The City of Waltham

Invites
Interested Parties
To propose the best offer and or bid
For the service or product herewith described:

FERNALD CENTER WETLANDS RESTORATION AND STREAM DAYLIGHTING

The VIRTUAL ZOOM GENERAL BID is due: b2ØŜY ōŜ o нлнм X млYлл l·ΦYΦ
(ZOOM Meeting Information will be posted to our website)

PRE-BID Meeting and Briefing on Site: hŎú2ōŜ нт нлнм X млYлл l·ΦYΦ
(a ŜŜú l·ú Fernald Center Entrance off Waverly Oaks Road ² l·túKl·Y)

LAST DAY FOR WRITTEN QUESTIONS: October 28, 2021 @ 5:00 p.m.
(To cphilpott@city.waltham.ma.us)

TABLE OF CONTENTS

SECTION NO.	TITLE
COVER	
TABLE OF CONTENTS	
DIVISION 00	Bidding documents
00010	Invitation to Bid
00100	Instructions to Bidders
00200	Compliance
00300	Bid Form
00500	Agreement
00610	Performance Bond
00615	Payment Bond
00710	Prevailing Wages
00821	Permits
DIVISION 01	Technical Specifications
ATTACHMENTS	
A	Drawings
B	Construction Details
C	Order of Conditions
D	Subsurface and Sampling Report
E	Existing Conditions
FERNALD NOI DESIGN PLANS	

SECTION 00010

INVITATION TO BID

Fernald Center Wetlands Restoration and Stream Daylighting

Location of Work: City of Waltham Massachusetts. Sealed Bids for construction of **the Fernald Center Wetlands Restoration and Stream Daylighting** will be received by Crystal Philpott, Purchasing Department 610 Main Street Waltham, Massachusetts until **November 3, 2021 10 AM** at which time and place all bids will be publicly opened and bids read aloud via ZOOM. Bids submitted after this time will not be accepted. The project involves the following:

The purpose of this Contract shall consist of daylighting a buried stream, approximately 1,800 LF and creation of wetland ponds and associated features as shown on the contract drawings and technical specifications within Fernald Center in the City of Waltham, Massachusetts. The project requires all work necessary or incidental to this purpose including providing all necessary supervisors, personnel, equipment and materials.

Contract Documents may be obtained by visiting the City's web site at www.city.waltham.ma.us/open-bids after **October 13, 2021.**

A Pre-Bid briefing will be held October 27, 2021 at 10 AM at the Fernald Center Entrance off Waverley Oaks Road, Waltham.

Last Day for written question is October 28, 2021 at 5 PM via e-mail ONLY to cphilpott@city.waltham.ma.us

BID SECURITIES shall be in amount of 5% of the bid and in the form of a certified check drawn upon a bank within the State of Massachusetts or a bid bond executed by a surety company authori ed to do business in Massachusetts, made payable to the **OWNER**.

The successful bidder must furnish a 100% **PERFORMANCE** and 100% **PAYMENT BOND** and will be required to execute the Contract Agreement within five (5) days following notification of the acceptance of his Bid. The **OWNER** reserves the right to reject any or all bids, to accept any bid, to waive any informality on bids received, and to omit any item or items deemed advisable for the best interests of the **OWNER**. The award of the contract may be contingent upon the appropriation of funds by the Waltham City Council. All costs associated with the preparation of the bids shall be the responsibility of the bidder, regardless of whether or not the Contract is awarded.

END OF SECTION

SECTION 00 01 0

INSTRUCTIONS TO BIDDERS

PART 1 - GENERAL

1.01 SCHEDULE OF DATES

A. Advertisement appears in the Commonwealth of Massachusetts Central Register. Bid Documents will be available from the City's web site at www.city.waltham.ma.us/ bids after October 13, 2021. No hard copies of Bid Documents will be offered.

B. Pre-bid conference on October 27, 2021 at 10 AM at the Fernald Center Entrance off Waverley Oaks Road, Waltham, MA.

C. Questions and requests for interpretations may be submitted in writing via e-mail ONLY to cphilpott@city.waltham.ma.us up to 5 PM on October 28, 2021.

D. Addenda will be issued with interpretations as determined by the Purchasing Department only via e-mail and posting on the City's web site.

E. General Bids Deadline: November 3, 2021 at 10 AM in the Purchasing Department, City Hall, 610 Main Street, Waltham, MA 02452, Attn: Crystal Philpott, Purchasing Agent, where the bids will be publicly open and read virtually via ZOOM. Link will be provided on the City's website.

G. The Owner is represented on this project by SSV Engineering, Sam Bade, 609 Winter Street Framingham, MA 01702 Phone: 508-745-4077 Email: sabade@ssv-eng.com

1.02 BIDDING PROCEDURE

A. Bids for the work are subject to the provisions of General Laws, Chapter 30, Sections 39M inclusive, as amended. Regulations governing the bidding procedures as set forth in the above mentioned amended General Laws must be followed.

B. In the event of any inconsistencies between any of the provisions of these Contract Documents and of the cited statute, anything herein to the contrary notwithstanding, the provisions of the said statute shall control.

