet	299.0		86	80-120	2	20	
Lead	125	15.6	mg/kg wet	144.0		87	80-120	0.7	20	
Nickel	150	7.81	mg/kg wet	171.0		88	80-120	2	20	
Silver	62.3	1.56	mg/kg wet	73.50		85	80-120	0.6	20	
Vanadium	231	3.12	mg/kg wet	259.0		89	80-120	2	20	
Zinc	709	7.81	mg/kg wet	874.0		81	80-120	2	20	

LCS Dup

Thallium	103	15.9	mg/kg wet	121.0		85	80-120	5	20	

LCS Dup

Selenium	45.9	5.00	mg/kg wet	49.28		93	80-120	1	30	

5035/8260B Volatile Organic Compounds / Low Level

Batch DE10633 - 5035

Blank

1,1,1,2-Tetrachloroethane	ND	0.0050	mg/kg wet
1,1,1-Trichloroethane	ND	0.0050	mg/kg wet
1,1,2,2-Tetrachloroethane	ND	0.0050	mg/kg wet
1,1,2-Trichloroethane	ND	0.0050	mg/kg wet
1,1-Dichloroethane	ND	0.0050	mg/kg wet
1,1-Dichloroethene	ND	0.0050	mg/kg wet
1,1-Dichloropropene	ND	0.0050	mg/kg wet
1,2,3-Trichlorobenzene	ND	0.0050	mg/kg wet
1,2,3-Trichloropropane	ND	0.0050	mg/kg wet
1,2,4-Trichlorobenzene	ND	0.0050	mg/kg wet
1,2,4-Trimethylbenzene	ND	0.0050	mg/kg wet
1,2-Dibromo-3-Chloropropane	ND	0.0050	mg/kg wet
1,2-Dibromoethane	ND	0.0050	mg/kg wet
1,2-Dichlorobenzene	ND	0.0050	mg/kg wet
1,2-Dichloroethane	ND	0.0050	mg/kg wet
1,2-Dichloropropane	ND	0.0050	mg/kg wet
1,3,5-Trimethylbenzene	ND	0.0050	mg/kg wet
1,3-Dichlorobenzene	ND	0.0050	mg/kg wet
1,3-Dichloropropane	ND	0.0050	mg/kg wet
1,4-Dichlorobenzene	ND	0.0050	mg/kg wet
1,4-Dioxane	ND	0.0800	mg/kg wet
2,2-Dichloropropane	ND	0.0050	mg/kg wet
2-Butanone	ND	0.0500	mg/kg wet
2-Chlorotoluene	ND	0.0050	mg/kg wet
2-Hexanone	ND	0.0500	mg/kg wet
4-Chlorotoluene	ND	0.0050	mg/kg wet
4-Isopropyltoluene	ND	0.0050	mg/kg wet
4-Methyl-2-Pentanone	ND	0.0500	mg/kg wet
Acetone	ND	0.0500	mg/kg wet



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge St Worcester MA

ESS Laboratory Work Order: 21E0122

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier

5035/8260B Volatile Organic Compounds / Low Level

Batch DE10633 - 5035

Benzene	ND	0.0050	mg/kg wet							
Bromobenzene	ND	0.0050	mg/kg wet							
Bromochloromethane	ND	0.0050	mg/kg wet							
Bromodichloromethane	ND	0.0050	mg/kg wet							
Bromoform	ND	0.0050	mg/kg wet							
Bromomethane	ND	0.0100	mg/kg wet							
Carbon Disulfide	ND	0.0050	mg/kg wet							
Carbon Tetrachloride	ND	0.0050	mg/kg wet							
Chlorobenzene	ND	0.0050	mg/kg wet							
Chloroethane	ND	0.0100	mg/kg wet							
Chloroform	ND	0.0050	mg/kg wet							
Chloromethane	ND	0.0100	mg/kg wet							
cis-1,2-Dichloroethene	ND	0.0050	mg/kg wet							
cis-1,3-Dichloropropene	ND	0.0050	mg/kg wet							
Dibromochloromethane	ND	0.0050	mg/kg wet							
Dibromomethane	ND	0.0050	mg/kg wet							
Dichlorodifluoromethane	ND	0.0100	mg/kg wet							
Diethyl Ether	ND	0.0050	mg/kg wet							
Di-isopropyl ether	ND	0.0050	mg/kg wet							
Ethyl tertiary-butyl ether	ND	0.0050	mg/kg wet							
Ethylbenzene	ND	0.0050	mg/kg wet							
Hexachlorobutadiene	ND	0.0050	mg/kg wet							
Isopropylbenzene	ND	0.0050	mg/kg wet							
Methyl tert-Butyl Ether	ND	0.0050	mg/kg wet							
Methylene Chloride	ND	0.0250	mg/kg wet							
Naphthalene	ND	0.0050	mg/kg wet							
n-Butylbenzene	ND	0.0050	mg/kg wet							
n-Propylbenzene	ND	0.0050	mg/kg wet							
sec-Butylbenzene	ND	0.0050	mg/kg wet							
Styrene	ND	0.0050	mg/kg wet							
tert-Butylbenzene	ND	0.0050	mg/kg wet							
Tertiary-amyl methyl ether	ND	0.0050	mg/kg wet							
Tetrachloroethene	ND	0.0050	mg/kg wet							
Tetrahydrofuran	ND	0.0050	mg/kg wet							
Toluene	ND	0.0050	mg/kg wet							
trans-1,2-Dichloroethene	ND	0.0050	mg/kg wet							
trans-1,3-Dichloropropene	ND	0.0050	mg/kg wet							
Trichloroethene	ND	0.0050	mg/kg wet							
Trichlorofluoromethane	ND	0.0050	mg/kg wet							
Vinyl Chloride	ND	0.0100	mg/kg wet							
Xylene O	ND	0.0050	mg/kg wet							
Xylene P,M	ND	0.0100	mg/kg wet							
Surrogate: 1,2-Dichloroethane-d4	0.0589		mg/kg wet	0.05000		118	70-130			
Surrogate: 4-Bromofluorobenzene	0.0497		mg/kg wet	0.05000		99	70-130			
Surrogate: Dibromofluoromethane	0.0530		mg/kg wet	0.05000		106	70-130			



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge St Worcester MA

ESS Laboratory Work Order: 21E0122

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier

5035/8260B Volatile Organic Compounds / Low Level

Batch DE10633 - 5035

<i>Surrogate: Toluene-d8</i>	<i>0.0492</i>		mg/kg wet	<i>0.05000</i>		<i>98</i>	<i>70-130</i>			
LCS										
1,1,1,2-Tetrachloroethane	0.0541	0.0050	mg/kg wet	0.05000		108	70-130			
1,1,1-Trichloroethane	0.0539	0.0050	mg/kg wet	0.05000		108	70-130			
1,1,2,2-Tetrachloroethane	0.0486	0.0050	mg/kg wet	0.05000		97	70-130			
1,1,2-Trichloroethane	0.0490	0.0050	mg/kg wet	0.05000		98	70-130			
1,1-Dichloroethane	0.0498	0.0050	mg/kg wet	0.05000		100	70-130			
1,1-Dichloroethene	0.0521	0.0050	mg/kg wet	0.05000		104	70-130			
1,1-Dichloropropene	0.0526	0.0050	mg/kg wet	0.05000		105	70-130			
1,2,3-Trichlorobenzene	0.0507	0.0050	mg/kg wet	0.05000		101	70-130			
1,2,3-Trichloropropane	0.0492	0.0050	mg/kg wet	0.05000		98	70-130			
1,2,4-Trichlorobenzene	0.0495	0.0050	mg/kg wet	0.05000		99	70-130			
1,2,4-Trimethylbenzene	0.0474	0.0050	mg/kg wet	0.05000		95	70-130			
1,2-Dibromo-3-Chloropropane	0.0556	0.0050	mg/kg wet	0.05000		111	70-130			
1,2-Dibromoethane	0.0484	0.0050	mg/kg wet	0.05000		97	70-130			
1,2-Dichlorobenzene	0.0461	0.0050	mg/kg wet	0.05000		92	70-130			
1,2-Dichloroethane	0.0532	0.0050	mg/kg wet	0.05000		106	70-130			
1,2-Dichloropropane	0.0479	0.0050	mg/kg wet	0.05000		96	70-130			
1,3,5-Trimethylbenzene	0.0495	0.0050	mg/kg wet	0.05000		99	70-130			
1,3-Dichlorobenzene	0.0454	0.0050	mg/kg wet	0.05000		91	70-130			
1,3-Dichloropropane	0.0490	0.0050	mg/kg wet	0.05000		98	70-130			
1,4-Dichlorobenzene	0.0467	0.0050	mg/kg wet	0.05000		93	70-130			
1,4-Dioxane	0.993	0.0800	mg/kg wet	1.000		99	70-130			
2,2-Dichloropropane	0.0556	0.0050	mg/kg wet	0.05000		111	70-130			
2-Butanone	0.269	0.0500	mg/kg wet	0.2500		108	70-130			
2-Chlorotoluene	0.0461	0.0050	mg/kg wet	0.05000		92	70-130			
2-Hexanone	0.251	0.0500	mg/kg wet	0.2500		100	70-130			
4-Chlorotoluene	0.0469	0.0050	mg/kg wet	0.05000		94	70-130			
4-Isopropyltoluene	0.0478	0.0050	mg/kg wet	0.05000		96	70-130			
4-Methyl-2-Pentanone	0.264	0.0500	mg/kg wet	0.2500		106	70-130			
Acetone	0.274	0.0500	mg/kg wet	0.2500		109	70-130			
Benzene	0.0475	0.0050	mg/kg wet	0.05000		95	70-130			
Bromobenzene	0.0459	0.0050	mg/kg wet	0.05000		92	70-130			
Bromochloromethane	0.0480	0.0050	mg/kg wet	0.05000		96	70-130			
Bromodichloromethane	0.0545	0.0050	mg/kg wet	0.05000		109	70-130			
Bromoform	0.0531	0.0050	mg/kg wet	0.05000		106	70-130			
Bromomethane	0.0482	0.0100	mg/kg wet	0.05000		96	70-130			
Carbon Disulfide	0.0533	0.0050	mg/kg wet	0.05000		107	70-130			
Carbon Tetrachloride	0.0592	0.0050	mg/kg wet	0.05000		118	70-130			
Chlorobenzene	0.0454	0.0050	mg/kg wet	0.05000		91	70-130			
Chloroethane	0.0465	0.0100	mg/kg wet	0.05000		93	70-130			
Chloroform	0.0507	0.0050	mg/kg wet	0.05000		101	70-130			
Chloromethane	0.0538	0.0100	mg/kg wet	0.05000		108	70-130			
cis-1,2-Dichloroethene	0.0486	0.0050	mg/kg wet	0.05000		97	70-130			



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge St Worcester MA

ESS Laboratory Work Order: 21E0122

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier

5035/8260B Volatile Organic Compounds / Low Level

Batch DE10633 - 5035

cis-1,3-Dichloropropene	0.0535	0.0050	mg/kg wet	0.05000		107	70-130			
Dibromochloromethane	0.0534	0.0050	mg/kg wet	0.05000		107	70-130			
Dibromomethane	0.0503	0.0050	mg/kg wet	0.05000		101	70-130			
Dichlorodifluoromethane	0.0615	0.0100	mg/kg wet	0.05000		123	70-130			
Diethyl Ether	0.0507	0.0050	mg/kg wet	0.05000		101	70-130			
Di-isopropyl ether	0.0540	0.0050	mg/kg wet	0.05000		108	70-130			
Ethyl tertiary-butyl ether	0.0497	0.0050	mg/kg wet	0.05000		99	70-130			
Ethylbenzene	0.0468	0.0050	mg/kg wet	0.05000		94	70-130			
Hexachlorobutadiene	0.0506	0.0050	mg/kg wet	0.05000		101	70-130			
Isopropylbenzene	0.0463	0.0050	mg/kg wet	0.05000		93	70-130			
Methyl tert-Butyl Ether	0.0541	0.0050	mg/kg wet	0.05000		108	70-130			
Methylene Chloride	0.0477	0.0250	mg/kg wet	0.05000		95	70-130			
Naphthalene	0.0497	0.0050	mg/kg wet	0.05000		99	70-130			
n-Butylbenzene	0.0501	0.0050	mg/kg wet	0.05000		100	70-130			
n-Propylbenzene	0.0471	0.0050	mg/kg wet	0.05000		94	70-130			
sec-Butylbenzene	0.0462	0.0050	mg/kg wet	0.05000		92	70-130			
Styrene	0.0453	0.0050	mg/kg wet	0.05000		91	70-130			
tert-Butylbenzene	0.0474	0.0050	mg/kg wet	0.05000		95	70-130			
Tertiary-amyl methyl ether	0.0522	0.0050	mg/kg wet	0.05000		104	70-130			
Tetrachloroethene	0.0419	0.0050	mg/kg wet	0.05000		84	70-130			
Tetrahydrofuran	0.0505	0.0050	mg/kg wet	0.05000		101	70-130			
Toluene	0.0477	0.0050	mg/kg wet	0.05000		95	70-130			
trans-1,2-Dichloroethene	0.0488	0.0050	mg/kg wet	0.05000		98	70-130			
trans-1,3-Dichloropropene	0.0486	0.0050	mg/kg wet	0.05000		97	70-130			
Trichloroethene	0.0485	0.0050	mg/kg wet	0.05000		97	70-130			
Trichlorofluoromethane	0.0566	0.0050	mg/kg wet	0.05000		113	70-130			
Vinyl Chloride	0.0576	0.0100	mg/kg wet	0.05000		115	70-130			
Xylene O	0.0468	0.0050	mg/kg wet	0.05000		94	70-130			
Xylene P,M	0.0969	0.0100	mg/kg wet	0.1000		97	70-130			
Surrogate: 1,2-Dichloroethane-d4	0.0548		mg/kg wet	0.05000		110	70-130			
Surrogate: 4-Bromofluorobenzene	0.0499		mg/kg wet	0.05000		100	70-130			
Surrogate: Dibromofluoromethane	0.0533		mg/kg wet	0.05000		107	70-130			
Surrogate: Toluene-d8	0.0486		mg/kg wet	0.05000		97	70-130			

LCS Dup

1,1,1,2-Tetrachloroethane	0.0597	0.0050	mg/kg wet	0.05000		119	70-130	10	20	
1,1,1-Trichloroethane	0.0588	0.0050	mg/kg wet	0.05000		118	70-130	9	20	
1,1,2,2-Tetrachloroethane	0.0553	0.0050	mg/kg wet	0.05000		111	70-130	13	20	
1,1,2-Trichloroethane	0.0548	0.0050	mg/kg wet	0.05000		110	70-130	11	20	
1,1-Dichloroethane	0.0546	0.0050	mg/kg wet	0.05000		109	70-130	9	20	
1,1-Dichloroethene	0.0572	0.0050	mg/kg wet	0.05000		114	70-130	9	20	
1,1-Dichloropropene	0.0553	0.0050	mg/kg wet	0.05000		111	70-130	5	20	
1,2,3-Trichlorobenzene	0.0568	0.0050	mg/kg wet	0.05000		114	70-130	11	20	
1,2,3-Trichloropropane	0.0560	0.0050	mg/kg wet	0.05000		112	70-130	13	20	
1,2,4-Trichlorobenzene	0.0553	0.0050	mg/kg wet	0.05000		111	70-130	11	20	
1,2,4-Trimethylbenzene	0.0523	0.0050	mg/kg wet	0.05000		105	70-130	10	20	



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge St Worcester MA

ESS Laboratory Work Order: 21E0122

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier

5035/8260B Volatile Organic Compounds / Low Level

Batch DE10633 - 5035

1,2-Dibromo-3-Chloropropane	0.0634	0.0050	mg/kg wet	0.05000		127	70-130	13	20	
1,2-Dibromoethane	0.0539	0.0050	mg/kg wet	0.05000		108	70-130	11	20	
1,2-Dichlorobenzene	0.0513	0.0050	mg/kg wet	0.05000		103	70-130	11	20	
1,2-Dichloroethane	0.0583	0.0050	mg/kg wet	0.05000		117	70-130	9	20	
1,2-Dichloropropane	0.0520	0.0050	mg/kg wet	0.05000		104	70-130	8	20	
1,3,5-Trimethylbenzene	0.0535	0.0050	mg/kg wet	0.05000		107	70-130	8	20	
1,3-Dichlorobenzene	0.0509	0.0050	mg/kg wet	0.05000		102	70-130	11	20	
1,3-Dichloropropane	0.0546	0.0050	mg/kg wet	0.05000		109	70-130	11	20	
1,4-Dichlorobenzene	0.0518	0.0050	mg/kg wet	0.05000		104	70-130	10	20	
1,4-Dioxane	1.14	0.0800	mg/kg wet	1.000		114	70-130	14	20	
2,2-Dichloropropane	0.0610	0.0050	mg/kg wet	0.05000		122	70-130	9	20	
2-Butanone	0.308	0.0500	mg/kg wet	0.2500		123	70-130	13	20	
2-Chlorotoluene	0.0514	0.0050	mg/kg wet	0.05000		103	70-130	11	20	
2-Hexanone	0.300	0.0500	mg/kg wet	0.2500		120	70-130	18	20	
4-Chlorotoluene	0.0517	0.0050	mg/kg wet	0.05000		103	70-130	10	20	
4-Isopropyltoluene	0.0525	0.0050	mg/kg wet	0.05000		105	70-130	10	20	
4-Methyl-2-Pentanone	0.300	0.0500	mg/kg wet	0.2500		120	70-130	13	20	
Acetone	0.319	0.0500	mg/kg wet	0.2500		128	70-130	15	20	
Benzene	0.0523	0.0050	mg/kg wet	0.05000		105	70-130	10	20	
Bromobenzene	0.0508	0.0050	mg/kg wet	0.05000		102	70-130	10	20	
Bromochloromethane	0.0536	0.0050	mg/kg wet	0.05000		107	70-130	11	20	
Bromodichloromethane	0.0600	0.0050	mg/kg wet	0.05000		120	70-130	10	20	
Bromoform	0.0589	0.0050	mg/kg wet	0.05000		118	70-130	10	20	
Bromomethane	0.0529	0.0100	mg/kg wet	0.05000		106	70-130	9	20	
Carbon Disulfide	0.0586	0.0050	mg/kg wet	0.05000		117	70-130	10	20	
Carbon Tetrachloride	0.0644	0.0050	mg/kg wet	0.05000		129	70-130	8	20	
Chlorobenzene	0.0500	0.0050	mg/kg wet	0.05000		100	70-130	10	20	
Chloroethane	0.0518	0.0100	mg/kg wet	0.05000		104	70-130	11	20	
Chloroform	0.0556	0.0050	mg/kg wet	0.05000		111	70-130	9	20	
Chloromethane	0.0582	0.0100	mg/kg wet	0.05000		116	70-130	8	20	
cis-1,2-Dichloroethene	0.0539	0.0050	mg/kg wet	0.05000		108	70-130	10	20	
cis-1,3-Dichloropropene	0.0596	0.0050	mg/kg wet	0.05000		119	70-130	11	20	
Dibromochloromethane	0.0592	0.0050	mg/kg wet	0.05000		118	70-130	10	20	
Dibromomethane	0.0563	0.0050	mg/kg wet	0.05000		113	70-130	11	20	
Dichlorodifluoromethane	0.0641	0.0100	mg/kg wet	0.05000		128	70-130	4	20	
Diethyl Ether	0.0558	0.0050	mg/kg wet	0.05000		112	70-130	10	20	
Di-isopropyl ether	0.0599	0.0050	mg/kg wet	0.05000		120	70-130	11	20	
Ethyl tertiary-butyl ether	0.0560	0.0050	mg/kg wet	0.05000		112	70-130	12	20	
Ethylbenzene	0.0510	0.0050	mg/kg wet	0.05000		102	70-130	9	20	
Hexachlorobutadiene	0.0549	0.0050	mg/kg wet	0.05000		110	70-130	8	20	
Isopropylbenzene	0.0516	0.0050	mg/kg wet	0.05000		103	70-130	11	20	
Methyl tert-Butyl Ether	0.0613	0.0050	mg/kg wet	0.05000		123	70-130	12	20	
Methylene Chloride	0.0522	0.0250	mg/kg wet	0.05000		104	70-130	9	20	
Naphthalene	0.0562	0.0050	mg/kg wet	0.05000		112	70-130	12	20	
n-Butylbenzene	0.0554	0.0050	mg/kg wet	0.05000		111	70-130	10	20	



CERTIFICATE OF ANALYSIS

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ESS Laboratory Work Order: 21E0122

Quality Control Data

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5035/8260B Volatile Organic Compounds / Low Level

Batch DE10633 - 5035

n-Propylbenzene	0.0524	0.0050	mg/kg wet	0.05000		105	70-130	11	20	
sec-Butylbenzene	0.0510	0.0050	mg/kg wet	0.05000		102	70-130	10	20	
Styrene	0.0507	0.0050	mg/kg wet	0.05000		101	70-130	11	20	
tert-Butylbenzene	0.0526	0.0050	mg/kg wet	0.05000		105	70-130	11	20	
Tertiary-amyl methyl ether	0.0587	0.0050	mg/kg wet	0.05000		117	70-130	12	20	
Tetrachloroethene	0.0462	0.0050	mg/kg wet	0.05000		92	70-130	10	20	
Tetrahydrofuran	0.0599	0.0050	mg/kg wet	0.05000		120	70-130	17	20	
Toluene	0.0525	0.0050	mg/kg wet	0.05000		105	70-130	10	20	
trans-1,2-Dichloroethene	0.0537	0.0050	mg/kg wet	0.05000		107	70-130	10	20	
trans-1,3-Dichloropropene	0.0547	0.0050	mg/kg wet	0.05000		109	70-130	12	20	
Trichloroethene	0.0534	0.0050	mg/kg wet	0.05000		107	70-130	10	20	
Trichlorofluoromethane	0.0612	0.0050	mg/kg wet	0.05000		122	70-130	8	20	
Vinyl Chloride	0.0622	0.0100	mg/kg wet	0.05000		124	70-130	8	20	
Xylene O	0.0511	0.0050	mg/kg wet	0.05000		102	70-130	9	20	
Xylene P,M	0.106	0.0100	mg/kg wet	0.1000		106	70-130	9	20	
Surrogate: 1,2-Dichloroethane-d4	0.0545		mg/kg wet	0.05000		109	70-130			
Surrogate: 4-Bromofluorobenzene	0.0504		mg/kg wet	0.05000		101	70-130			
Surrogate: Dibromofluoromethane	0.0530		mg/kg wet	0.05000		106	70-130			
Surrogate: Toluene-d8	0.0483		mg/kg wet	0.05000		97	70-130			

8082A Polychlorinated Biphenyls (PCB)

Batch DE10513 - 3540C

Blank										
Aroclor 1016	ND	0.02	mg/kg wet							
Aroclor 1016 [2C]	ND	0.02	mg/kg wet							
Aroclor 1221	ND	0.02	mg/kg wet							
Aroclor 1221 [2C]	ND	0.02	mg/kg wet							
Aroclor 1232	ND	0.02	mg/kg wet							
Aroclor 1232 [2C]	ND	0.02	mg/kg wet							
Aroclor 1242	ND	0.02	mg/kg wet							
Aroclor 1242 [2C]	ND	0.02	mg/kg wet							
Aroclor 1248	ND	0.02	mg/kg wet							
Aroclor 1248 [2C]	ND	0.02	mg/kg wet							
Aroclor 1254	ND	0.02	mg/kg wet							
Aroclor 1254 [2C]	ND	0.02	mg/kg wet							
Aroclor 1260	ND	0.02	mg/kg wet							
Aroclor 1260 [2C]	ND	0.02	mg/kg wet							
Aroclor 1262	ND	0.02	mg/kg wet							
Aroclor 1262 [2C]	ND	0.02	mg/kg wet							
Aroclor 1268	ND	0.02	mg/kg wet							
Aroclor 1268 [2C]	ND	0.02	mg/kg wet							
Surrogate: Decachlorobiphenyl	ND		mg/kg wet	0.02500		87	30-150			
Surrogate: Decachlorobiphenyl [2C]	ND		mg/kg wet	0.02500		91	30-150			
Surrogate: Tetrachloro-m-xylene	ND		mg/kg wet	0.02500		93	30-150			



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Quality Control Data

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8082A Polychlorinated Biphenyls (PCB)

Batch DE10513 - 3540C

<i>Surrogate: Tetrachloro-m-xylene [2C]</i>	ND		mg/kg wet	0.02500		96	30-150			

LCS

Aroclor 1016	0.5	0.02	mg/kg wet	0.5000		97	40-140			
Aroclor 1016 [2C]	0.5	0.02	mg/kg wet	0.5000		105	40-140			
Aroclor 1260	0.5	0.02	mg/kg wet	0.5000		97	40-140			
Aroclor 1260 [2C]	0.5	0.02	mg/kg wet	0.5000		101	40-140			

<i>Surrogate: Decachlorobiphenyl</i>	0.0213		mg/kg wet	0.02500		85	30-150			
<i>Surrogate: Decachlorobiphenyl [2C]</i>	0.0220		mg/kg wet	0.02500		88	30-150			
<i>Surrogate: Tetrachloro-m-xylene</i>	0.0233		mg/kg wet	0.02500		93	30-150			
<i>Surrogate: Tetrachloro-m-xylene [2C]</i>	0.0252		mg/kg wet	0.02500		101	30-150			

LCS Dup

Aroclor 1016	0.5	0.02	mg/kg wet	0.5000		102	40-140	5	30	
Aroclor 1016 [2C]	0.5	0.02	mg/kg wet	0.5000		106	40-140	1	30	
Aroclor 1260	0.5	0.02	mg/kg wet	0.5000		99	40-140	2	30	
Aroclor 1260 [2C]	0.5	0.02	mg/kg wet	0.5000		103	40-140	3	30	

<i>Surrogate: Decachlorobiphenyl</i>	0.0219		mg/kg wet	0.02500		88	30-150			
<i>Surrogate: Decachlorobiphenyl [2C]</i>	0.0230		mg/kg wet	0.02500		92	30-150			
<i>Surrogate: Tetrachloro-m-xylene</i>	0.0242		mg/kg wet	0.02500		97	30-150			
<i>Surrogate: Tetrachloro-m-xylene [2C]</i>	0.0259		mg/kg wet	0.02500		104	30-150			

8100M Total Petroleum Hydrocarbons

Batch DE10537 - 3546

Blank

Decane (C10)	ND	0.2	mg/kg wet							
Docosane (C22)	ND	0.2	mg/kg wet							
Dodecane (C12)	ND	0.2	mg/kg wet							
Eicosane (C20)	ND	0.2	mg/kg wet							
Hexacosane (C26)	ND	0.2	mg/kg wet							
Hexadecane (C16)	ND	0.2	mg/kg wet							
Hexatriacontane (C36)	ND	0.2	mg/kg wet							
Nonadecane (C19)	ND	0.2	mg/kg wet							
Nonane (C9)	ND	0.2	mg/kg wet							
Octacosane (C28)	ND	0.2	mg/kg wet							
Octadecane (C18)	ND	0.2	mg/kg wet							
Tetracosane (C24)	ND	0.2	mg/kg wet							
Tetradecane (C14)	ND	0.2	mg/kg wet							
Total Petroleum Hydrocarbons	ND	10.0	mg/kg wet							
Triacontane (C30)	ND	0.2	mg/kg wet							

<i>Surrogate: O-Terphenyl</i>	4.95		mg/kg wet	5.000		99	40-140			

LCS

Decane (C10)	1.9	0.2	mg/kg wet	2.500		77	40-140			



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8100M Total Petroleum Hydrocarbons

Batch DE10537 - 3546

Docosane (C22)	2.3	0.2	mg/kg wet	2.500		90	40-140			
Dodecane (C12)	2.1	0.2	mg/kg wet	2.500		84	40-140			
Eicosane (C20)	2.3	0.2	mg/kg wet	2.500		91	40-140			
Hexacosane (C26)	2.3	0.2	mg/kg wet	2.500		92	40-140			
Hexadecane (C16)	2.2	0.2	mg/kg wet	2.500		89	40-140			
Hexatriacontane (C36)	2.1	0.2	mg/kg wet	2.500		83	40-140			
Nonadecane (C19)	2.4	0.2	mg/kg wet	2.500		94	40-140			
Nonane (C9)	1.8	0.2	mg/kg wet	2.500		71	30-140			
Octacosane (C28)	2.3	0.2	mg/kg wet	2.500		92	40-140			
Octadecane (C18)	2.2	0.2	mg/kg wet	2.500		89	40-140			
Tetracosane (C24)	2.3	0.2	mg/kg wet	2.500		92	40-140			
Tetradecane (C14)	2.2	0.2	mg/kg wet	2.500		88	40-140			
Total Petroleum Hydrocarbons	33.2	10.0	mg/kg wet	35.00		95	40-140			
Triacontane (C30)	2.2	0.2	mg/kg wet	2.500		90	40-140			

Surrogate: O-Terphenyl	4.81		mg/kg wet	5.000		96	40-140			

LCS Dup

Decane (C10)	1.9	0.2	mg/kg wet	2.500		76	40-140	2	25	
Docosane (C22)	2.2	0.2	mg/kg wet	2.500		90	40-140	0.5	25	
Dodecane (C12)	2.1	0.2	mg/kg wet	2.500		83	40-140	2	25	
Eicosane (C20)	2.3	0.2	mg/kg wet	2.500		90	40-140	0.8	25	
Hexacosane (C26)	2.3	0.2	mg/kg wet	2.500		91	40-140	0.5	25	
Hexadecane (C16)	2.2	0.2	mg/kg wet	2.500		88	40-140	1	25	
Hexatriacontane (C36)	2.4	0.2	mg/kg wet	2.500		95	40-140	14	25	
Nonadecane (C19)	2.3	0.2	mg/kg wet	2.500		93	40-140	2	25	
Nonane (C9)	1.7	0.2	mg/kg wet	2.500		69	30-140	3	25	
Octacosane (C28)	2.3	0.2	mg/kg wet	2.500		92	40-140	0.02	25	
Octadecane (C18)	2.2	0.2	mg/kg wet	2.500		88	40-140	2	25	
Tetracosane (C24)	2.3	0.2	mg/kg wet	2.500		91	40-140	0.5	25	
Tetradecane (C14)	2.2	0.2	mg/kg wet	2.500		86	40-140	2	25	
Total Petroleum Hydrocarbons	32.1	10.0	mg/kg wet	35.00		92	40-140	3	25	
Triacontane (C30)	2.3	0.2	mg/kg wet	2.500		91	40-140	0.9	25	

Surrogate: O-Terphenyl	4.68		mg/kg wet	5.000		94	40-140			

8270D Semi-Volatile Organic Compounds

Batch DE10516 - 3546

Blank

1,2,4-Trichlorobenzene	ND	0.333	mg/kg wet							
1,2-Dichlorobenzene	ND	0.333	mg/kg wet							
1,3-Dichlorobenzene	ND	0.333	mg/kg wet							
1,4-Dichlorobenzene	ND	0.167	mg/kg wet							
2,4,5-Trichlorophenol	ND	0.333	mg/kg wet							
2,4,6-Trichlorophenol	ND	0.167	mg/kg wet							
2,4-Dichlorophenol	ND	0.167	mg/kg wet							



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8270D Semi-Volatile Organic Compounds

Batch DE10516 - 3546

2,4-Dimethylphenol	ND	0.167	mg/kg wet
2,4-Dinitrophenol	ND	0.667	mg/kg wet
2,4-Dinitrotoluene	ND	0.167	mg/kg wet
2,6-Dinitrotoluene	ND	0.333	mg/kg wet
2-Chloronaphthalene	ND	0.333	mg/kg wet
2-Chlorophenol	ND	0.167	mg/kg wet
2-Methylnaphthalene	ND	0.167	mg/kg wet
2-Methylphenol	ND	0.333	mg/kg wet
2-Nitrophenol	ND	0.333	mg/kg wet
3,3'-Dichlorobenzidine	ND	0.333	mg/kg wet
3+4-Methylphenol	ND	0.667	mg/kg wet
4-Bromophenyl-phenylether	ND	0.333	mg/kg wet
4-Chloroaniline	ND	0.333	mg/kg wet
4-Nitrophenol	ND	1.67	mg/kg wet
Acenaphthene	ND	0.333	mg/kg wet
Acenaphthylene	ND	0.333	mg/kg wet
Acetophenone	ND	0.667	mg/kg wet
Aniline	ND	1.67	mg/kg wet
Anthracene	ND	0.333	mg/kg wet
Azobenzene	ND	0.333	mg/kg wet
Benzo(a)anthracene	ND	0.333	mg/kg wet
Benzo(a)pyrene	ND	0.167	mg/kg wet
Benzo(b)fluoranthene	ND	0.333	mg/kg wet
Benzo(g,h,i)perylene	ND	0.333	mg/kg wet
Benzo(k)fluoranthene	ND	0.333	mg/kg wet
bis(2-Chloroethoxy)methane	ND	0.333	mg/kg wet
bis(2-Chloroethyl)ether	ND	0.167	mg/kg wet
bis(2-chloroisopropyl)Ether	ND	0.167	mg/kg wet
bis(2-Ethylhexyl)phthalate	ND	0.333	mg/kg wet
Butylbenzylphthalate	ND	0.333	mg/kg wet
Chrysene	ND	0.167	mg/kg wet
Dibenzo(a,h)Anthracene	ND	0.167	mg/kg wet
Dibenzofuran	ND	0.333	mg/kg wet
Diethylphthalate	ND	0.333	mg/kg wet
Dimethylphthalate	ND	0.333	mg/kg wet
Di-n-butylphthalate	ND	0.333	mg/kg wet
Di-n-octylphthalate	ND	0.333	mg/kg wet
Fluoranthene	ND	0.333	mg/kg wet
Fluorene	ND	0.333	mg/kg wet
Hexachlorobenzene	ND	0.167	mg/kg wet
Hexachlorobutadiene	ND	0.333	mg/kg wet
Hexachloroethane	ND	0.167	mg/kg wet
Indeno(1,2,3-cd)Pyrene	ND	0.333	mg/kg wet
Isophorone	ND	0.333	mg/kg wet
Naphthalene	ND	0.333	mg/kg wet