C. No Bid received by the Awarding Authority after the time respectively established herein for the opening of the Bids will be considered, regardless of the cause for the delay in the receipt of any such bid.

1.03 WITHDRAWAL OF BIDS

A. Bids may be withdrawn prior to the time respectively established for the opening of the Bids only on written request to the Awarding Authority.

1.04 INTERPRETATION OF CONTRACT DOCUMENTS

A. No oral interpretation will be made to any Bidder. All questions or requests for interpretations must be made using the procedure noted above in Paragraph 1.01.C.

B. Every interpretation made to a Bidder will be in the form of an Addendum to the Bid Documents. Copies of Addenda will be e- mailed to the registered Bidders. Addenda will also be posted on the City's web site noted above.

C. Failure of the Awarding Authority to send, or of any Bidder to receive any such Addendum shall not relieve any Bidder from obligation under their bid as submitted.

D. All such Addenda shall become a part of the Contract Documents.

1.05 EXAMINATION OF SITE AND CONTRACT DOCUMENTS

A. Each Bidder shall visit the site of the proposed work and fully acquaint themselves with conditions as they exist, and shall also thoroughly examine the Contract Documents. Failure of any Bidder to visit the site and acquaint themselves with the Contract Documents shall not relieve any Bidder from any obligation with respect to their bid.

B. By submitting a bid, the Bidder agrees that the Contract Documents are adequate and that the required result for a full and complete installation can be produced. The successful Bidder shall furnish any and all labor, materials, insurance, permits and all other items needed to produce the required result to the satisfaction of the Awarding Authority.

1.06 BID SECURITY

A. The General Contractor's bid must be accompanied by bid security in the amount of five percent (5%) of the bid.

B. At the option of the Bidder, the security may be bid bond, certified, treasurer's or cashier's check issued by a responsible bank or trust company. No other type of bid security is acceptable.

Bid Bonds shall be issued by a Surety Company qualified to do business under the laws of the Commonwealth of Massachusetts.

C. Certified, Treasurer's or Cashier's check shall be made payable to the City of Waltham, Massachusetts.

D. The bid security shall secure the execution of the Contract and the furnishing of a Performance and Payment Bond by the successful General Bidder for 100%, of the contract value for each of the performance and Payment bonds

E. Should any General Bidder to whom an award is made fail to enter into a contract therefore within five (5) days, Saturdays, Sundays and Legal Holidays, excluded, after notice of award has been mailed to them or fail within such time to furnish a Performance Bond and also a Labor and Materials or Payment Bond as required, the amount so received from such General Bidder through their Bid Bond, Certified, Treasurer's or Cashier's check as bid deposit shall become the property of the City of Waltham, Massachusetts as liquidated damages provided that the amount of the bid deposit, which becomes the property of the City of Waltham, Massachusetts, shall not in any event exceed the difference between their bid price and the bid price of the next lowest responsible and eligible Bidder and provided further that, in case of death, disability, bona fide clerical error or mechanical error of a substantial nature, or other unforeseen circumstances affecting the General Bidder, their deposit shall be returned to them.

1.07 BID FORM

A. General Bids shall be submitted on the FORM FOR GENERAL BID, Sec 00300 enclosed. Erasures or other changes must be explained or noted over the signature of the Bidder.

B. Bid forms must be completely filled in. Bids which are incomplete, conditional, or obscure, or which contain additions not called for will be rejected.

C. General Bidders shall submit **one original set** of executed bid forms printed on a single side and with one staple in the top left corner. **The original bid must bear "wet" signatures** in all places where a signature is required.

1.08 SUBMISSION OF BIDS AND BID SECURITIES

A. Each bid submitted by a General Contractor shall be enclosed in a sealed envelope that shall be placed with the bid security in an outer envelope. The outer envelope shall be sealed and clearly marked as follows:

(Firm Name): _____

Filed Sub-bid or General Bid and Bid Security for:
Fernald Wetlands Restoration

1.09 AWARD OF CONTRACT

A. The Contract shall be awarded to the lowest responsible and eligible General Bidder on the basis of competitive bids in accordance with the procedure set forth in the provision inclusive, as amended or inserted, of Chapter 30,39M of the General Laws of the Commonwealth of Massachusetts.

B. If the Bidder selected as the General Contractor fails to perform their agreement to execute a contract in accordance with the terms of their General Bid, and furnish a

Performance Bond and also a Labor and Materials or Payment Bond, as stated in their General Bid, shall be made by the next lowest responsible and eligible Bidder.

C. The words lowest responsible and eligible Bidder shall be the Bidder whose name is the lowest of those Bidders possessing the skill, ability and integrity necessary for the faithful performance of the work and who shall certify that they are able to furnish labor that can work in harmony with all other elements of labor employed, or to be employed, on the work. Essential information in regard to such qualifications shall be submitted in such form as the Awarding Authority may require.

D. Action on the award will be taken within sixty (60) days, Saturdays, Sundays and Legal Holidays excluded after the opening of the bids. During this period this offer will be irrevocable.