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Quality Control Data

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8270D Semi-Volatile Organic Compounds

Batch DE10516 - 3546

Nitrobenzene	ND	0.333	mg/kg wet							
N-Nitrosodimethylamine	ND	0.333	mg/kg wet							
Pentachlorophenol	ND	0.667	mg/kg wet							
Phenanthrene	ND	0.333	mg/kg wet							
Phenol	ND	0.333	mg/kg wet							
Pyrene	ND	0.333	mg/kg wet							
Surrogate: 1,2-Dichlorobenzene-d4	2.31		mg/kg wet	3.333		69	30-130			
Surrogate: 2,4,6-Tribromophenol	3.72		mg/kg wet	5.000		74	30-130			
Surrogate: 2-Chlorophenol-d4	3.69		mg/kg wet	5.000		74	30-130			
Surrogate: 2-Fluorobiphenyl	2.44		mg/kg wet	3.333		73	30-130			
Surrogate: 2-Fluorophenol	3.77		mg/kg wet	5.000		75	30-130			
Surrogate: Nitrobenzene-d5	2.42		mg/kg wet	3.333		72	30-130			
Surrogate: Phenol-d6	3.70		mg/kg wet	5.000		74	30-130			
Surrogate: p-Terphenyl-d14	3.13		mg/kg wet	3.333		94	30-130			

LCS

1,2,4-Trichlorobenzene	2.36	0.333	mg/kg wet	3.333		71	40-140			
1,2-Dichlorobenzene	2.19	0.333	mg/kg wet	3.333		66	40-140			
1,3-Dichlorobenzene	2.14	0.333	mg/kg wet	3.333		64	40-140			
1,4-Dichlorobenzene	2.16	0.167	mg/kg wet	3.333		65	40-140			
2,4,5-Trichlorophenol	2.75	0.333	mg/kg wet	3.333		83	30-130			
2,4,6-Trichlorophenol	2.72	0.167	mg/kg wet	3.333		82	30-130			
2,4-Dichlorophenol	2.70	0.167	mg/kg wet	3.333		81	30-130			
2,4-Dimethylphenol	2.81	0.167	mg/kg wet	3.333		84	30-130			
2,4-Dinitrophenol	2.13	0.667	mg/kg wet	3.333		64	30-130			
2,4-Dinitrotoluene	2.99	0.167	mg/kg wet	3.333		90	40-140			
2,6-Dinitrotoluene	2.84	0.333	mg/kg wet	3.333		85	40-140			
2-Chloronaphthalene	2.48	0.333	mg/kg wet	3.333		74	40-140			
2-Chlorophenol	2.40	0.167	mg/kg wet	3.333		72	30-130			
2-Methylnaphthalene	2.54	0.167	mg/kg wet	3.333		76	40-140			
2-Methylphenol	2.49	0.333	mg/kg wet	3.333		75	30-130			
2-Nitrophenol	2.47	0.333	mg/kg wet	3.333		74	30-130			
3,3'-Dichlorobenzidine	2.62	0.333	mg/kg wet	3.333		79	40-140			
3+4-Methylphenol	2.62	0.667	mg/kg wet	3.333		79	30-130			
4-Bromophenyl-phenylether	2.64	0.333	mg/kg wet	3.333		79	40-140			
4-Chloroaniline	2.26	0.333	mg/kg wet	3.333		68	40-140			
4-Nitrophenol	3.12	1.67	mg/kg wet	3.333		94	30-130			
Acenaphthene	2.50	0.333	mg/kg wet	3.333		75	40-140			
Acenaphthylene	2.60	0.333	mg/kg wet	3.333		78	40-140			
Acetophenone	2.35	0.667	mg/kg wet	3.333		70	40-140			
Aniline	2.25	1.67	mg/kg wet	3.333		67	40-140			
Anthracene	2.82	0.333	mg/kg wet	3.333		85	40-140			
Azobenzene	2.46	0.333	mg/kg wet	3.333		74	40-140			
Benzo(a)anthracene	2.87	0.333	mg/kg wet	3.333		86	40-140			
Benzo(a)pyrene	3.22	0.167	mg/kg wet	3.333		97	40-140			
Benzo(b)fluoranthene	2.73	0.333	mg/kg wet	3.333		82	40-140			



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge St Worcester MA

ESS Laboratory Work Order: 21E0122

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier

8270D Semi-Volatile Organic Compounds

Batch DE10516 - 3546

Benzo(g,h,i)perylene	3.25	0.333	mg/kg wet	3.333		98	40-140			
Benzo(k)fluoranthene	2.87	0.333	mg/kg wet	3.333		86	40-140			
bis(2-Chloroethoxy)methane	2.34	0.333	mg/kg wet	3.333		70	40-140			
bis(2-Chloroethyl)ether	2.11	0.167	mg/kg wet	3.333		63	40-140			
bis(2-chloroisopropyl)Ether	2.20	0.167	mg/kg wet	3.333		66	40-140			
bis(2-Ethylhexyl)phthalate	2.72	0.333	mg/kg wet	3.333		82	40-140			
Butylbenzylphthalate	2.64	0.333	mg/kg wet	3.333		79	40-140			
Chrysene	2.82	0.167	mg/kg wet	3.333		85	40-140			
Dibenzo(a,h)Anthracene	3.20	0.167	mg/kg wet	3.333		96	40-140			
Dibenzofuran	2.66	0.333	mg/kg wet	3.333		80	40-140			
Diethylphthalate	2.93	0.333	mg/kg wet	3.333		88	40-140			
Dimethylphthalate	2.80	0.333	mg/kg wet	3.333		84	40-140			
Di-n-butylphthalate	3.12	0.333	mg/kg wet	3.333		94	40-140			
Di-n-octylphthalate	2.34	0.333	mg/kg wet	3.333		70	40-140			
Fluoranthene	3.13	0.333	mg/kg wet	3.333		94	40-140			
Fluorene	2.76	0.333	mg/kg wet	3.333		83	40-140			
Hexachlorobenzene	2.69	0.167	mg/kg wet	3.333		81	40-140			
Hexachlorobutadiene	2.30	0.333	mg/kg wet	3.333		69	40-140			
Hexachloroethane	2.16	0.167	mg/kg wet	3.333		65	40-140			
Indeno(1,2,3-cd)Pyrene	3.18	0.333	mg/kg wet	3.333		96	40-140			
Isophorone	2.41	0.333	mg/kg wet	3.333		72	40-140			
Naphthalene	2.33	0.333	mg/kg wet	3.333		70	40-140			
Nitrobenzene	2.34	0.333	mg/kg wet	3.333		70	40-140			
N-Nitrosodimethylamine	2.24	0.333	mg/kg wet	3.333		67	40-140			
Pentachlorophenol	2.95	0.667	mg/kg wet	3.333		89	30-130			
Phenanthrene	2.71	0.333	mg/kg wet	3.333		81	40-140			
Phenol	2.51	0.333	mg/kg wet	3.333		75	30-130			
Pyrene	2.64	0.333	mg/kg wet	3.333		79	40-140			
Surrogate: 1,2-Dichlorobenzene-d4	2.32		mg/kg wet	3.333		70	30-130			
Surrogate: 2,4,6-Tribromophenol	4.45		mg/kg wet	5.000		89	30-130			
Surrogate: 2-Chlorophenol-d4	3.96		mg/kg wet	5.000		79	30-130			
Surrogate: 2-Fluorobiphenyl	2.72		mg/kg wet	3.333		82	30-130			
Surrogate: 2-Fluorophenol	3.90		mg/kg wet	5.000		78	30-130			
Surrogate: Nitrobenzene-d5	2.52		mg/kg wet	3.333		76	30-130			
Surrogate: Phenol-d6	4.04		mg/kg wet	5.000		81	30-130			
Surrogate: p-Terphenyl-d14	2.89		mg/kg wet	3.333		87	30-130			

LCS Dup

1,2,4-Trichlorobenzene	2.29	0.333	mg/kg wet	3.333		69	40-140	3	30	
1,2-Dichlorobenzene	2.16	0.333	mg/kg wet	3.333		65	40-140	2	30	
1,3-Dichlorobenzene	2.06	0.333	mg/kg wet	3.333		62	40-140	3	30	
1,4-Dichlorobenzene	2.10	0.167	mg/kg wet	3.333		63	40-140	3	30	
2,4,5-Trichlorophenol	2.68	0.333	mg/kg wet	3.333		80	30-130	3	30	
2,4,6-Trichlorophenol	2.68	0.167	mg/kg wet	3.333		80	30-130	1	30	
2,4-Dichlorophenol	2.67	0.167	mg/kg wet	3.333		80	30-130	1	30	
2,4-Dimethylphenol	2.74	0.167	mg/kg wet	3.333		82	30-130	2	30	



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge St Worcester MA

ESS Laboratory Work Order: 21E0122

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier

8270D Semi-Volatile Organic Compounds

Batch DE10516 - 3546

2,4-Dinitrophenol	2.43	0.667	mg/kg wet	3.333		73	30-130	13	30	
2,4-Dinitrotoluene	2.88	0.167	mg/kg wet	3.333		86	40-140	4	30	
2,6-Dinitrotoluene	2.77	0.333	mg/kg wet	3.333		83	40-140	3	30	
2-Chloronaphthalene	2.44	0.333	mg/kg wet	3.333		73	40-140	2	30	
2-Chlorophenol	2.33	0.167	mg/kg wet	3.333		70	30-130	3	30	
2-Methylnaphthalene	2.43	0.167	mg/kg wet	3.333		73	40-140	4	30	
2-Methylphenol	2.40	0.333	mg/kg wet	3.333		72	30-130	3	30	
2-Nitrophenol	2.41	0.333	mg/kg wet	3.333		72	30-130	3	30	
3,3'-Dichlorobenzidine	2.66	0.333	mg/kg wet	3.333		80	40-140	2	30	
3+4-Methylphenol	2.55	0.667	mg/kg wet	3.333		76	30-130	3	30	
4-Bromophenyl-phenylether	2.64	0.333	mg/kg wet	3.333		79	40-140	0.2	30	
4-Chloroaniline	2.27	0.333	mg/kg wet	3.333		68	40-140	0.2	30	
4-Nitrophenol	2.94	1.67	mg/kg wet	3.333		88	30-130	6	30	
Acenaphthene	2.45	0.333	mg/kg wet	3.333		74	40-140	2	30	
Acenaphthylene	2.53	0.333	mg/kg wet	3.333		76	40-140	3	30	
Acetophenone	2.27	0.667	mg/kg wet	3.333		68	40-140	3	30	
Aniline	2.27	1.67	mg/kg wet	3.333		68	40-140	0.9	30	
Anthracene	2.79	0.333	mg/kg wet	3.333		84	40-140	1	30	
Azobenzene	2.46	0.333	mg/kg wet	3.333		74	40-140	0.05	30	
Benzo(a)anthracene	2.87	0.333	mg/kg wet	3.333		86	40-140	0.09	30	
Benzo(a)pyrene	3.26	0.167	mg/kg wet	3.333		98	40-140	1	30	
Benzo(b)fluoranthene	2.78	0.333	mg/kg wet	3.333		83	40-140	2	30	
Benzo(g,h,i)perylene	2.83	0.333	mg/kg wet	3.333		85	40-140	14	30	
Benzo(k)fluoranthene	2.99	0.333	mg/kg wet	3.333		90	40-140	4	30	
bis(2-Chloroethoxy)methane	2.25	0.333	mg/kg wet	3.333		68	40-140	4	30	
bis(2-Chloroethyl)ether	2.09	0.167	mg/kg wet	3.333		63	40-140	1	30	
bis(2-chloroisopropyl)Ether	2.15	0.167	mg/kg wet	3.333		65	40-140	2	30	
bis(2-Ethylhexyl)phthalate	2.76	0.333	mg/kg wet	3.333		83	40-140	1	30	
Butylbenzylphthalate	2.70	0.333	mg/kg wet	3.333		81	40-140	2	30	
Chrysene	2.82	0.167	mg/kg wet	3.333		85	40-140	0.06	30	
Dibenzo(a,h)Anthracene	2.92	0.167	mg/kg wet	3.333		88	40-140	9	30	
Dibenzofuran	2.56	0.333	mg/kg wet	3.333		77	40-140	4	30	
Diethylphthalate	2.86	0.333	mg/kg wet	3.333		86	40-140	2	30	
Dimethylphthalate	2.75	0.333	mg/kg wet	3.333		82	40-140	2	30	
Di-n-butylphthalate	3.02	0.333	mg/kg wet	3.333		91	40-140	3	30	
Di-n-octylphthalate	2.55	0.333	mg/kg wet	3.333		76	40-140	8	30	
Fluoranthene	2.98	0.333	mg/kg wet	3.333		89	40-140	5	30	
Fluorene	2.69	0.333	mg/kg wet	3.333		81	40-140	2	30	
Hexachlorobenzene	2.69	0.167	mg/kg wet	3.333		81	40-140	0.06	30	
Hexachlorobutadiene	2.27	0.333	mg/kg wet	3.333		68	40-140	1	30	
Hexachloroethane	2.11	0.167	mg/kg wet	3.333		63	40-140	2	30	
Indeno(1,2,3-cd)Pyrene	2.85	0.333	mg/kg wet	3.333		85	40-140	11	30	
Isophorone	2.35	0.333	mg/kg wet	3.333		70	40-140	3	30	
Naphthalene	2.27	0.333	mg/kg wet	3.333		68	40-140	3	30	
Nitrobenzene	2.29	0.333	mg/kg wet	3.333		69	40-140	2	30	



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge St Worcester MA

ESS Laboratory Work Order: 21E0122

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier

8270D Semi-Volatile Organic Compounds

Batch DE10516 - 3546

N-Nitrosodimethylamine	2.16	0.333	mg/kg wet	3.333		65	40-140	4	30	
Pentachlorophenol	2.94	0.667	mg/kg wet	3.333		88	30-130	0.2	30	
Phenanthrene	2.68	0.333	mg/kg wet	3.333		80	40-140	1	30	
Phenol	2.42	0.333	mg/kg wet	3.333		73	30-130	4	30	
Pyrene	2.76	0.333	mg/kg wet	3.333		83	40-140	4	30	
Surrogate: 1,2-Dichlorobenzene-d4	2.24		mg/kg wet	3.333		67	30-130			
Surrogate: 2,4,6-Tribromophenol	4.34		mg/kg wet	5.000		87	30-130			
Surrogate: 2-Chlorophenol-d4	3.72		mg/kg wet	5.000		74	30-130			
Surrogate: 2-Fluorobiphenyl	2.61		mg/kg wet	3.333		78	30-130			
Surrogate: 2-Fluorophenol	3.68		mg/kg wet	5.000		74	30-130			
Surrogate: Nitrobenzene-d5	2.39		mg/kg wet	3.333		72	30-130			
Surrogate: Phenol-d6	3.79		mg/kg wet	5.000		76	30-130			
Surrogate: p-Terphenyl-d14	2.97		mg/kg wet	3.333		89	30-130			

Classical Chemistry

Batch DE10730 - General Preparation

Reference										
Flashpoint	81		°F	81.00		100	97.9-102.1			

Batch DE10733 - General Preparation

Blank										
Reactive Cyanide	ND	2.0	mg/kg							
Reactive Sulfide	ND	2.0	mg/kg							

LCS										
Reactive Cyanide	4.1	2.0	mg/kg	100.3		4	0.68-5.41			
Reactive Sulfide	ND	2.0	mg/kg	10.00		0	0-44			

Batch DE11039 - General Preparation

Blank										
Conductivity	ND	5	umhos/cm							



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge St Worcester MA

ESS Laboratory Work Order: 21E0122

Notes and Definitions

Z-10	Soil pH measured in water at 21.0 °C.
WL	Results obtained from a deionized water leach of the sample.
U	Analyte included in the analysis, but not detected
Q	Calibration required quadratic regression (Q).
EL	Elevated Method Reporting Limits due to sample matrix (EL).
D	Diluted.
CD+	Continuing Calibration %Diff/Drift is above control limit (CD+).
>	Greater than.
ND	Analyte NOT DETECTED at or above the MRL (LOQ), LOD for DoD Reports, MDL for J-Flagged Analytes
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
MDL	Method Detection Limit
MRL	Method Reporting Limit
LOD	Limit of Detection
LOQ	Limit of Quantitation
DL	Detection Limit
I/V	Initial Volume
F/V	Final Volume
§	Subcontracted analysis; see attached report
1	Range result excludes concentrations of surrogates and/or internal standards eluting in that range.
2	Range result excludes concentrations of target analytes eluting in that range.
3	Range result excludes the concentration of the C9-C10 aromatic range.
Avg	Results reported as a mathematical average.
NR	No Recovery
[CALC]	Calculated Analyte
SUB	Subcontracted analysis; see attached report
RL	Reporting Limit
EDL	Estimated Detection Limit
MF	Membrane Filtration
MPN	Most Probably Number
TNTC	Too numerous to Count
CFU	Colony Forming Units



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge St Worcester MA

ESS Laboratory Work Order: 21E0122

ESS LABORATORY CERTIFICATIONS AND ACCREDITATIONS

ENVIRONMENTAL

Rhode Island Potable and Non Potable Water: LAI00179

<http://www.health.ri.gov/find/labs/analytical/ESS.pdf>

Connecticut Potable and Non Potable Water, Solid and Hazardous Waste: PH-0750

http://www.ct.gov/dph/lib/dph/environmental_health/environmental_laboratories/pdf/OutOfStateCommercialLaboratories.pdf

Maine Potable and Non Potable Water, and Solid and Hazardous Waste: RI00002

<http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/partners/labCert.shtml>

Massachusetts Potable and Non Potable Water: M-RI002

<http://public.dep.state.ma.us/Labcert/Labcert.aspx>

New Hampshire (NELAP accredited) Potable and Non Potable Water, Solid and Hazardous Waste: 2424

<http://des.nh.gov/organization/divisions/water/dwgb/nhelap/index.htm>

New York (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: 11313

<http://www.wadsworth.org/labcert/elap/comm.html>

New Jersey (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: RI006

http://datamine2.state.nj.us/DEP_OPRA/OpraMain/pi_main?mode=pi_by_site&sort_order=PI_NAMEA&Select+a+Site:=58715

United States Department of Agriculture Soil Permit: P330-12-00139

Pennsylvania: 68-01752

<http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx>

ESS Laboratory Sample and Cooler Receipt Checklist

Client: Weston and Sampson Engineers, Inc - TB
 Shipped/Delivered Via: ESS Courier

ESS Project ID: 21E0122
 Date Received: 5/5/2021
 Project Due Date: 5/12/2021
 Days for Project: 5 Day

1. Air bill manifest present? ☐ No
 Air No.: NA
2. Were custody seals present? ☐ No
3. Is radiation count <100 CPM? ☐ Yes
4. Is a Cooler Present? ☐ Yes
 Temp: 0.4 Iced with: Ice
5. Was COC signed and dated by client? ☐ Yes

6. Does COC match bottles? ☐ Yes
7. Is COC complete and correct? ☐ Yes
8. Were samples received intact? ☐ Yes
9. Were labs informed about short holds & rushes? ☒ Yes / No / NA
10. Were any analyses received outside of hold time? Yes ☒ No

11. Any Subcontracting needed? Yes / ☒ No
 ESS Sample IDs: _____
 Analysis: _____
 TAT: _____

12. Were VOAs received? ☒ Yes / No
 a. Air bubbles in aqueous VOAs? ☒ Yes / No
 b. Does methanol cover soil completely? ☒ Yes / No / NA

13. Are the samples properly preserved?

- a. If metals preserved upon receipt:
 b. Low Level VOA vials frozen:

☒ Yes / No

Date: 5/5/21

Time: 1521

By: u

Sample Receiving Notes:

14. Was there a need to contact Project Manager?

- a. Was there a need to contact the client?

Who was contacted? _____

Yes / ☒ No
 Yes / No

Date: _____

Time: _____

By: _____

Sample Number	Container ID	Proper Container	Air Bubbles Present	Sufficient Volume	Container Type	Preservative	Record pH (Cyanide and 608 Pesticides)
1	162094	Yes	N/A	Yes	8 oz jar	NP	
1	162095	Yes	N/A	Yes	VOA Vial	DI Water	
1	162096	Yes	N/A	Yes	VOA Vial	DI Water	
1	162097	Yes	N/A	Yes	VOA Vial	MeOH	

2nd Review

Were all containers scanned into storage/lab?

Are barcode labels on correct containers?

Are all Flashpoint stickers attached/container ID # circled?

Are all Hex Chrome stickers attached?

Are all QC stickers attached?

Are VOA stickers attached if bubbles noted?

Initials: TD

☒ Yes / No
☒ Yes / No / NA
☒ Yes / No / NA
☒ Yes / No / NA
☒ Yes / No / NA

Completed

By: Yayon Davis

Date & Time: 5/5/21 1500

Reviewed

By: QJ

Date & Time: 5/5/21 1521

ESS Laboratory Sample and Cooler Receipt Checklist

Client: Weston and Sampson Engineers, Inc - TB
 Shipped/Delivered Via: ESS Courier

ESS Project ID: 21E0122
 Date Received: 5/5/2021
 Project Due Date: 5/12/2021
 Days for Project: 5 Day

1. Air bill manifest present? ☐ No
 Air No.: NA
2. Were custody seals present? ☐ No
3. Is radiation count <100 CPM? ☐ Yes
4. Is a Cooler Present? ☐ Yes
 Temp: 0.4 Iced with: Ice
5. Was COC signed and dated by client? ☐ Yes

6. Does COC match bottles? ☐ Yes
7. Is COC complete and correct? ☐ Yes
8. Were samples received intact? ☐ Yes
9. Were labs informed about short holds & rushes? ☒ Yes / No / NA
10. Were any analyses received outside of hold time? ☒ Yes / No

11. Any Subcontracting needed? Yes / ☒ No
 ESS Sample IDs: _____
 Analysis: _____
 TAT: _____

12. Were VOAs received? ☒ Yes / No
 a. Air bubbles in aqueous VOAs? ☒ Yes / No
 b. Does methanol cover soil completely? ☒ Yes / No / NA

13. Are the samples properly preserved? ☒ Yes / No
 a. If metals preserved upon receipt: _____
 b. Low Level VOA vials frozen: _____

Date: 5/5/21 Time: 1521
 By: u

Sample Receiving Notes:

14. Was there a need to contact Project Manager? Yes / ☒ No
 a. Was there a need to contact the client? Yes / ☒ No
 Who was contacted? _____

Date: _____ Time: _____ By: _____

Sample Number	Container ID	Proper Container	Air Bubbles Present	Sufficient Volume	Container Type	Preservative	Record pH (Cyanide and 608 Pesticides)
1	162094	Yes	N/A	Yes	8 oz jar	NP	
1	162095	Yes	N/A	Yes	VOA Vial	DI Water	
1	162096	Yes	N/A	Yes	VOA Vial	DI Water	
1	162097	Yes	N/A	Yes	VOA Vial	MeOH	

2nd Review

Were all containers scanned into storage/lab?

Are barcode labels on correct containers?

Are all Flashpoint stickers attached/container ID # circled?

Are all Hex Chrome stickers attached?

Are all QC stickers attached?

Are VOA stickers attached if bubbles noted?

Initials: TD
☒ Yes / No
☒ Yes / No / NA
☒ Yes / No / NA
☒ Yes / No / NA
☒ Yes / No / NA

Completed By: _____ Date & Time: _____
 Reviewed By: [Signature] Date & Time: 5/5/21 1521

CERTIFICATE OF ANALYSIS

Sarah Ruizzo
Weston and Sampson Engineers, Inc.
5 Centennial Drive
Peabody, MA 01960

RE: Cambridge Street Worcester RGP (2191051-A)
ESS Laboratory Work Order Number: 21F0196

This signed Certificate of Analysis is our approved release of your analytical results. These results are only representative of sample aliquots received at the laboratory. ESS Laboratory expects its clients to follow all regulatory sampling guidelines. Beginning with this page, the entire report has been paginated. This report should not be copied except in full without the approval of the laboratory. Samples will be disposed of thirty days after the final report has been delivered. If you have any questions or concerns, please feel free to call our Customer Service Department.



Laurel Stoddard
Laboratory Director

REVIEWED*By ESS Laboratory at 5:19 pm, Jun 11, 2021***Analytical Summary**

The project as described above has been analyzed in accordance with the ESS Quality Assurance Plan. This plan utilizes the following methodologies: US EPA SW-846, US EPA Methods for Chemical Analysis of Water and Wastes per 40 CFR Part 136, APHA Standard Methods for the Examination of Water and Wastewater, American Society for Testing and Materials (ASTM), and other recognized methodologies. The analyses with these noted observations are in conformance to the Quality Assurance Plan. In chromatographic analysis, manual integration is frequently used instead of automated integration because it produces more accurate results.

The test results present in this report are in compliance with TNI and relative state standards, and/or client Quality Assurance Project Plans (QAPP). The laboratory has reviewed the following: Sample Preservations, Hold Times, Initial Calibrations, Continuing Calibrations, Method Blanks, Blank Spikes, Blank Spike Duplicates, Duplicates, Matrix Spikes, Matrix Spike Duplicates, Surrogates and Internal Standards. Any results which were found to be outside of the recommended ranges stated in our SOPs will be noted in the Project Narrative.



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge Street Worcester RGP

ESS Laboratory Work Order: 21F0196

SAMPLE RECEIPT

The following samples were received on June 04, 2021 for the analyses specified on the enclosed Chain of Custody Record.

The samples and analyses listed below were analyzed in accordance with the 2017 Remediation General Permit under the National Pollutant Discharge Elimination System (NPDES).

ESS Laboratory is unable to achieve the required detection limit of 0.4 mg/L for Ethanol for the RGP permit. We have also been unable to procure a subcontract laboratory that is able to achieve this limit. The data for Ethanol has been reported using our current method reporting limit.

<u>Lab Number</u>	<u>Sample Name</u>	<u>Matrix</u>	<u>Analysis</u>
21F0196-01	MW-1	Ground Water	1664A, 200.7, 245.1, 2540D, 300.0, 3113B, 350.1, 3500Cr B-2009, 420.1, 4500 CN CE, 4500 H+ B, 4500Cl D, 504.1, 524.2, 608.3, 625.1 SIM, 8270D SIM, ASTM D3695, CALC
21F0196-02	MW-2	Ground Water	1664A, 200.7, 245.1, 2540D, 300.0, 3113B, 350.1, 3500Cr B-2009, 420.1, 4500 CN CE, 4500 H+ B, 4500Cl D, 504.1, 524.2, 608.3, 625.1 SIM, 8270D SIM, ASTM D3695, CALC



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge Street Worcester RGP

ESS Laboratory Work Order: 21F0196

PROJECT NARRATIVE

625.1(SIM) Semi-Volatile Organic Compounds

D1F0076-CCV1 Calibration required quadratic regression (Q).
2,4,6-Tribromophenol (109% @ 80-120%), Pentachlorophenol (75% @ 80-120%)
D1F0076-CCV1 Continuing Calibration %Diff/Drift is above control limit (CD+).
Di-n-octylphthalate (28% @ 20%)
D1F0076-CCV1 Continuing Calibration %Diff/Drift is below control limit (CD-).
Pentachlorophenol (25% @ 20%)
D1F0149-CCV1 Calibration required quadratic regression (Q).
2,4,6-Tribromophenol (114% @ 80-120%), Pentachlorophenol (108% @ 80-120%)
D1F0149-CCV1 Continuing Calibration %Diff/Drift is above control limit (CD+).
Di-n-octylphthalate (22% @ 20%)

Classical Chemistry

21F0196-01 The maximum holding time listed in 40 CFR Part 136 Table II for pH, Dissolved Oxygen, Sulfite and Residual Chlorine is fifteen minutes.
21F0196-02 Sample was received improperly preserved (PH).
Phenols
21F0196-02 The maximum holding time listed in 40 CFR Part 136 Table II for pH, Dissolved Oxygen, Sulfite and Residual Chlorine is fifteen minutes.

Dissolved Metals

21F0196-01 Elevated Method Reporting Limits due to sample matrix (EL).
Antimony , Cadmium , Chromium , Copper , Lead , Nickel , Silver , Zinc
21F0196-02 Elevated Method Reporting Limits due to sample matrix (EL).
Antimony , Cadmium , Chromium , Copper , Lead , Silver

Total Metals

21F0196-01 Elevated Method Reporting Limits due to sample matrix (EL).
Antimony , Cadmium , Chromium , Copper , Lead , Nickel , Silver , Zinc
21F0196-02 Elevated Method Reporting Limits due to sample matrix (EL).
Cadmium , Silver

No other observations noted.

End of Project Narrative.



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge Street Worcester RGP

ESS Laboratory Work Order: 21F0196

DATA USABILITY LINKS

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[Definitions of Quality Control Parameters](#)

[Semivolatile Organics Internal Standard Information](#)

[Semivolatile Organics Surrogate Information](#)

[Volatile Organics Internal Standard Information](#)

[Volatile Organics Surrogate Information](#)

[EPH and VPH Alkane Lists](#)

CURRENT SW-846 METHODOLOGY VERSIONS

Analytical Methods

1010A - Flashpoint
6010C - ICP
6020A - ICP MS
7010 - Graphite Furnace
7196A - Hexavalent Chromium
7470A - Aqueous Mercury
7471B - Solid Mercury
8011 - EDB/DBCP/TCP
8015C - GRO/DRO
8081B - Pesticides
8082A - PCB
8100M - TPH
8151A - Herbicides
8260B - VOA
8270D - SVOA
8270D SIM - SVOA Low Level
9014 - Cyanide
9038 - Sulfate
9040C - Aqueous pH
9045D - Solid pH (Corrosivity)
9050A - Specific Conductance
9056A - Anions (IC)
9060A - TOC
9095B - Paint Filter
MADEP 04-1.1 - EPH
MADEP 18-2.1 - VPH

Prep Methods

3005A - Aqueous ICP Digestion
3020A - Aqueous Graphite Furnace / ICP MS Digestion
3050B - Solid ICP / Graphite Furnace / ICP MS Digestion
3060A - Solid Hexavalent Chromium Digestion
3510C - Separatory Funnel Extraction
3520C - Liquid / Liquid Extraction
3540C - Manual Soxhlet Extraction
3541 - Automated Soxhlet Extraction
3546 - Microwave Extraction
3580A - Waste Dilution
5030B - Aqueous Purge and Trap
5030C - Aqueous Purge and Trap
5035A - Solid Purge and Trap

SW846 Reactivity Methods 7.3.3.2 (Reactive Cyanide) and 7.3.4.1 (Reactive Sulfide) have been withdrawn by EPA. These methods are reported per client request and are not NELAP accredited.