1.10 SECURITY FOR FAITHFUL PERFORMANCE

A. The successful Bidder must deliver to the Awarding Authority simultaneously with their delivery of the executed contract, an executed Performance Bond, and also a Labor and materials or Payment Bond, each issued by a surety company qualified to do business under the laws of the Commonwealth and satisfactory to the Awarding Authority and each in the sum of One Hundred Percent (100%) of the Contract Price, as surety for the faithful performance of their contract, and for the payment of all persons performing labor or furnishing materials in connection therewith. Said bonds shall provide that, if the General Contractor fails or refuses to complete the Contract, the Surety Company will be obligated to do so.

B. Premiums are to be paid by the General Contractor, and are to be included in the Contract Price.

C. This project's contract shall not be in force until said bonds have been delivered and accepted by the City of Waltham.

1.11 EQUAL OPPORTUNITY

A. The City of Waltham is an Equal Opportunity employer and will require compliance with the minority business enterprise plan (MBE) on file in the Purchasing Department

1.12 PRE-BID WAL -THRU

A. A non-mandatory pre-bid conference will be held at the site on **October 27 at 10 AM**. Meet at the Fernald Center Entrance off Waverley Oaks Road, Waltham, MA. Interested parties are encouraged to attend given that this will be the only time the location is open prior to the submission of bids. Further, prior to the bid opening, potential Bidders may not go onto the site any time other than the aforementioned pre-bid conference.

1.13 SITE VISITS

A. Prospective Bidders are prohibited from going onto the site prior to the Bid Opening or any time other than the pre-bid conference, as set forth in Section 1.12 above, unless authori ed in writing by the City.

1.14 EQUALITY

A. Except where otherwise specifically provided to the contrary, the words or approved equal are hereby inserted immediately following the name or description of each article, assembly, system, or any component part thereof in the Contract Documents. It is the Contractor's responsibility to provide all the research and documentation that would prove a product or assembly is equal . Failure to provide research or documentation does not alleviate the Contractor's responsibility to meet the schedule. See Specification Section 01 60 00-Product Requirements for additional information.

1.15 TAX FREE NUMBER

A. The City of Waltham has a tax-free number.

1.16 CONSTRUCTION SCHEDULE

A. The work of the Contract shall be Substantially Complete in **One hundred fifty (150) calendar days** after the date of the Notice-to-Proceed.

1.17 LIQUIDATED DAMAGES

A. If the work is not Substantially Complete as specified in 1.16, the Contractor will be charged a maximum of **Five Hundred Dollars ($500.00)** per calendar day to pay for consulting and testing fees required to manage and arrange for the completion of the project. Liquidated Damages will be deducted from the Contract via Change Order.

1.18 WEE LY OB MEETINGS

A. There will be a weekly job meeting at the site on the same agreed-upon day and time. Time will be provided to discuss and view the progress of the work and to answer questions. The Contractor's job Superintendent and Project Manager shall attend each meeting. The City reserves the right to have job meetings conducted in any City location.

1.19 PRO ECT SUPERINTENDENT

A. The Contractor shall provide the same person as Superintendent for the entire duration of the project. Failure to maintain the same person in this position shall result in a One Thousand Dollar (1,000.00) penalty per incident which shall cover the Architect's time to re-orient new personnel.

1.20 AWARD

A. The Awarding Authority reserves the right to reject any or all bids if it is in the public interest to do so, and to act upon the bids and make its award in any lawful manner.

1.21 PREVAILING WAGE SCHEDULE

A. Bids shall be made on the basis of the Prevailing Wage Rates as determined by the Commissioner of the Department of Labor and Workforce Development under the provision of the Massachusetts General Laws apply to this project.
The Prevailing wage Schedule for this project can be found on the City of Waltham's web Site at www.city.waltham.ma.us/ bids in the folder pertaining to this project.

1.22 CONFLICT OF INTEREST

A. A Bidder filing a proposal thereby certifies that the proposal is made in good faith, without fraud, collusion, or connection of any kind with any other Bidder for the same work, and that the Bidder is competing solely on its own behalf without connection with, or obligation to, any undisclosed person or firm.

1.23 PROCEED ORDERS

A. No General Contractor is to commence work without receipt of a Notice to Proceed from the City as set forth in the contract.

1.24 INTENTIONALLY DELETED

1.25 CONSTRUCTION BARRICADES

A. The General Contractor shall provide all barricades to enclose the work area to prevent unauthori ed access to the site.
   1. The barricades shall provide enough room for all construction activities to be performed while separated from non-construction personnel.
   2. Safety is the sole responsibility of the Contractor and any barricades necessary to protect the work and the public shall be provided.
   3. Provide entrance protection.

1.26 SITE ACCESS

A. The General Contractor shall gain access to the site ONLY via The Waverley Oaks Rd entrance.
   1. The General Contractor as part of the bid price will restore all roads, curbs, walks and grassed or landscaped areas damaged during construction.

1.27 CONSTRUCTION TRAILER

A. The General Contractor shall locate the construction trailer at locations approved by the Owner.

B. The General Contractor shall locate all on site stored or staged materials within the enclosed area designated by the Owner.

1.28 BUILDING PERMIT FEES

A. Construction permit fees will be waived for this project. However, the Contractor is expected to obtain all proper permits as required by State Laws and City Ordinances

1.29 INTENTIONALLY LEFT BLANK

1.30 COMPLETE BID FORMS

A. Please Note: Each Bidder must fill in all the blanks on all the bid forms, even if the information is "zero dollars" or "not applicable". Also, please acknowledge all Addenda even if they do not pertain to your trade.

1.31 READ ALL DOCUMENTS.

A. Bidders should familiarize themselves with all the documents contained herein; it is mandatory that all Bids be in compliance with all the provisions contained in said documents.

1.32 FORMS AND ATTACHMENTS.

A. Bids are to be completed on the forms provided ONLY and enclosed in a sealed envelope marked on the outside "BID (title)" and the name and address of bidder. Attachments submitted in addition to the Waltham Purchasing Department produced forms may not be considered.

1.33 PRINTED OR TYPED RESPONSE.

A. All information must be typewritten or printed in ink, including the price the bidder offers in the space as provided on the bid form.

1.34 BIDDER EXPERIENCE EVALUATION

Each bidder shall submit with their bid, all the information relative to their experience and qualifications in performing the work required under this contract and shall have been in business for a minimum of five (5) years, in order for their bid to be considered.

1.35 CORRECTIONS.

A. Bids that are submitted containing cross outs, white outs or erasures, will be rejected. All corrections or modifications to the original bid are to be submitted in a separate envelope, properly marked on the outside, "CORRECTION/ MODIFICATION TO BID (title)" and submitted prior to the bid opening.

1.36 All documents submitted with your response will be incorporated into the Contract.

1.37 PRICE IS ALL INCLUSIVE.

A. Bid prices shall encompass everything necessary for furnishing all items, ADMINISTRATIVE COSTS, Overhead and profit, travel, communication costs, materials, supplies or services as specified, and in accordance with the specifications, including proper packing, cost of delivery, and in the case of services, completion of same, as per specification

1.38 WITHDRAW

A. A Bid may be withdrawn by written request prior to the schedule for the Bid Opening. No withdrawals are permitted after the bid opening date and time. Withdrawals after the bid opening date will cause the forfeit of the bid Deposit.

1.39 BID OPENING INCLEMENT WEATHER

If, at the time of the originally scheduled bid opening, City Hall is closed due to inclement weather or another unforeseeable event, the bid opening will be extended until 2:00 P.M. on the next normal business day. Bids will be accepted until that date and time.

1.40 INTENTIONALLY LEFT BLAN .

1.41 DOCUMENTS TO SUBMIT WITH BID

A. Bidders are required to submit the following Documents/Forms with their Bid to the Owner.

1. Completed bid form with acknowledgment of all addenda
2. Bid security in the amount of 5%
3. Certificate of Non-Collusion
4. Tax Compliance Certification
5. Certificate of Vote of Authori ation
6. Corporate Identification
7. Right to now Law Compliance
8. Debarment Certification
9. 10 Hours OSHA Training Confirmation
10. A letter from a surety company certifying that the General Contractor is qualified and capable of obtaining the required Performance and Payment Bonds.
11. General Contractor's Bid

Signature of Individual or Corporate Name

By:

_____

(Signature of Corporate Officer if applicable)

Title:_____

Social Security Number or Federal Identification Number: _____

END OF DOCUMENT

Section 00 20 00

Compliance

The documents in this section shall bear "wet" Original signatures and returned with your bid

Compliance

The compliance documents in this section must be completed, signed and returned **with your bid package**.

Purchasing Department

City of Waltham
610 Main Street
Waltham, MA 02452

Failure to submit the completed documents will cause the disqualification of the proposal.

Section Index

Check when Complete

- Non-collusion form and Tax Compliance form
- Corporation Identification Form ..
- Certificate of Vote Authori ation .
- Certificate of Insurance (showing all limits of WC GL).....
- Three (3) References
- 5% Bid Bond or Certified Check .....
- Debarment Certificate ..
- Prevailing Wage Certificate .
- Right-to-know Law
- OSHA 10 Certificate for all Assigned Employees (MGL ch30, 39M and Ch 149)

Before the commencement of the Job, the contractor must provide to the above office:

- Performance and Payment Bonds **each** for 100% of the contract value and naming the City of Waltham

Your Company's Name:

Service or Product Bid

NOTE: Failure to submit any of the required documents, in this or in other sections, with your bid response package may cause the disqualification of your proposal.