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge Street Worcester RGP
Client Sample ID: MW-1
Date Sampled: 06/04/21 10:00
Percent Solids: N/A

ESS Laboratory Work Order: 21F0196
ESS Laboratory Sample ID: 21F0196-01
Sample Matrix: Ground Water
Units: ug/L

Extraction Method: 3005A/200.7

Dissolved Metals

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Antimony	EL ND (15.0)		200.7		3	KJK	06/08/21 20:27	100	10	DF10748
Arsenic	ND (2.5)		3113B		5	KJK	06/08/21 19:51	100	10	DF10748
Cadmium	EL ND (3.0)		200.7		3	KJK	06/08/21 20:27	100	10	DF10748
Chromium	EL ND (6.0)		200.7		3	KJK	06/08/21 20:27	100	10	DF10748
Copper	EL ND (6.0)		200.7		3	KJK	06/08/21 20:27	100	10	DF10748
Iron	51.9 (30.0)		200.7		3	KJK	06/08/21 20:27	100	10	DF10748
Lead	EL ND (6.0)		200.7		3	KJK	06/08/21 20:27	100	10	DF10748
Mercury	ND (0.20)		245.1		1	JRB	06/08/21 11:33	20	40	DF10728
Nickel	EL ND (15.0)		200.7		3	KJK	06/08/21 20:27	100	10	DF10748
Selenium	ND (5.0)		3113B		5	KJK	06/09/21 4:19	100	10	DF10748
Silver	EL ND (3.0)		200.7		3	KJK	06/08/21 20:27	100	10	DF10748
Zinc	EL ND (15.0)		200.7		3	KJK	06/08/21 20:27	100	10	DF10748



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge Street Worcester RGP
Client Sample ID: MW-1
Date Sampled: 06/04/21 10:00
Percent Solids: N/A

ESS Laboratory Work Order: 21F0196
ESS Laboratory Sample ID: 21F0196-01
Sample Matrix: Ground Water
Units: ug/L

Extraction Method: 3005A/200.7

Total Metals

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Antimony	EL ND (15.0)		200.7		3	KJK	06/08/21 19:58	100	10	DF10748
Arsenic	ND (2.5)		3113B		5	KJK	06/08/21 18:43	100	10	DF10748
Cadmium	EL ND (3.0)		200.7		3	KJK	06/08/21 19:58	100	10	DF10748
Chromium	EL ND (6.0)		200.7		3	KJK	06/08/21 19:58	100	10	DF10748
Chromium III	ND (10.0)		200.7		3	CCP	06/08/21 19:58	1	1	[CALC]
Copper	EL ND (6.0)		200.7		3	KJK	06/08/21 19:58	100	10	DF10748
Iron	356 (30.0)		200.7		3	KJK	06/08/21 19:58	100	10	DF10748
Lead	EL ND (6.0)		200.7		3	KJK	06/08/21 19:58	100	10	DF10748
Mercury	ND (0.2)		245.1		1	JRB	06/08/21 11:16	20	40	DF10728
Nickel	EL ND (15.0)		200.7		3	KJK	06/08/21 19:58	100	10	DF10748
Selenium	ND (5.0)		3113B		5	KJK	06/09/21 3:05	100	10	DF10748
Silver	EL ND (3.0)		200.7		3	KJK	06/08/21 19:58	100	10	DF10748
Total Hardness	162000 (247)		CALC		3	KJK	06/08/21 19:58	1	1	[CALC]
Zinc	EL ND (15.0)		200.7		3	KJK	06/08/21 19:58	100	10	DF10748



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge Street Worcester RGP
Client Sample ID: MW-1
Date Sampled: 06/04/21 10:00
Percent Solids: N/A
Initial Volume: 25
Final Volume: 25
Extraction Method: 524.2

ESS Laboratory Work Order: 21F0196
ESS Laboratory Sample ID: 21F0196-01
Sample Matrix: Ground Water
Units: ug/L
Analyst: MD

524.2 Volatile Organic Compounds

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
1,1,1-Trichloroethane	ND (0.5)		524.2		1	06/09/21 15:37	D1F0173	DF10927
1,1,2-Trichloroethane	ND (0.5)		524.2		1	06/09/21 15:37	D1F0173	DF10927
1,1-Dichloroethane	ND (0.5)		524.2		1	06/09/21 15:37	D1F0173	DF10927
1,1-Dichloroethene	ND (0.5)		524.2		1	06/09/21 15:37	D1F0173	DF10927
1,2-Dichlorobenzene	ND (0.5)		524.2		1	06/09/21 15:37	D1F0173	DF10927
1,2-Dichloroethane	ND (0.5)		524.2		1	06/09/21 15:37	D1F0173	DF10927
1,3-Dichlorobenzene	ND (0.5)		524.2		1	06/09/21 15:37	D1F0173	DF10927
1,4-Dichlorobenzene	ND (0.5)		524.2		1	06/09/21 15:37	D1F0173	DF10927
Acetone	ND (5.0)		524.2		1	06/09/21 15:37	D1F0173	DF10927
Benzene	ND (0.5)		524.2		1	06/09/21 15:37	D1F0173	DF10927
Carbon Tetrachloride	ND (0.3)		524.2		1	06/09/21 15:37	D1F0173	DF10927
cis-1,2-Dichloroethene	ND (0.5)		524.2		1	06/09/21 15:37	D1F0173	DF10927
Ethylbenzene	ND (0.5)		524.2		1	06/09/21 15:37	D1F0173	DF10927
Methyl tert-Butyl Ether	0.8 (0.5)		524.2		1	06/09/21 15:37	D1F0173	DF10927
Methylene Chloride	ND (0.5)		524.2		1	06/09/21 15:37	D1F0173	DF10927
Naphthalene	ND (0.5)		524.2		1	06/09/21 15:37	D1F0173	DF10927
Tertiary-amyl methyl ether	ND (1.0)		524.2		1	06/09/21 15:37	D1F0173	DF10927
Tertiary-butyl Alcohol	ND (25.0)		524.2		1	06/09/21 15:37	D1F0173	DF10927
Tetrachloroethene	ND (0.5)		524.2		1	06/09/21 15:37	D1F0173	DF10927
Toluene	ND (0.5)		524.2		1	06/09/21 15:37	D1F0173	DF10927
Trichloroethene	ND (0.5)		524.2		1	06/09/21 15:37	D1F0173	DF10927
Vinyl Chloride	ND (0.2)		524.2		1	06/09/21 15:37	D1F0173	DF10927
Xylene O	ND (0.5)		524.2		1	06/09/21 15:37	D1F0173	DF10927
Xylene P,M	ND (0.5)		524.2		1	06/09/21 15:37	D1F0173	DF10927

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: 1,2-Dichlorobenzene-d4</i>	<i>86 %</i>		<i>80-120</i>
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>84 %</i>		<i>80-120</i>



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge Street Worcester RGP
Client Sample ID: MW-1
Date Sampled: 06/04/21 10:00
Percent Solids: N/A
Initial Volume: 1070
Final Volume: 1
Extraction Method: 3510C

ESS Laboratory Work Order: 21F0196
ESS Laboratory Sample ID: 21F0196-01
Sample Matrix: Ground Water
Units: ug/L
Analyst: MJV
Prepared: 6/7/21 12:21

608.3 Polychlorinated Biphenyls (PCB)

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Aroclor 1016	ND (0.09)		608.3		1	06/07/21 13:45		DF10702
Aroclor 1221	ND (0.09)		608.3		1	06/07/21 13:45		DF10702
Aroclor 1232	ND (0.09)		608.3		1	06/07/21 13:45		DF10702
Aroclor 1242	ND (0.09)		608.3		1	06/07/21 13:45		DF10702
Aroclor 1248	ND (0.09)		608.3		1	06/07/21 13:45		DF10702
Aroclor 1254	ND (0.09)		608.3		1	06/07/21 13:45		DF10702
Aroclor 1260	ND (0.09)		608.3		1	06/07/21 13:45		DF10702
Aroclor 1262	ND (0.09)		608.3		1	06/07/21 13:45		DF10702
Aroclor 1268	ND (0.09)		608.3		1	06/07/21 13:45		DF10702

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: Decachlorobiphenyl</i>	76 %		30-150
<i>Surrogate: Decachlorobiphenyl [2C]</i>	76 %		30-150
<i>Surrogate: Tetrachloro-m-xylene</i>	72 %		30-150
<i>Surrogate: Tetrachloro-m-xylene [2C]</i>	76 %		30-150



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge Street Worcester RGP
Client Sample ID: MW-1
Date Sampled: 06/04/21 10:00
Percent Solids: N/A
Initial Volume: 1060
Final Volume: 0.25
Extraction Method: 3510C

ESS Laboratory Work Order: 21F0196
ESS Laboratory Sample ID: 21F0196-01
Sample Matrix: Ground Water
Units: ug/L
Analyst: TAJ
Prepared: 6/4/21 19:15

625.1(SIM) Semi-Volatile Organic Compounds

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Acenaphthene	ND (0.19)		625.1 SIM		1	06/10/21 5:11	D1F0149	DF10420
Acenaphthylene	ND (0.19)		625.1 SIM		1	06/10/21 5:11	D1F0149	DF10420
Anthracene	ND (0.19)		625.1 SIM		1	06/10/21 5:11	D1F0149	DF10420
Benzo(a)anthracene	ND (0.05)		625.1 SIM		1	06/10/21 5:11	D1F0149	DF10420
Benzo(a)pyrene	ND (0.05)		625.1 SIM		1	06/10/21 5:11	D1F0149	DF10420
Benzo(b)fluoranthene	ND (0.05)		625.1 SIM		1	06/10/21 5:11	D1F0149	DF10420
Benzo(g,h,i)perylene	ND (0.19)		625.1 SIM		1	06/10/21 5:11	D1F0149	DF10420
Benzo(k)fluoranthene	ND (0.05)		625.1 SIM		1	06/10/21 5:11	D1F0149	DF10420
bis(2-Ethylhexyl)phthalate	ND (2.36)		625.1 SIM		1	06/10/21 5:11	D1F0149	DF10420
Butylbenzylphthalate	ND (2.36)		625.1 SIM		1	06/10/21 5:11	D1F0149	DF10420
Chrysene	ND (0.05)		625.1 SIM		1	06/10/21 5:11	D1F0149	DF10420
Dibenzo(a,h)Anthracene	ND (0.05)		625.1 SIM		1	06/10/21 5:11	D1F0149	DF10420
Diethylphthalate	ND (2.36)		625.1 SIM		1	06/10/21 5:11	D1F0149	DF10420
Dimethylphthalate	ND (2.36)		625.1 SIM		1	06/10/21 5:11	D1F0149	DF10420
Di-n-butylphthalate	ND (2.36)		625.1 SIM		1	06/10/21 5:11	D1F0149	DF10420
Di-n-octylphthalate	ND (2.36)		625.1 SIM		1	06/10/21 5:11	D1F0149	DF10420
Fluoranthene	ND (0.19)		625.1 SIM		1	06/10/21 5:11	D1F0149	DF10420
Fluorene	ND (0.19)		625.1 SIM		1	06/10/21 5:11	D1F0149	DF10420
Indeno(1,2,3-cd)Pyrene	ND (0.05)		625.1 SIM		1	06/10/21 5:11	D1F0149	DF10420
Naphthalene	ND (0.19)		625.1 SIM		1	06/10/21 5:11	D1F0149	DF10420
Pentachlorophenol	ND (0.85)		625.1 SIM		1	06/10/21 5:11	D1F0149	DF10420
Phenanthrene	ND (0.19)		625.1 SIM		1	06/10/21 5:11	D1F0149	DF10420
Pyrene	ND (0.19)		625.1 SIM		1	06/10/21 5:11	D1F0149	DF10420

	<u>%Recovery</u>	<u>Qualifier</u>	<u>Limits</u>
Surrogate: 1,2-Dichlorobenzene-d4	45 %		30-130
Surrogate: 2,4,6-Tribromophenol	85 %		15-110
Surrogate: 2-Fluorobiphenyl	59 %		30-130
Surrogate: Nitrobenzene-d5	69 %		30-130
Surrogate: p-Terphenyl-d14	90 %		30-130



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge Street Worcester RGP
Client Sample ID: MW-1
Date Sampled: 06/04/21 10:00
Percent Solids: N/A
Initial Volume: 500
Final Volume: 0.5
Extraction Method: 3535A

ESS Laboratory Work Order: 21F0196
ESS Laboratory Sample ID: 21F0196-01
Sample Matrix: Ground Water
Units: ug/L
Analyst: TAJ
Prepared: 6/9/21 15:00

8270D(SIM) Semi-Volatile Organic Compounds w/ Isotope Dilution

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
1,4-Dioxane	ND (0.250)		8270D SIM		1	06/10/21 4:06	D1F0149	DF10935
		<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				
<i>Surrogate: 1,4-Dioxane-d8</i>		58 %		15-115				



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge Street Worcester RGP
Client Sample ID: MW-1
Date Sampled: 06/04/21 10:00
Percent Solids: N/A

ESS Laboratory Work Order: 21F0196
ESS Laboratory Sample ID: 21F0196-01
Sample Matrix: Ground Water

Classical Chemistry

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Ammonia as N	ND (0.10)		350.1		1	EEM	06/09/21 14:49	mg/L	DF10836
Chloride	385 (20.0)		300.0		40	EEM	06/07/21 23:32	mg/L	DF10725
Hexavalent Chromium	ND (10.0)		3500Cr B-2009		1	CCP	06/04/21 20:00	ug/L	DF10432
pH	6.45 (N/A)		4500 H+ B		1	EAM	06/04/21 20:15	S.U.	DF10463
pH Sample Temp	Aqueous pH measured in water at 16.4 °C. (N/A)								
Phenols	102 (50)		420.1		1	JLK	06/07/21 19:13	ug/L	DF10746
Total Cyanide	ND (5.00)		4500 CN CE		1	JLK	06/09/21 16:38	ug/L	DF10945
Total Petroleum Hydrocarbon	ND (5)		1664A		1	LAB	06/07/21 15:27	mg/L	DF10714
Total Residual Chlorine	ND (20.0)		4500Cl D		1	CCP	06/04/21 19:54	ug/L	DF10458
Total Suspended Solids	16 (5)		2540D		1	CCP	06/07/21 17:20	mg/L	DF10737



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge Street Worcester RGP
Client Sample ID: MW-1
Date Sampled: 06/04/21 10:00
Percent Solids: N/A
Initial Volume: 35
Final Volume: 2
Extraction Method: 504/8011

ESS Laboratory Work Order: 21F0196
ESS Laboratory Sample ID: 21F0196-01
Sample Matrix: Ground Water
Units: ug/L
Analyst: DMC
Prepared: 6/9/21 11:10

504.1 1,2-Dibromoethane / 1,2-Dibromo-3-chloropropane

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
1,2-Dibromo-3-Chloropropane	ND (0.015)		504.1		1	06/09/21 16:41		DF10924
1,2-Dibromoethane	ND (0.015)		504.1		1	06/09/21 16:41		DF10924
		<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				
<i>Surrogate: Pentachloroethane</i>		107 %		30-150				
<i>Surrogate: Pentachloroethane [2C]</i>		106 %		30-150				



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge Street Worcester RGP
Client Sample ID: MW-1
Date Sampled: 06/04/21 10:00
Percent Solids: N/A
Initial Volume: 1
Final Volume: 1
Extraction Method: No Prep

ESS Laboratory Work Order: 21F0196
ESS Laboratory Sample ID: 21F0196-01
Sample Matrix: Ground Water
Units: mg/L
Analyst: IBM
Prepared: 6/7/21 12:32

Alcohol Scan by GC/FID

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Ethanol	ND (10)		ASTM D3695		1	IBM	06/08/21 9:49		DF10730



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge Street Worcester RGP
Client Sample ID: MW-2
Date Sampled: 06/04/21 10:00
Percent Solids: N/A

ESS Laboratory Work Order: 21F0196
ESS Laboratory Sample ID: 21F0196-02
Sample Matrix: Ground Water
Units: ug/L

Extraction Method: 3005A/200.7

Dissolved Metals

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Antimony	EL ND (15.0)		200.7		3	KJK	06/08/21 20:29	100	10	DF10748
Arsenic	ND (2.5)		3113B		5	KJK	06/08/21 19:56	100	10	DF10748
Cadmium	EL ND (3.0)		200.7		3	KJK	06/08/21 20:29	100	10	DF10748
Chromium	EL ND (6.0)		200.7		3	KJK	06/08/21 20:29	100	10	DF10748
Copper	EL ND (6.0)		200.7		3	KJK	06/08/21 20:29	100	10	DF10748
Iron	62.7 (30.0)		200.7		3	KJK	06/08/21 20:29	100	10	DF10748
Lead	EL ND (6.0)		200.7		3	KJK	06/08/21 20:29	100	10	DF10748
Mercury	ND (0.20)		245.1		1	JRB	06/08/21 11:35	20	40	DF10728
Nickel	20.5 (15.0)		200.7		3	KJK	06/08/21 20:29	100	10	DF10748
Selenium	ND (5.0)		3113B		5	KJK	06/09/21 4:24	100	10	DF10748
Silver	EL ND (3.0)		200.7		3	KJK	06/08/21 20:29	100	10	DF10748
Zinc	20.3 (15.0)		200.7		3	KJK	06/08/21 20:29	100	10	DF10748



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge Street Worcester RGP
Client Sample ID: MW-2
Date Sampled: 06/04/21 10:00
Percent Solids: N/A

ESS Laboratory Work Order: 21F0196
ESS Laboratory Sample ID: 21F0196-02
Sample Matrix: Ground Water
Units: ug/L

Extraction Method: 3005A/200.7

Total Metals

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>I/V</u>	<u>F/V</u>	<u>Batch</u>
Antimony	ND (15.0)		200.7		3	KJK	06/08/21 20:00	100	10	DF10748
Arsenic	22.1 (2.5)		3113B		5	KJK	06/08/21 18:48	100	10	DF10748
Cadmium	EL ND (3.0)		200.7		3	KJK	06/08/21 20:00	100	10	DF10748
Chromium	122 (6.0)		200.7		3	KJK	06/08/21 20:00	100	10	DF10748
Chromium III	122 (10.0)		200.7		3	CCP	06/08/21 20:00	1	1	[CALC]
Copper	64.7 (6.0)		200.7		3	KJK	06/08/21 20:00	100	10	DF10748
Iron	27000 (30.0)		200.7		3	KJK	06/08/21 20:00	100	10	DF10748
Lead	45.0 (6.0)		200.7		3	KJK	06/08/21 20:00	100	10	DF10748
Mercury	ND (0.2)		245.1		1	JRB	06/08/21 11:18	20	40	DF10728
Nickel	54.6 (15.0)		200.7		3	KJK	06/08/21 20:00	100	10	DF10748
Selenium	ND (5.0)		3113B		5	KJK	06/09/21 3:11	100	10	DF10748
Silver	EL ND (3.0)		200.7		3	KJK	06/08/21 20:00	100	10	DF10748
Total Hardness	689000 (999)		CALC		20	KJK	06/08/21 20:38	1	1	[CALC]
Zinc	159 (15.0)		200.7		3	KJK	06/08/21 20:00	100	10	DF10748