Wet Signature Required

NON-COLLUSION FORM AND TAX COMPLIANCE FORM

CERTIFICATE OF NON-COLLUSION

The undersigned certifies under penalties of perjury that this bid or proposal has been made and submitted in good faith and without collusion or fraud with any other person. As used in this certification, the word "person" shall mean any natural person, business, partnership, corporation, union, committee, club, or other organization, entity or group of individuals. The undersigned certifies that no representations made by any City officials, employees, entity, or group of individuals other than the Purchasing Agent of the City of Waltham was relied upon in the making of this bid

_____, _____
(Signature of person signing bid or proposal) Date

_____
(Name of business)

Wet Signature Required

TAX COMPLIANCE CERTIFICATION

Pursuant to M.G.L. c. 62C, & 49A,I certify under the penalties of perjury that, to the best of my knowledge and belief, I am in compliance with all laws of the Commonwealth relating to taxes, reporting of employees and contractors, and withholding and remitting child support.

_____, _____
Signature of person submitting bid or proposal Date

_____
Name of business

NOTE

Failure to submit any of the required documents, in this or in other sections, with your bid response package may cause the disqualification of your proposal.

Wet Signature Required

CERTIFICATE OF VOTE OF AUTHORIZATION

Date:

I _____, Clerk of_____hereby certify that at a meeting of the Board of Directors of said Corporation duly held on the_____day of_____at which time a quorum was present and voting throughout, the following vote was duly passed and is now in full force and effect:

VOTED: That _____(*name*) is hereby authorized, directed and empowered for the name and on behalf of this Corporation to sign, seal with the corporate seat, execute, acknowledge and deliver all contracts and other obligations of this Corporation; the execution of any such contract to be valid and binding upon this Corporation for all purposes, and that this vote shall remain in full force and effect unless and until the same has been altered, amended or revoked by a subsequent vote of such directors and a certificate of such later vote attested by the Clerk of this Corporation.

I further certify that_____ is duly elected/appointed_____ _____of said corporation

SIGNED:

(Corporate Seal)

_____

Clerk of the Corporation:

Print Name: _____

COMMONWEALTH OF MASSACHUSETTS

County of_____ **Date:**

Then personally appeared the above named and acknowledged the foregoing instrument to be their free act and deed before me,_____

Notary Public;

My Commission expires: _____

Wet Signature Required

CORPORATION IDENTIFICATION

The bidder for the information of the Awarding Authority furnishes the following information.

If a Corporation:

Incorporated in what state _____
President _____
Treasurer _____
Secretary _____
Federal ID Number_____

If a foreign (out of State) Corporation – Are you registered to do business in Massachusetts?
Yes _____, No _____

If you are selected for this work you are required under M.G.L.ch. 30S, 39L to obtain from the Secretary of State, Foreign Corp. Section, State House, Boston, a certificate stating that you Corporation is registered, and furnish said certificate to the Awarding Authority prior to the award.

If a Partnership: (Name all partners)
Name of partner _____
Residence _____
Name of partner _____
Residence _____

If an Individual:
Name _____
Residence _____

If an Individual doing business under a firm's name:
Name of Firm _____
Name of Individual _____
Business Address _____
Residence _____
Date _____

Name of Bidder _____
By _____
Signature
_____
Title
_____
Business Address (POST OFFICE BOX NUMBER NOT ACCEPTABLE)
_____
State Telephone Number Today's Date

PROVIDE THREE (3) SERVICE APPROPRIATE REFERENCES

1. Company Name:
   Address:
   Contact Name:
   Phone
   Type of service/product provided to this Company:

   Dollar value of service provided to this Company:

2. Company Name:
   Address:
   Contact Name:
   Phone
   Type of service/product provided to this Company:

   Dollar value of service provided to this Company:

3. Company Name:
   Address:
   Contact Name:
   Phone
   Type of service/product provided to this Company:

   Dollar value of service provided to this Company:

NOTE

Failure to submit any of the required documents, in this or in other sections, with your bid response package will be cause for the disqualification of your company.

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, on a weekly basis, a copy of his or her 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 reports 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

, 200

I ,
(Name of signatory party) (Title)

I 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

Print_____

WEEKLY PAYROLL REPORT FORM

Company Name: _____

Project Name: _____

Awarding Auth.: _____

Work Week Ending: _____

☐ Final Report

☐ Prime Contractor

☐ Subcontractor
List Prime Contractor: _____

Employer Signature: _____

Print Name & Title: _____

Employee Name & Address	Work Classification	Hours Worked							(A) Tot. Hrs.	(B) Hourly Base Wage	Employer Contributions			(F) [B+C+D+E] Hourly Total Wage (prev. wage)	(G) [A*F] Weekly Total Amount
		S	M	T	W	T	F	S			(C) Health & Welfare	(D) Pension	(E) Supp. Unemp.		

NOTE: Every contractor and subcontractor is required to submit a copy of their weekly payroll records to the awarding authority.

Wet Signature Required

RIGHT TO KNOW LAW

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. c. 111F, §§8,9 and 10 and the regulations contained in 441 CMR 21.06 when deliveries are made. The vendor agrees to deliver all containers properly labeled pursuant to M.G.L. c. 111F §7 and regulations contained in 441 CMR 21.05. Failure to furnish MSDS 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 111F or M.G.L. are cautioned to obtain and read the laws, rules and regulations referenced above. Copies may be obtained from the State House Bookstore, Secretary of State, State House, Room 117, Boston, MA (617) 727-2834.

Authorized Signature Indicating Compliance with the Right-to-know laws:

Signature **Date**

Print Name

NOTE

Failure to submit any of the required documents, in this or in other sections, with your bid response package may cause the disqualification of your proposal.

Wet Signature Required

DEBARMENT CERTIFICATION

In connection with this bid and all procurement transactions, by signature thereon, the respondent certifies that neither the company nor its principals are suspended, debarred, proposed for debarment, declared ineligible, or voluntarily excluded from the award of contracts, procurement or non procurement programs from the Commonwealth of Massachusetts, the US Federal Government and /or the City of Waltham. "Principals" means officers, directors, owners, partners and persons having primary interest, management or supervisory responsibilities with the business entity. Vendors shall provide immediate written notification to the Purchasing Agent of the City of Waltham at any time during the period of the contract of prior to the contract award if the vendor learns of any changed condition with regards to the debarment of the company or its officers. This certification is a material representation of fact upon which reliance will be placed when making the business award. If at any time it is determined that the vendor knowingly misrepresented this certification, in addition to other legal remedies available to the city of Waltham, the contract will be cancelled and the award revoked.

Company Name _____

Address _____

City _____, **State**_____, **Zip Code** _____

Phone Number (____) _____

E-Mail Address _____

Signed by Authorized Company Representative:

_____

Print name _____,

Date _____

Wet Signature Required

10 HOURS OSHA TRAINING CONFIRMATION

Chapter 306 of the Acts of 2004

CONSTRUCTION PROJECTS

AN ACT RELATIVE TO THE HEALTH AND SAFETY ON PUBLIC

The undersigned hereby certifies that all employees to be employed at a worksite for construction, reconstruction, alteration, remodeling, repair, installation, demolition, maintenance or repair of any public work or any public building estimated to cost more than 10,000.00 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 payroll report for each employee and will comply with all laws and regulations applicable to awards of subcontracts subject to section 44F.

Company Name: _____

Address: _____

Signature: _____

Title: _____

Print Name _____

Date

See Chapter 306 of the Acts of 2004

NOTE

Failure to submit any of the required documents, in this or in other sections, with your bid response package will be cause for the disqualification of your company.

SECTION 00301

BID FORM

To the City of Waltham, Massachusetts, acting through its Mayor:

The Undersigned, as Bidder, declares as follows:

- The only parties interested in this BID as Principals are named herein;
- this BID is made without collusion with any other person, firm, or corporation;
- no officer, agent, or employee of the Owner is directly or indirectly interested in this BID;
- the Bidder has carefully examined the site of the proposed Work and fully informed and satisfied himself as to the conditions there existing, the character and requirements of the proposed Work, the difficulties attendant upon its execution and the accuracy of all estimated quantities stated in this BID, and has carefully read and examined the Drawings, the annexed proposed AGREEMENT and the Specifications and other Contract Documents therein referred to and knows and understands the terms and provisions thereof;
- understands that information relative to subsurface and other conditions, natural phenomena, existing pipes and other structures (surface and/or subsurface) has been furnished only for his information and convenience without any warranty or guarantee, expressed or implied, that the subsurface and/or other conditions, natural phenomena, existing pipes and other structures (surface and/or subsurface) actually encountered will be the same as those shown on the Drawings or in any of the other Contract Documents and agrees that the Bidder shall not use or be entitled to use any such information made available to him through the Contract Documents or otherwise or obtained by him in his own examination of the site, as a basis of or ground for any claim against the Owner or the Engineer arising from or by reason of any variance which may exist between the aforesaid information made available to or acquired by him and the subsurface and/or other conditions, natural phenomena, existing pipes and other structures (surface and/or subsurface) actually encountered during the construction work, and has made due allowance therefore in this BID;
- and the Bidder understands that the quantities of work tabulated in this BID or indicated on the Drawings or in the Specifications or other Contract Documents are only approximate and are subject to increase or decrease as deemed necessary by the Engineer;
- and agrees that, if this is accepted will contract with the Owner, as provided the copy of the Contract Documents deposited in the office of the Engineer, this BID form being part of said Documents, that the will perform all work and all the materials and equipment, and provide all labor, services, plant, machinery, apparatus, appliances, tools, supplies all other required by Contract Documents the manner within the therein prescribed according to the requirements the

Engineer as therein set forth, and that the Bidder will take in full payment therefore the lump sum or unit price applicable to each item of the Work as stated in the following schedule:

Bidders must bid on each item of the Base Bid. All entries in the entire BID must be made clearly and in ink; prices bid must be written in both words and figures. In case of discrepancy, the amount shown in words will govern.

Bidders shall insert extended item prices obtained from quantities and unit prices. In case of discrepancy between the product obtained by multiplying the estimated quantity by the unit price, the actual product shall apply. In case of discrepancy between the sum of the total figure of the items and the total amount listed, the actual sum shall apply.

Receipt of Addenda numbered_____to_____ , inclusive, is acknowledged.