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge Street Worcester RGP
Client Sample ID: MW-2
Date Sampled: 06/04/21 10:00
Percent Solids: N/A
Initial Volume: 25
Final Volume: 25
Extraction Method: 524.2

ESS Laboratory Work Order: 21F0196
ESS Laboratory Sample ID: 21F0196-02
Sample Matrix: Ground Water
Units: ug/L
Analyst: MD

524.2 Volatile Organic Compounds

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
1,1,1-Trichloroethane	ND (0.5)		524.2		1	06/09/21 16:06	D1F0173	DF10927
1,1,2-Trichloroethane	ND (0.5)		524.2		1	06/09/21 16:06	D1F0173	DF10927
1,1-Dichloroethane	ND (0.5)		524.2		1	06/09/21 16:06	D1F0173	DF10927
1,1-Dichloroethene	ND (0.5)		524.2		1	06/09/21 16:06	D1F0173	DF10927
1,2-Dichlorobenzene	ND (0.5)		524.2		1	06/09/21 16:06	D1F0173	DF10927
1,2-Dichloroethane	ND (0.5)		524.2		1	06/09/21 16:06	D1F0173	DF10927
1,3-Dichlorobenzene	ND (0.5)		524.2		1	06/09/21 16:06	D1F0173	DF10927
1,4-Dichlorobenzene	ND (0.5)		524.2		1	06/09/21 16:06	D1F0173	DF10927
Acetone	ND (5.0)		524.2		1	06/09/21 16:06	D1F0173	DF10927
Benzene	ND (0.5)		524.2		1	06/09/21 16:06	D1F0173	DF10927
Carbon Tetrachloride	ND (0.3)		524.2		1	06/09/21 16:06	D1F0173	DF10927
cis-1,2-Dichloroethene	ND (0.5)		524.2		1	06/09/21 16:06	D1F0173	DF10927
Ethylbenzene	ND (0.5)		524.2		1	06/09/21 16:06	D1F0173	DF10927
Methyl tert-Butyl Ether	ND (0.5)		524.2		1	06/09/21 16:06	D1F0173	DF10927
Methylene Chloride	ND (0.5)		524.2		1	06/09/21 16:06	D1F0173	DF10927
Naphthalene	ND (0.5)		524.2		1	06/09/21 16:06	D1F0173	DF10927
Tertiary-amyl methyl ether	ND (1.0)		524.2		1	06/09/21 16:06	D1F0173	DF10927
Tertiary-butyl Alcohol	ND (25.0)		524.2		1	06/09/21 16:06	D1F0173	DF10927
Tetrachloroethene	ND (0.5)		524.2		1	06/09/21 16:06	D1F0173	DF10927
Toluene	ND (0.5)		524.2		1	06/09/21 16:06	D1F0173	DF10927
Trichloroethene	ND (0.5)		524.2		1	06/09/21 16:06	D1F0173	DF10927
Vinyl Chloride	ND (0.2)		524.2		1	06/09/21 16:06	D1F0173	DF10927
Xylene O	ND (0.5)		524.2		1	06/09/21 16:06	D1F0173	DF10927
Xylene P,M	ND (0.5)		524.2		1	06/09/21 16:06	D1F0173	DF10927

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: 1,2-Dichlorobenzene-d4</i>	88 %		80-120
<i>Surrogate: 4-Bromofluorobenzene</i>	86 %		80-120



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge Street Worcester RGP
Client Sample ID: MW-2
Date Sampled: 06/04/21 10:00
Percent Solids: N/A
Initial Volume: 1060
Final Volume: 1
Extraction Method: 3510C

ESS Laboratory Work Order: 21F0196
ESS Laboratory Sample ID: 21F0196-02
Sample Matrix: Ground Water
Units: ug/L
Analyst: MJV
Prepared: 6/7/21 12:21

608.3 Polychlorinated Biphenyls (PCB)

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Aroclor 1016	ND (0.09)		608.3		1	06/07/21 14:04		DF10702
Aroclor 1221	ND (0.09)		608.3		1	06/07/21 14:04		DF10702
Aroclor 1232	ND (0.09)		608.3		1	06/07/21 14:04		DF10702
Aroclor 1242	ND (0.09)		608.3		1	06/07/21 14:04		DF10702
Aroclor 1248	ND (0.09)		608.3		1	06/07/21 14:04		DF10702
Aroclor 1254	ND (0.09)		608.3		1	06/07/21 14:04		DF10702
Aroclor 1260	ND (0.09)		608.3		1	06/07/21 14:04		DF10702
Aroclor 1262	ND (0.09)		608.3		1	06/07/21 14:04		DF10702
Aroclor 1268	ND (0.09)		608.3		1	06/07/21 14:04		DF10702

	<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>
<i>Surrogate: Decachlorobiphenyl</i>	63 %		30-150
<i>Surrogate: Decachlorobiphenyl [2C]</i>	50 %		30-150
<i>Surrogate: Tetrachloro-m-xylene</i>	63 %		30-150
<i>Surrogate: Tetrachloro-m-xylene [2C]</i>	69 %		30-150



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge Street Worcester RGP
Client Sample ID: MW-2
Date Sampled: 06/04/21 10:00
Percent Solids: N/A
Initial Volume: 1070
Final Volume: 0.25
Extraction Method: 3510C

ESS Laboratory Work Order: 21F0196
ESS Laboratory Sample ID: 21F0196-02
Sample Matrix: Ground Water
Units: ug/L
Analyst: TAJ
Prepared: 6/4/21 19:15

625.1(SIM) Semi-Volatile Organic Compounds

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Acenaphthene	ND (0.19)		625.1 SIM		1	06/10/21 5:58	D1F0149	DF10420
Acenaphthylene	ND (0.19)		625.1 SIM		1	06/10/21 5:58	D1F0149	DF10420
Anthracene	ND (0.19)		625.1 SIM		1	06/10/21 5:58	D1F0149	DF10420
Benzo(a)anthracene	ND (0.05)		625.1 SIM		1	06/10/21 5:58	D1F0149	DF10420
Benzo(a)pyrene	ND (0.05)		625.1 SIM		1	06/10/21 5:58	D1F0149	DF10420
Benzo(b)fluoranthene	ND (0.05)		625.1 SIM		1	06/10/21 5:58	D1F0149	DF10420
Benzo(g,h,i)perylene	ND (0.19)		625.1 SIM		1	06/10/21 5:58	D1F0149	DF10420
Benzo(k)fluoranthene	ND (0.05)		625.1 SIM		1	06/10/21 5:58	D1F0149	DF10420
bis(2-Ethylhexyl)phthalate	ND (2.34)		625.1 SIM		1	06/10/21 5:58	D1F0149	DF10420
Butylbenzylphthalate	ND (2.34)		625.1 SIM		1	06/10/21 5:58	D1F0149	DF10420
Chrysene	ND (0.05)		625.1 SIM		1	06/10/21 5:58	D1F0149	DF10420
Dibenzo(a,h)Anthracene	ND (0.05)		625.1 SIM		1	06/10/21 5:58	D1F0149	DF10420
Diethylphthalate	ND (2.34)		625.1 SIM		1	06/10/21 5:58	D1F0149	DF10420
Dimethylphthalate	ND (2.34)		625.1 SIM		1	06/10/21 5:58	D1F0149	DF10420
Di-n-butylphthalate	ND (2.34)		625.1 SIM		1	06/10/21 5:58	D1F0149	DF10420
Di-n-octylphthalate	ND (2.34)		625.1 SIM		1	06/10/21 5:58	D1F0149	DF10420
Fluoranthene	ND (0.19)		625.1 SIM		1	06/10/21 5:58	D1F0149	DF10420
Fluorene	ND (0.19)		625.1 SIM		1	06/10/21 5:58	D1F0149	DF10420
Indeno(1,2,3-cd)Pyrene	ND (0.05)		625.1 SIM		1	06/10/21 5:58	D1F0149	DF10420
Naphthalene	0.19 (0.19)		625.1 SIM		1	06/10/21 5:58	D1F0149	DF10420
Pentachlorophenol	ND (0.84)		625.1 SIM		1	06/10/21 5:58	D1F0149	DF10420
Phenanthrene	ND (0.19)		625.1 SIM		1	06/10/21 5:58	D1F0149	DF10420
Pyrene	ND (0.19)		625.1 SIM		1	06/10/21 5:58	D1F0149	DF10420

	<u>%Recovery</u>	<u>Qualifier</u>	<u>Limits</u>
Surrogate: 1,2-Dichlorobenzene-d4	56 %		30-130
Surrogate: 2,4,6-Tribromophenol	92 %		15-110
Surrogate: 2-Fluorobiphenyl	69 %		30-130
Surrogate: Nitrobenzene-d5	81 %		30-130
Surrogate: p-Terphenyl-d14	81 %		30-130



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge Street Worcester RGP
Client Sample ID: MW-2
Date Sampled: 06/04/21 10:00
Percent Solids: N/A
Initial Volume: 500
Final Volume: 0.5
Extraction Method: 3535A

ESS Laboratory Work Order: 21F0196
ESS Laboratory Sample ID: 21F0196-02
Sample Matrix: Ground Water
Units: ug/L
Analyst: TAJ
Prepared: 6/9/21 15:00

8270D(SIM) Semi-Volatile Organic Compounds w/ Isotope Dilution

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
1,4-Dioxane	ND (0.250)		8270D SIM		1	06/10/21 4:38	D1F0149	DF10935
		<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				
<i>Surrogate: 1,4-Dioxane-d8</i>		65 %		15-115				



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge Street Worcester RGP
Client Sample ID: MW-2
Date Sampled: 06/04/21 10:00
Percent Solids: N/A

ESS Laboratory Work Order: 21F0196
ESS Laboratory Sample ID: 21F0196-02
Sample Matrix: Ground Water

Classical Chemistry

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Units</u>	<u>Batch</u>
Ammonia as N	0.33 (0.10)		350.1		1	EEM	06/09/21 14:51	mg/L	DF10836
Chloride	1760 (100)		300.0		200	EEM	06/08/21 0:22	mg/L	DF10725
Hexavalent Chromium	ND (10.0)		3500Cr B-2009		1	CCP	06/04/21 20:00	ug/L	DF10432
pH	6.16 (N/A)		4500 H+ B		1	EAM	06/04/21 20:15	S.U.	DF10463
pH Sample Temp	Aqueous pH measured in water at 17.1 °C. (N/A)								
Phenols	PH ND (50)		420.1		1	JLK	06/07/21 19:13	ug/L	DF10746
Total Cyanide	76.7 (5.00)		4500 CN CE		1	JLK	06/09/21 16:38	ug/L	DF10945
Total Petroleum Hydrocarbon	ND (5)		1664A		1	LAB	06/07/21 15:27	mg/L	DF10714
Total Residual Chlorine	ND (20.0)		4500Cl D		1	CCP	06/04/21 19:54	ug/L	DF10458
Total Suspended Solids	6950 (33)		2540D		1	CCP	06/07/21 17:20	mg/L	DF10737



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge Street Worcester RGP
Client Sample ID: MW-2
Date Sampled: 06/04/21 10:00
Percent Solids: N/A
Initial Volume: 35
Final Volume: 2
Extraction Method: 504/8011

ESS Laboratory Work Order: 21F0196
ESS Laboratory Sample ID: 21F0196-02
Sample Matrix: Ground Water
Units: ug/L
Analyst: DMC
Prepared: 6/9/21 11:10

504.1 1,2-Dibromoethane / 1,2-Dibromo-3-chloropropane

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
1,2-Dibromo-3-Chloropropane	ND (0.015)		504.1		1	06/09/21 17:12		DF10924
1,2-Dibromoethane	ND (0.015)		504.1		1	06/09/21 17:12		DF10924
		<i>%Recovery</i>	<i>Qualifier</i>	<i>Limits</i>				
<i>Surrogate: Pentachloroethane</i>		100 %		30-150				
<i>Surrogate: Pentachloroethane [2C]</i>		107 %		30-150				



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge Street Worcester RGP
Client Sample ID: MW-2
Date Sampled: 06/04/21 10:00
Percent Solids: N/A
Initial Volume: 1
Final Volume: 1
Extraction Method: No Prep

ESS Laboratory Work Order: 21F0196
ESS Laboratory Sample ID: 21F0196-02
Sample Matrix: Ground Water
Units: mg/L
Analyst: IBM
Prepared: 6/7/21 12:32

Alcohol Scan by GC/FID

<u>Analyte</u>	<u>Results (MRL)</u>	<u>MDL</u>	<u>Method</u>	<u>Limit</u>	<u>DF</u>	<u>Analyst</u>	<u>Analyzed</u>	<u>Sequence</u>	<u>Batch</u>
Ethanol	ND (10)		ASTM D3695		1	IBM	06/08/21 10:30		DF10730



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge Street Worcester RGP

ESS Laboratory Work Order: 21F0196

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier

Dissolved Metals

Batch DF10728 - 245.1/7470A

Blank

Mercury	ND	0.20	ug/L

LCS

Mercury	6.02	0.20	ug/L	6.042	100	85-115

LCS Dup

Mercury	5.83	0.20	ug/L	6.042	96	85-115	3	20

Batch DF10748 - 3005A/200.7

Blank

Antimony	ND	5.0	ug/L
Cadmium	ND	1.0	ug/L
Chromium	ND	2.0	ug/L
Copper	ND	1.0	ug/L
Iron	ND	10.0	ug/L
Lead	ND	2.0	ug/L
Nickel	ND	5.0	ug/L
Silver	ND	0.5	ug/L
Zinc	ND	5.0	ug/L

Blank

Arsenic	ND	0.5	ug/L
Selenium	ND	1.0	ug/L

Blank

Antimony	ND	5.0	ug/L
Arsenic	ND	0.5	ug/L
Cadmium	ND	1.0	ug/L
Chromium	ND	2.0	ug/L
Copper	ND	1.0	ug/L
Iron	ND	10.0	ug/L
Lead	ND	2.0	ug/L
Nickel	ND	5.0	ug/L
Selenium	ND	1.0	ug/L
Silver	ND	0.5	ug/L
Zinc	ND	5.0	ug/L

LCS

Antimony	51.0	5.0	ug/L	50.00	102	85-115
Cadmium	24.2	1.0	ug/L	25.00	97	85-115
Chromium	49.5	2.0	ug/L	50.00	99	85-115
Copper	49.9	1.0	ug/L	50.00	100	85-115
Iron	247	10.0	ug/L	250.0	99	85-115
Lead	50.6	2.0	ug/L	50.00	101	80-120
Nickel	51.1	5.0	ug/L	50.00	102	85-115
Silver	25.1	0.5	ug/L	25.00	100	85-115
Zinc	51.4	5.0	ug/L	50.00	103	85-115

LCS



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge Street Worcester RGP

ESS Laboratory Work Order: 21F0196

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier

Dissolved Metals

Batch DF10748 - 3005A/200.7

Arsenic	50.8	12.5	ug/L	50.00		102	85-115			
Selenium	103	25.0	ug/L	100.0		103	85-115			

LCS Dup

Selenium	104	25.0	ug/L	100.0		104	85-115	0.5	20	

Total Metals

Batch DF10728 - 245.1/7470A

Blank

Mercury	ND	0.2	ug/L							

LCS

Mercury	6.0	0.2	ug/L	6.042		100	85-115			

LCS Dup

Mercury	5.8	0.2	ug/L	6.042		96	85-115	3	20	

Batch DF10748 - 3005A/200.7

Blank

Antimony	ND	5.0	ug/L							
Cadmium	ND	1.0	ug/L							
Calcium	ND	0.020	mg/L							
Chromium	ND	2.0	ug/L							
Copper	ND	2.0	ug/L							
Iron	ND	10.0	ug/L							
Lead	ND	2.0	ug/L							
Magnesium	ND	0.020	mg/L							
Nickel	ND	5.0	ug/L							
Silver	ND	1.0	ug/L							
Zinc	ND	5.0	ug/L							

Blank

Arsenic	ND	0.5	ug/L							
Selenium	ND	1.0	ug/L							

LCS

Antimony	51.0	5.0	ug/L	50.00		102	85-115			
Cadmium	24.2	1.0	ug/L	25.00		97	85-115			
Calcium	0.504	0.020	mg/L	0.5000		101	85-115			
Chromium	49.5	2.0	ug/L	50.00		99	85-115			
Copper	49.9	2.0	ug/L	50.00		100	85-115			
Iron	247	10.0	ug/L	250.0		99	85-115			
Lead	50.6	2.0	ug/L	50.00		101	85-115			
Magnesium	0.497	0.020	mg/L	0.5000		99	85-115			
Nickel	51.1	5.0	ug/L	50.00		102	85-115			
Silver	25.1	1.0	ug/L	25.00		100	85-115			
Zinc	51.4	5.0	ug/L	50.00		103	85-115			