(Bidder) _____

(by) _____

(Title) _____

BASE BID

Fernald Center Wetlands Restoration and Stream Daylighting

Refer to Section 01150 - Measurement and Payment for Item Descriptions. The work of the General Bidder, being all work covered by items 1 through 26, inclusive.

Item No.	Item Description Unit Price in Words	Units	Estimated Quantity	Unit Price (In Figures)	Extended Amount (In Figures)
1	Mobilization and Demobilization _____ Dollars and Cents	LS	1		
2	Traffic Management _____ Dollars and Cents	LS	1		
3	Test Pits _____ Dollars and Cents	CY	100		
4	Abandon and Controlled Density Fill Existing Utility Pipes _____ Dollars and Cents	LF	500		
5	Abandon and Controlled Density Fill Existing Drainage Structures _____ Dollars and Cents	EA	15		
6	Erosion and Sedimentation Control _____ Dollars and Cents	LS	1		
7	Tree and Shrub Plantings _____ Dollars and Cents	LS	1		
8	Rock Excavation and Disposal _____ Dollars and Cents	CY	500		
9	Storm Drain Piping (18" RCP), & Appurtenances _____ Dollars and Cents	LF	50		
10	5-foot Diameter Precast Concrete Manhole _____ Dollars and Cents	EA.	1		
11	Precast Concrete Headwall _____ Dollars and Cents	LF	100		
12	Stone Spillways _____ Dollars and Cents	EA.	4		
13	Stone Weir Walls _____ Dollars and Cents	LF	400		
14	Prefabricated Pedestrian Footbridges _____ Dollars and Cents	EA	2		

15	Stream J-hooks _____ Dollars and Cents	EA	15		
16	Stream Cross Veins _____ Dollars and Cents	EA	4		
17	Stream Channel _____ Dollars and Cents	LF	1800		
18	Stormwater Wetland Ponds _____ Dollars and Cents	LS	1		
19	Rebuild Existing Pond Berm and Grading _____ Dollars and Cents	LS	1		
20	Management of Contaminated Soils/Fill _____ Dollars and Cents	LS	1		
21	Removal and Disposal of Soil (Class A-1) _____ Dollars and Cents	CY	1,000		
22	Removal and Disposal of Soils and Waste Materials _____ Dollars and Cents	CY	400		
23	Tree Cutting and Stump Grinding _____ Dollars and Cents	LS	1		
24	Stabilization, Loam and Seed _____ Dollars and Cents	LS	1		
25	Police Detail Allowance _____ Dollars and Cents	HR	400	$50/hr	$20,000
26	Miscellaneous Work and Cleanup _____ Dollars and Cents	LS	1		

TOTAL FOR BASE BID

Total Amount of Base Bid (**Basis of Award**) (Items 1 through 26 inclusive).
$_____
(Amount in figures)

_____
(Amount in words)

The bidder understands that the Owner reserves the right to reject any and all bids and to waive any informality in the bidding.

The undersigned agrees that for extra work, if any, will be performed in accordance with Article 10 of the General Conditions of the Contract and will be paid for in accordance with Article 11 of the General Conditions of the Contract.

The bid security accompanying this BID shall be in the amount of 5 percent of the BID payable to the City of Waltham.

The time for completion of this contract is 150 calendar days. Liquidated damages specified in this contract are $1,000 per day for each calendar day beyond the contract completion date that work remains uncompleted.

Bids shall be valid for ninety (90) days and cannot be withdrawn until after the 90-day period has expired.

The undersigned agrees that if the Owner accepts this BID, the bidder will duly execute and acknowledge the AGREEMENT and furnish, duly executed and acknowledged, the required CONTRACT BONDS within ten (10) days, Saturdays, Sundays, and legal holidays excluded, after notification that the AGREEMENT and other Contract Documents are ready for signature.

A performance bond in an amount equal to 100 percent of the total amount of the bid with a surety company qualified to do business in the Commonwealth of Massachusetts will be required for the faithful performance of the contract, as well as a labor and materials bond in an amount equal to 100 percent of the total bid amount.

Should the bidder fail to fulfill any of his agreements as hereinabove set forth, the Owner shall have the right to retain as liquidated damages the amount of the bid check or cash which shall become the Owner's property. If a bid bond was given, it is agreed that the amount thereof shall be paid as liquidated damages to the Owner by the Surety.

The bidder, by submittal of this BID, agrees with the Owner that the amount of the bid security deposited with this BID fairly and reasonably represents the amount of damages the Owner will suffer due to the failure of the bidder to fulfill his agreements as above provided.

The undersigned bidder hereby certifies he/she will comply with the minority workforce percentage ratio and specific affirmative action steps contained in the EEO/AA provisions of this Contract, including compliance with the Minority/Woman Business Enterprise as required under these contract provisions. The Contractor receiving the award of the contract shall be required to obtain from each of its subcontractors a copy of the certification by said subcontractor, regardless of tier, that it will comply with the minority workforce ratio and specific affirmative action steps contained in these contract provisions and submit it to the contracting agency prior to the award of such subcontract.