LCS

Arsenic	50.8	12.5	ug/L	50.00		102	85-115			



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge Street Worcester RGP

ESS Laboratory Work Order: 21F0196

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier

Total Metals

Batch DF10748 - 3005A/200.7

Selenium	103	25.0	ug/L	100.0		103	85-115			

524.2 Volatile Organic Compounds

Batch DF10927 - 524.2

Blank

1,1,1-Trichloroethane	ND	0.5	ug/L							
1,1,2-Trichloroethane	ND	0.5	ug/L							
1,1-Dichloroethane	ND	0.5	ug/L							
1,1-Dichloroethene	ND	0.5	ug/L							
1,2-Dichlorobenzene	ND	0.5	ug/L							
1,2-Dichloroethane	ND	0.5	ug/L							
1,3-Dichlorobenzene	ND	0.5	ug/L							
1,4-Dichlorobenzene	ND	0.5	ug/L							
Acetone	ND	5.0	ug/L							
Benzene	ND	0.5	ug/L							
Carbon Tetrachloride	ND	0.3	ug/L							
cis-1,2-Dichloroethene	ND	0.5	ug/L							
Ethylbenzene	ND	0.5	ug/L							
Methyl tert-Butyl Ether	ND	0.5	ug/L							
Methylene Chloride	ND	0.5	ug/L							
Naphthalene	ND	0.5	ug/L							
Tertiary-amyl methyl ether	ND	1.0	ug/L							
Tertiary-butyl Alcohol	ND	25.0	ug/L							
Tetrachloroethene	ND	0.5	ug/L							
Toluene	ND	0.5	ug/L							
Trichloroethene	ND	0.5	ug/L							
Vinyl Chloride	ND	0.2	ug/L							
Xylene O	ND	0.5	ug/L							
Xylene P,M	ND	0.5	ug/L							
Surrogate: 1,2-Dichlorobenzene-d4	4.31		ug/L	5.000		86	80-120			
Surrogate: 4-Bromofluorobenzene	4.43		ug/L	5.000		89	80-120			

LCS

1,1,1-Trichloroethane	10.5	0.5	ug/L	10.00		105	70-130			
1,1,2-Trichloroethane	10.5	0.5	ug/L	10.00		105	70-130			
1,1-Dichloroethane	10.6	0.5	ug/L	10.00		106	70-130			
1,1-Dichloroethene	10.9	0.5	ug/L	10.00		109	70-130			
1,2-Dichlorobenzene	11.1	0.5	ug/L	10.00		111	70-130			
1,2-Dichloroethane	10.5	0.5	ug/L	10.00		105	70-130			
1,3-Dichlorobenzene	10.8	0.5	ug/L	10.00		108	70-130			
1,4-Dichlorobenzene	11.1	0.5	ug/L	10.00		111	70-130			
Acetone	46.3	5.0	ug/L	50.00		93	70-130			
Benzene	10.7	0.5	ug/L	10.00		107	70-130			
Carbon Tetrachloride	10.4	0.3	ug/L	10.00		104	70-130			
cis-1,2-Dichloroethene	10.4	0.5	ug/L	10.00		104	70-130			
Ethylbenzene	10.9	0.5	ug/L	10.00		109	70-130			



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge Street Worcester RGP

ESS Laboratory Work Order: 21F0196

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier

524.2 Volatile Organic Compounds

Batch DF10927 - 524.2

Methyl tert-Butyl Ether	10.9	0.5	ug/L	10.00		109	70-130			
Methylene Chloride	11.0	0.5	ug/L	10.00		110	70-130			
Naphthalene	11.4	0.5	ug/L	10.00		114	70-130			
Tertiary-amyl methyl ether	11.0	1.0	ug/L	10.00		110	70-130			
Tertiary-butyl Alcohol	55.0	25.0	ug/L	50.00		110	70-130			
Tetrachloroethene	10.3	0.5	ug/L	10.00		103	70-130			
Toluene	10.6	0.5	ug/L	10.00		106	70-130			
Trichloroethene	10.8	0.5	ug/L	10.00		108	70-130			
Vinyl Chloride	11.5	0.2	ug/L	10.00		115	70-130			
Xylene O	10.9	0.5	ug/L	10.00		109	70-130			
Xylene P,M	22.2	0.5	ug/L	20.00		111	70-130			
Surrogate: 1,2-Dichlorobenzene-d4	5.10		ug/L	5.000		102	80-120			
Surrogate: 4-Bromofluorobenzene	5.13		ug/L	5.000		103	80-120			

LCS Dup

1,1,1-Trichloroethane	10.7	0.5	ug/L	10.00		107	70-130	2	20	
1,1,2-Trichloroethane	10.6	0.5	ug/L	10.00		106	70-130	0.4	20	
1,1-Dichloroethane	10.5	0.5	ug/L	10.00		105	70-130	0.5	20	
1,1-Dichloroethene	11.1	0.5	ug/L	10.00		111	70-130	2	20	
1,2-Dichlorobenzene	11.1	0.5	ug/L	10.00		111	70-130	0.2	20	
1,2-Dichloroethane	10.5	0.5	ug/L	10.00		105	70-130	0.8	20	
1,3-Dichlorobenzene	10.9	0.5	ug/L	10.00		109	70-130	0.7	20	
1,4-Dichlorobenzene	11.4	0.5	ug/L	10.00		114	70-130	2	20	
Acetone	42.9	5.0	ug/L	50.00		86	70-130	8	20	
Benzene	10.8	0.5	ug/L	10.00		108	70-130	1	20	
Carbon Tetrachloride	10.5	0.3	ug/L	10.00		105	70-130	1	20	
cis-1,2-Dichloroethene	10.4	0.5	ug/L	10.00		104	70-130	0.4	20	
Ethylbenzene	10.9	0.5	ug/L	10.00		109	70-130	0.09	20	
Methyl tert-Butyl Ether	11.2	0.5	ug/L	10.00		112	70-130	3	20	
Methylene Chloride	11.5	0.5	ug/L	10.00		115	70-130	4	20	
Naphthalene	11.5	0.5	ug/L	10.00		115	70-130	0.7	20	
Tertiary-amyl methyl ether	10.7	1.0	ug/L	10.00		107	70-130	3	20	
Tertiary-butyl Alcohol	54.8	25.0	ug/L	50.00		110	70-130	0.5	25	
Tetrachloroethene	10.4	0.5	ug/L	10.00		104	70-130	0.8	20	
Toluene	10.8	0.5	ug/L	10.00		108	70-130	1	20	
Trichloroethene	10.8	0.5	ug/L	10.00		108	70-130	0	20	
Vinyl Chloride	11.5	0.2	ug/L	10.00		115	70-130	0.2	20	
Xylene O	10.9	0.5	ug/L	10.00		109	70-130	0	20	
Xylene P,M	22.4	0.5	ug/L	20.00		112	70-130	1	20	
Surrogate: 1,2-Dichlorobenzene-d4	5.01		ug/L	5.000		100	80-120			
Surrogate: 4-Bromofluorobenzene	5.07		ug/L	5.000		101	80-120			

608.3 Polychlorinated Biphenyls (PCB)

Batch DF10702 - 3510C

Blank

Aroclor 1016	ND	0.10	ug/L							



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge Street Worcester RGP

ESS Laboratory Work Order: 21F0196

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier

608.3 Polychlorinated Biphenyls (PCB)

Batch DF10702 - 3510C

Aroclor 1016 [2C]	ND	0.10	ug/L							
Aroclor 1221	ND	0.10	ug/L							
Aroclor 1221 [2C]	ND	0.10	ug/L							
Aroclor 1232	ND	0.10	ug/L							
Aroclor 1232 [2C]	ND	0.10	ug/L							
Aroclor 1242	ND	0.10	ug/L							
Aroclor 1242 [2C]	ND	0.10	ug/L							
Aroclor 1248	ND	0.10	ug/L							
Aroclor 1248 [2C]	ND	0.10	ug/L							
Aroclor 1254	ND	0.10	ug/L							
Aroclor 1254 [2C]	ND	0.10	ug/L							
Aroclor 1260	ND	0.10	ug/L							
Aroclor 1260 [2C]	ND	0.10	ug/L							
Aroclor 1262	ND	0.10	ug/L							
Aroclor 1262 [2C]	ND	0.10	ug/L							
Aroclor 1268	ND	0.10	ug/L							
Aroclor 1268 [2C]	ND	0.10	ug/L							
Surrogate: Decachlorobiphenyl	0.0349		ug/L	0.05000		70	30-150			
Surrogate: Decachlorobiphenyl [2C]	0.0346		ug/L	0.05000		69	30-150			
Surrogate: Tetrachloro-m-xylene	0.0352		ug/L	0.05000		70	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	0.0390		ug/L	0.05000		78	30-150			

LCS

Aroclor 1016	0.90	0.10	ug/L	1.000		90	50-140			
Aroclor 1016 [2C]	0.94	0.10	ug/L	1.000		94	50-140			
Aroclor 1260	1.00	0.10	ug/L	1.000		100	1-164			
Aroclor 1260 [2C]	0.95	0.10	ug/L	1.000		95	1-164			
Surrogate: Decachlorobiphenyl	0.0448		ug/L	0.05000		90	30-150			
Surrogate: Decachlorobiphenyl [2C]	0.0431		ug/L	0.05000		86	30-150			
Surrogate: Tetrachloro-m-xylene	0.0423		ug/L	0.05000		85	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	0.0434		ug/L	0.05000		87	30-150			

LCS Dup

Aroclor 1016	0.97	0.10	ug/L	1.000		97	50-140	7	36	
Aroclor 1016 [2C]	0.97	0.10	ug/L	1.000		97	50-140	3	36	
Aroclor 1260	1.03	0.10	ug/L	1.000		103	1-164	3	38	
Aroclor 1260 [2C]	0.98	0.10	ug/L	1.000		98	1-164	3	38	
Surrogate: Decachlorobiphenyl	0.0452		ug/L	0.05000		90	30-150			
Surrogate: Decachlorobiphenyl [2C]	0.0433		ug/L	0.05000		87	30-150			
Surrogate: Tetrachloro-m-xylene	0.0433		ug/L	0.05000		87	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	0.0435		ug/L	0.05000		87	30-150			

625.1(SIM) Semi-Volatile Organic Compounds

Batch DF10420 - 3510C



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge Street Worcester RGP

ESS Laboratory Work Order: 21F0196

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier

625.1(SIM) Semi-Volatile Organic Compounds

Batch DF10420 - 3510C

Blank

Acenaphthene	ND	0.20	ug/L							
Acenaphthylene	ND	0.20	ug/L							
Anthracene	ND	0.20	ug/L							
Benzo(a)anthracene	ND	0.05	ug/L							
Benzo(a)pyrene	ND	0.05	ug/L							
Benzo(b)fluoranthene	ND	0.05	ug/L							
Benzo(g,h,i)perylene	ND	0.20	ug/L							
Benzo(k)fluoranthene	ND	0.05	ug/L							
bis(2-Ethylhexyl)phthalate	ND	2.50	ug/L							
Butylbenzylphthalate	ND	2.50	ug/L							
Chrysene	ND	0.05	ug/L							
Dibenzo(a,h)Anthracene	ND	0.05	ug/L							
Diethylphthalate	ND	2.50	ug/L							
Dimethylphthalate	ND	2.50	ug/L							
Di-n-butylphthalate	ND	2.50	ug/L							
Di-n-octylphthalate	ND	2.50	ug/L							
Fluoranthene	ND	0.20	ug/L							
Fluorene	ND	0.20	ug/L							
Indeno(1,2,3-cd)Pyrene	ND	0.05	ug/L							
Naphthalene	ND	0.20	ug/L							
Pentachlorophenol	ND	0.90	ug/L							
Phenanthrene	ND	0.20	ug/L							
Pyrene	ND	0.20	ug/L							
Surrogate: 1,2-Dichlorobenzene-d4	1.24		ug/L	2.500		50	30-130			
Surrogate: 2,4,6-Tribromophenol	3.61		ug/L	3.750		96	15-110			
Surrogate: 2-Fluorobiphenyl	1.77		ug/L	2.500		71	30-130			
Surrogate: Nitrobenzene-d5	2.35		ug/L	2.500		94	30-130			
Surrogate: p-Terphenyl-d14	2.33		ug/L	2.500		93	30-130			

LCS

Acenaphthene	2.56	0.20	ug/L	4.000		64	40-140			
Acenaphthylene	2.55	0.20	ug/L	4.000		64	40-140			
Anthracene	2.98	0.20	ug/L	4.000		75	40-140			
Benzo(a)anthracene	3.32	0.05	ug/L	4.000		83	40-140			
Benzo(a)pyrene	3.17	0.05	ug/L	4.000		79	40-140			
Benzo(b)fluoranthene	3.29	0.05	ug/L	4.000		82	40-140			
Benzo(g,h,i)perylene	3.23	0.20	ug/L	4.000		81	40-140			
Benzo(k)fluoranthene	3.19	0.05	ug/L	4.000		80	40-140			
bis(2-Ethylhexyl)phthalate	3.99	2.50	ug/L	4.000		100	40-140			
Butylbenzylphthalate	3.85	2.50	ug/L	4.000		96	40-140			
Chrysene	3.19	0.05	ug/L	4.000		80	40-140			
Dibenzo(a,h)Anthracene	3.09	0.05	ug/L	4.000		77	40-140			
Diethylphthalate	3.42	2.50	ug/L	4.000		86	40-140			
Dimethylphthalate	3.36	2.50	ug/L	4.000		84	40-140			
Di-n-butylphthalate	3.35	2.50	ug/L	4.000		84	40-140			



CERTIFICATE OF ANALYSIS

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ESS Laboratory Work Order: 21F0196

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier

625.1(SIM) Semi-Volatile Organic Compounds

Batch DF10420 - 3510C

Di-n-octylphthalate	4.03	2.50	ug/L	4.000		101	40-140			
Fluoranthene	3.15	0.20	ug/L	4.000		79	40-140			
Fluorene	2.92	0.20	ug/L	4.000		73	40-140			
Indeno(1,2,3-cd)Pyrene	3.36	0.05	ug/L	4.000		84	40-140			
Naphthalene	2.14	0.20	ug/L	4.000		53	40-140			
Pentachlorophenol	2.74	0.90	ug/L	4.000		68	30-130			
Phenanthrene	2.94	0.20	ug/L	4.000		74	40-140			
Pyrene	3.52	0.20	ug/L	4.000		88	40-140			
Surrogate: 1,2-Dichlorobenzene-d4	1.47		ug/L	2.500		59	30-130			
Surrogate: 2,4,6-Tribromophenol	3.58		ug/L	3.750		96	15-110			
Surrogate: 2-Fluorobiphenyl	1.93		ug/L	2.500		77	30-130			
Surrogate: Nitrobenzene-d5	2.20		ug/L	2.500		88	30-130			
Surrogate: p-Terphenyl-d14	2.19		ug/L	2.500		87	30-130			

LCS Dup

Acenaphthene	3.05	0.20	ug/L	4.000		76	40-140	17	20	
Acenaphthylene	3.01	0.20	ug/L	4.000		75	40-140	16	20	
Anthracene	3.24	0.20	ug/L	4.000		81	40-140	8	20	
Benzo(a)anthracene	3.75	0.05	ug/L	4.000		94	40-140	12	20	
Benzo(a)pyrene	3.59	0.05	ug/L	4.000		90	40-140	12	20	
Benzo(b)fluoranthene	3.68	0.05	ug/L	4.000		92	40-140	11	20	
Benzo(g,h,i)perylene	3.76	0.20	ug/L	4.000		94	40-140	15	20	
Benzo(k)fluoranthene	3.66	0.05	ug/L	4.000		91	40-140	14	20	
bis(2-Ethylhexyl)phthalate	4.56	2.50	ug/L	4.000		114	40-140	13	20	
Butylbenzylphthalate	4.37	2.50	ug/L	4.000		109	40-140	13	20	
Chrysene	3.57	0.05	ug/L	4.000		89	40-140	11	20	
Dibenzo(a,h)Anthracene	3.69	0.05	ug/L	4.000		92	40-140	18	20	
Diethylphthalate	3.86	2.50	ug/L	4.000		96	40-140	12	20	
Dimethylphthalate	3.85	2.50	ug/L	4.000		96	40-140	14	20	
Di-n-butylphthalate	3.82	2.50	ug/L	4.000		95	40-140	13	20	
Di-n-octylphthalate	4.47	2.50	ug/L	4.000		112	40-140	10	20	
Fluoranthene	3.57	0.20	ug/L	4.000		89	40-140	12	20	
Fluorene	3.38	0.20	ug/L	4.000		85	40-140	15	20	
Indeno(1,2,3-cd)Pyrene	3.94	0.05	ug/L	4.000		99	40-140	16	20	
Naphthalene	2.58	0.20	ug/L	4.000		65	40-140	19	20	
Pentachlorophenol	3.36	0.90	ug/L	4.000		84	30-130	20	20	
Phenanthrene	3.29	0.20	ug/L	4.000		82	40-140	11	20	
Pyrene	3.97	0.20	ug/L	4.000		99	40-140	12	20	
Surrogate: 1,2-Dichlorobenzene-d4	1.66		ug/L	2.500		66	30-130			
Surrogate: 2,4,6-Tribromophenol	3.86		ug/L	3.750		103	15-110			
Surrogate: 2-Fluorobiphenyl	2.15		ug/L	2.500		86	30-130			
Surrogate: Nitrobenzene-d5	2.40		ug/L	2.500		96	30-130			
Surrogate: p-Terphenyl-d14	2.42		ug/L	2.500		97	30-130			

8270D(SIM) Semi-Volatile Organic Compounds w/ Isotope Dilution

Batch DF10935 - 3535A



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge Street Worcester RGP

ESS Laboratory Work Order: 21F0196

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier

8270D(SIM) Semi-Volatile Organic Compounds w/ Isotope Dilution

Batch DF10935 - 3535A

Blank

1,4-Dioxane	ND	0.250	ug/L							
Surrogate: 1,4-Dioxane-d8	2.79		ug/L	5.000		56	15-115			

LCS

1,4-Dioxane	8.73	0.250	ug/L	10.00		87	40-140			
Surrogate: 1,4-Dioxane-d8	3.16		ug/L	5.000		63	15-115			

LCS Dup

1,4-Dioxane	7.98	0.250	ug/L	10.00		80	40-140	9	20	
Surrogate: 1,4-Dioxane-d8	3.51		ug/L	5.000		70	15-115			

Classical Chemistry

Batch DF10432 - General Preparation

Blank

Hexavalent Chromium	ND	10.0	ug/L							

LCS

Hexavalent Chromium	505	10.0	ug/L	499.8		101	90-110			

LCS Dup

Hexavalent Chromium	501	10.0	ug/L	499.8		100	90-110	0.8	20	

Batch DF10458 - General Preparation

Blank

Total Residual Chlorine	ND	20.0	ug/L							

LCS

Total Residual Chlorine	2.26		mg/L	2.260		100	85-115			

Batch DF10714 - General Preparation

Blank

Total Petroleum Hydrocarbon	ND	5	mg/L							

LCS

Total Petroleum Hydrocarbon	14	5	mg/L	19.38		74	66-114			

Batch DF10725 - General Preparation

Blank

Chloride	ND	0.5	mg/L							

LCS

Chloride	9.5		mg/L	10.00		95	90-110			

Batch DF10737 - General Preparation

Blank

Total Suspended Solids	ND	5	mg/L							

LCS

Total Suspended Solids	84		mg/L	81.70		103	80-120			

Batch DF10746 - General Preparation

Blank



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge Street Worcester RGP

ESS Laboratory Work Order: 21F0196

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier

Classical Chemistry

Batch DF10746 - General Preparation

Phenols	ND	50	ug/L							

LCS

Phenols	1020	50	ug/L	1000		102	80-120			

Batch DF10836 - NH4 Prep

Blank

Ammonia as N	ND	0.10	mg/L							

LCS

Ammonia as N	0.96	0.10	mg/L	0.9994		96	80-120			

Batch DF10945 - TCN Prep

Blank

Total Cyanide	ND	5.00	ug/L							

LCS

Total Cyanide	20.7	5.00	ug/L	20.06		103	90-110			

LCS

Total Cyanide	148	5.00	ug/L	150.4		98	90-110			

LCS Dup

Total Cyanide	149	5.00	ug/L	150.4		99	90-110	0.5	20	

504.1 1,2-Dibromoethane / 1,2-Dibromo-3-chloropropane

Batch DF10924 - 504/8011

Blank

1,2-Dibromo-3-Chloropropane	ND	0.015	ug/L							
1,2-Dibromo-3-Chloropropane [2C]	ND	0.015	ug/L							
1,2-Dibromoethane	ND	0.015	ug/L							
1,2-Dibromoethane [2C]	ND	0.015	ug/L							

Surrogate: Pentachloroethane	0.0828		ug/L	0.08000		104	30-150			
Surrogate: Pentachloroethane [2C]	0.0793		ug/L	0.08000		99	30-150			

LCS

1,2-Dibromo-3-Chloropropane	0.043	0.015	ug/L	0.04000		107	70-130			
1,2-Dibromo-3-Chloropropane [2C]	0.040	0.015	ug/L	0.04000		101	70-130			
1,2-Dibromoethane	0.037	0.015	ug/L	0.04000		94	70-130			
1,2-Dibromoethane [2C]	0.037	0.015	ug/L	0.04000		92	70-130			

Surrogate: Pentachloroethane	0.0853		ug/L	0.08000		107	30-150			
Surrogate: Pentachloroethane [2C]	0.0825		ug/L	0.08000		103	30-150			

LCS

1,2-Dibromo-3-Chloropropane	0.088	0.015	ug/L	0.08000		110	70-130			
1,2-Dibromo-3-Chloropropane [2C]	0.082	0.015	ug/L	0.08000		103	70-130			
1,2-Dibromoethane	0.080	0.015	ug/L	0.08000		101	70-130			
1,2-Dibromoethane [2C]	0.084	0.015	ug/L	0.08000		105	70-130			

Surrogate: Pentachloroethane	0.0827		ug/L	0.08000		103	30-150			



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge Street Worcester RGP

ESS Laboratory Work Order: 21F0196

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier

504.1 1,2-Dibromoethane / 1,2-Dibromo-3-chloropropane

Batch DF10924 - 504/8011

Surrogate: Pentachloroethane [2C] 0.0782 ug/L 0.08000 98 30-150

Alcohol Scan by GC/FID

Batch DF10730 - No Prep

Blank

Ethanol	ND	10	mg/L

LCS

Ethanol	1020	10	mg/L	1000	102	60-140

LCS Dup

Ethanol	979	10	mg/L	1000	98	60-140	4	30



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge Street Worcester RGP

ESS Laboratory Work Order: 21F0196

Notes and Definitions

Z16a	Aqueous pH measured in water at 17.1 °C.
Z16	Aqueous pH measured in water at 16.4 °C.
U	Analyte included in the analysis, but not detected
Q	Calibration required quadratic regression (Q).
PH	Sample was received improperly preserved (PH).
HT	The maximum holding time listed in 40 CFR Part 136 Table II for pH, Dissolved Oxygen, Sulfite and Residual Chlorine is fifteen minutes.
EL	Elevated Method Reporting Limits due to sample matrix (EL).
D	Diluted.
CD+	Continuing Calibration %Diff/Drift is above control limit (CD+).
CD-	Continuing Calibration %Diff/Drift is below control limit (CD-).
ND	Analyte NOT DETECTED at or above the MRL (LOQ), LOD for DoD Reports, MDL for J-Flagged Analytes
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
MDL	Method Detection Limit
MRL	Method Reporting Limit
LOD	Limit of Detection
LOQ	Limit of Quantitation
DL	Detection Limit
I/V	Initial Volume
F/V	Final Volume
§	Subcontracted analysis; see attached report
1	Range result excludes concentrations of surrogates and/or internal standards eluting in that range.
2	Range result excludes concentrations of target analytes eluting in that range.
3	Range result excludes the concentration of the C9-C10 aromatic range.
Avg	Results reported as a mathematical average.
NR	No Recovery
[CALC]	Calculated Analyte
SUB	Subcontracted analysis; see attached report
RL	Reporting Limit
EDL	Estimated Detection Limit
MF	Membrane Filtration
MPN	Most Probably Number
TNTC	Too numerous to Count
CFU	Colony Forming Units



CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Cambridge Street Worcester RGP

ESS Laboratory Work Order: 21F0196

ESS LABORATORY CERTIFICATIONS AND ACCREDITATIONS

ENVIRONMENTAL

Rhode Island Potable and Non Potable Water: LAI00179

<http://www.health.ri.gov/find/labs/analytical/ESS.pdf>

Connecticut Potable and Non Potable Water, Solid and Hazardous Waste: PH-0750

http://www.ct.gov/dph/lib/dph/environmental_health/environmental_laboratories/pdf/OutofStateCommercialLaboratories.pdf

Maine Potable and Non Potable Water, and Solid and Hazardous Waste: RI00002

<http://www.maine.gov/dhhs/meedc/environmental-health/dwp/partners/labCert.shtml>

Massachusetts Potable and Non Potable Water: M-RI002

<http://public.dep.state.ma.us/Labcert/Labcert.aspx>

New Hampshire (NELAP accredited) Potable and Non Potable Water, Solid and Hazardous Waste: 2424

<http://des.nh.gov/organization/divisions/water/dwgb/nhelap/index.htm>

New York (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: 11313

<http://www.wadsworth.org/labcert/elap/comm.html>

New Jersey (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: RI006

http://datamine2.state.nj.us/DEP_OPRA/OpraMain/pi_main?mode=pi_by_site&sort_order=PI_NAMEA&Select+a+Site:=58715

United States Department of Agriculture Soil Permit: P330-12-00139

Pennsylvania: 68-01752

<http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx>

ESS Laboratory Sample and Cooler Receipt Checklist

Client: Weston and Sampson Engineers, Inc - TB

ESS Project ID: 21F0196

Shipped/Delivered Via: ESS Courier

Date Received: 6/4/2021

Project Due Date: 6/11/2021

Days for Project: 5 Day

1. Air bill manifest present? ☐ No
Air No.: NA

6. Does COC match bottles? ☐ Yes

2. Were custody seals present? ☐ No

7. Is COC complete and correct? ☐ Yes

3. Is radiation count <100 CPM? ☐ Yes

8. Were samples received intact? ☐ Yes

4. Is a Cooler Present? ☐ Yes
Temp: 3.8 Iced with: Ice

9. Were labs informed about short holds & rushes? ☒ Yes / No / NA

5. Was COC signed and dated by client? ☐ Yes

10. Were any analyses received outside of hold time? ☒ Yes / No

11. Any Subcontracting needed? ☒ Yes / No
ESS Sample IDs: _____
Analysis: _____
TAT: _____

12. Were VOAs received? ☒ Yes / No
a. Air bubbles in aqueous VOAs? ☒ Yes / No
b. Does methanol cover soil completely? ☒ Yes / No / NA

13. Are the samples properly preserved? ☒ Yes / No
a. If metals preserved upon receipt: _____
b. Low Level VOA vials frozen: _____

Date: _____ Time: _____ By: _____
Date: _____ Time: _____ By: _____

Sample Receiving Notes:

14. Was there a need to contact Project Manager? ☒ Yes / No
a. Was there a need to contact the client? ☒ Yes / No
Who was contacted? _____ Date: _____ Time: _____ By: _____

Sample Number	Container ID	Proper Container	Air Bubbles Present	Sufficient Volume	Container Type	Preservative	Record pH (Cyanide and 608 Pesticides)
1	173967	Yes	N/A	Yes	250 mL Poly	HNO3	
1	173971	Yes	N/A	Yes	1L Poly	NP	
1	173973	Yes	N/A	Yes	250 mL Poly	NaOH	pH 12
1	173975	Yes	N/A	Yes	250 mL Poly	NP	
1	173977	Yes	N/A	Yes	500 mL Poly	H2SO4	
1	~~173979~~	~~Yes~~	~~No~~	~~Yes~~	~~VOA Vial~~	~~HCl~~	
1	~~173980~~	~~Yes~~	~~No~~	~~Yes~~	~~VOA Vial~~	~~HCl~~	TOUIC
1	173981	Yes	No	Yes	VOA Vial	HCl	
1	173982	Yes	No	Yes	VOA Vial	HCl	
1	173991	Yes	N/A	Yes	VOA Vial	NP	
1	173993	Yes	N/A	Yes	1L Amber	NP	
1	173994	Yes	N/A	Yes	1L Amber	NP	
1	173995	Yes	N/A	Yes	1L Amber	NP	
1	173996	Yes	N/A	Yes	1L Amber	NP	
1	174127	Yes	N/A	Yes	1L Amber	NP	
1	174128	Yes	N/A	Yes	1L Amber	NP	
1	174186	Yes	No	Yes	VOA Vial	HCl	m 6/4/21

ESS Laboratory Sample and Cooler Receipt Checklist

Client: Weston and Sampson Engineers, Inc - TB

ESS Project ID: 21F0196
Date Received: 6/4/2021

1	174129	Yes	N/A	Yes	1L Amber	H2SO4
1	174131	Yes	N/A	Yes	VOA Vial	HCl
1	174132	Yes	N/A	Yes	VOA Vial	HCl
1	174133	Yes	N/A	Yes	VOA Vial	HCl
1	174137	Yes	N/A	Yes	500 mL Poly	HNO3
1	174138	Yes	N/A	Yes	500 mL Poly	HNO3
1	174141	Yes	N/A	Yes	1L Amber	H2SO4
2	173969	Yes	N/A	Yes	250 mL Poly	HNO3
2	173972	Yes	N/A	Yes	1L Poly	NP
2	173974	Yes	N/A	Yes	250 mL Poly	NaOH pH 12
2	173976	Yes	N/A	Yes	250 mL Poly	NP
2	173978	Yes	N/A	Yes	500 mL Poly	H2SO4
~~2~~	~~173983~~	~~Yes~~	~~No~~	~~Yes~~	~~VOA Vial~~	~~HCl~~ ~ 6/4/21
2	173984	Yes	No	Yes	VOA Vial	HCl
2	173985	Yes	No	Yes	VOA Vial	HCl
2	173986	Yes	No	Yes	VOA Vial	HCl
2	173992	Yes	N/A	Yes	VOA Vial	NP
2	173997	Yes	N/A	Yes	1L Amber	NP
2	173998	Yes	N/A	Yes	1L Amber	NP
2	173999	Yes	N/A	Yes	1L Amber	NP
2	174130	Yes	N/A	Yes	1L Amber	H2SO4
2	174134	Yes	N/A	Yes	VOA Vial	HCl
2	174135	Yes	N/A	Yes	VOA Vial	HCl
2	174136	Yes	N/A	Yes	VOA Vial	HCl
2	174139	Yes	N/A	Yes	500 mL Poly	HNO3
2	174140	Yes	N/A	Yes	500 mL Poly	HNO3

2nd Review

Were all containers scanned into storage/lab?

Are barcode labels on correct containers?

Are all Flashpoint stickers attached/container ID # circled?

Are all Hex Chrome stickers attached?

Are all QC stickers attached?

Are VOA stickers attached if bubbles noted?

Initials JD
Yes ☒ No ☐
Yes / No / NA ☐
Yes / No / NA ☐
Yes / No / NA ☐
Yes / No / NA ☐

Completed

By:

Date & Time:

Reviewed

By:

Date & Time:

Division of Thielsch Engineering, Inc.
185 Frances Avenue, Cranston, RI 02910-2211
Tel. (401) 461-7181 Fax (401) 461-4486
www.esslaboratory.com

ESS LAB PROJECT ID
Z1FD1910

Turn Time ✓ Standard Rush Approved By:

Reporting Limits -

State where samples were collected (MA) NH

Discharge into: Fresh Water ☒ Salt Water ☐

Is this project for:

Electronic Deliverable	Yes ☒	No ☐

Format: Excel ☒ Access ☐ PDF ☒ Other ☐

RGP

Project # 2191051 - A

Project Name: Cambridge
Street, Worcester

PO# 2191051 - A

Project Manager: Sarah Ruizzo
Company: Weston + Sampson
Address: 100 Foxborough Blvd
Foxborough, MA 02035

[illegible]

Matrix: S-Soil SD-Solid D-Sludge WW-Wastewater GW-Groundwater SW-Surface Water DW-Drinking Water O-Oil W-Wipes F-Filter

Cooler Present	☒ Yes	☐ No

Seals Intact ☐ Yes ☐ No ☐ NA:Cooler Temperature 3.8 °C

Relinquished by: (Signature)

Date/time

Relinquished by: (Signature)

Date/Time

Sampled by :

Comments: 1) RGP Metals include Sb, As, Cd, Cu, Fe, Pb, Ni, Se, Ag and Zn by 200.7/3113B and Hg by 245.1

2) Parameters in **BOLD** have Short hold-time

PERMIT ATTACHED

* TSS, TRC and Cl taken from the same container

Received by: (Signature)

14/01

Received by: (Signature)

Relinquished by: (Signature)

1977

Date/Time

Received by (Signature) _____

Relinquished by: (Signature)

Date/Time

Received by (Signature)

Please E-mail all changes to Chain of Custody in writing

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