The undersigned further certifies under penalty of perjury that the said undersigned is not presently debarred from doing public construction work in the Commonwealth under the provisions of Section Twenty-Nine F of Chapter Twenty-Nine, or any other applicable debarment provisions of any other chapter of the General Laws or any rule or regulation promulgated thereunder.
Pursuant to M.G.L. Ch. 62C, sec. 49A, I certify under the penalties of perjury that I, to my best knowledge and belief, have filed all state tax returns and paid all state taxes required under law.

The attached Minority Business Participation and Women Business Participation Form (Form EEO-BMF-190) and the attached Minority Business Participation and the Women Business Participation Letters of Intent (Form EEO-BMF-191) must be completed and submitted as part of the Bid Proposal.

The undersigned hereby certifies that he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work and that he will comply fully with all laws and regulations applicable to awards made subject to MOL Ch. 30, Section 39M. The bidding and award of

the contract will be in full compliance with Section 39M inclusive of Chapter 30 of the General Laws of the Commonwealth of Massachusetts as last revised.

The undersigned certifies under penalties of perjury that this bid is in all respects bona fide, fair and made without collusion or fraud with any other person. As used in this paragraph the word "person" shall mean any natural person, joint venture, partnership, corporation or other business or legal entity. The attached CERTIFICATE OF NON-COLLUSION must be signed and submitted as part of the Bid Proposal.

_____
(Name of General Bidder)

By_____ Date_____
(Signature and title of authorized representative)

SEAL

_____ _____
(Telephone) (Business address)

_____ _____
(Fax Number) (City, State, Zip)

The following documents are attached to and made a condition of the bid, and shall be filed with the bid:

- Bid Security (5%)
- Completed and signed Bid Proposal (Section 00301)
- Contractor's Certification (Attached to Section 00301)
- MBE/WBE Participation and Vendor Information Forms (Attached to Section 00301)
  1. Schedule of Participation for SRF Construction (EEO-DEP-190C)
  2. Letter of intent for SRF Construction (EEO-DEP-191C)
  3. Vendor Information Form- SRF Construction (EEO-DEP-VIF-C)
- Completed Certificate of Non-Collusion (Section 00480)
- Completed Certificate of Corporate Vote (Corporation Only) (Section 00481)
- Completed Certificate as to Payment of State Taxes (Section 00482)
- Completed State "Debarment Disclosure Form for Public Contracts" (Section 00484)

The Bidder is requested to list four or more of your firm's recent projects of a similar character as required for acceptable bid. References will enable the Owner to judge his experience, skill, and business standing.

Project Name:_____

Project Location:_____

Contract Amount: $_____Completion Date_____

Owner:_____

Contact Name: _____Telephone: _____

Architect/Engineer: _____

Contact Name: _____Telephone: _____

Project Name:_____

Project Location:_____

Contract Amount: $_____Completion Date_____

Owner:_____

Contact Name: _____Telephone: _____

Architect/Engineer: _____

Contact Name: _____Telephone: _____

Project Name:_____

Project Location:_____

Contract Amount: $_____Completion Date_____

Owner:_____

Contact Name: _____Telephone: _____

Architect/Engineer: _____

Contact Name: _____Telephone: _____

Project Name:_____

Project Location:_____

Contract Amount: $_____Completion Date_____

Owner:_____

Contact Name: _____Telephone: _____

Architect/Engineer: _____

Contact Name: _____Telephone: _____

Add supplementary page if necessary.

END OF SECTION 00301

SECTION 00500
AGREEMENT
CITY OF WALTHAM

This agreement, made this day of , 2021 by and between the CITY OF WALTHAM, party of the first part, hereinafter called the CITY, by its MAYOR, and

hereinafter called the CONTRACTOR.

Witnesseth, that the parties to this agreement, each in consideration of the agreement on the part of the others herein contained, do hereby agree, the CITY OF WALTHAM for itself, and said contractor for his heirs, executors, administrators and assigns as follows:

CITY OF WALTHAM, MASSACHUSETTS

FOR THE CITY

eannette A. McCarthy, Mayor
City of Waltham
Date:

ohn Cervone. City Solicitor
Date:
APPROVED AS TO FORM ONLY

Robert Winn, City Engineer Date:

Crystal Philpott, Acting Purchasing Agent
Date:

Paul Centofanti, Auditor
Date:

I CERTIFY THAT SUFFICIENT FUNDS ARE AVAILABLE FOR THIS CONTRACT

FOR THE COMPANY

CONTRACTOR (Signature),
Date:

Company

Address

City Charter – See attached Charter Section 3-12

Change Orders are not effective until if, as and when signed by mayor. No work is to commence until change orders are fully executed by all parties.

the provisions of this section, he shall exercise all the rights and powers of mayor including compensation and shall be sworn to the faithful discharge of his duties and a vacancy shall exist in his seat on the city council.

Section 3-8. Mayor's attendance at council meeting.

The mayor, when requested by the city council to be present at a council meeting to answer questions relative to matters properly within the jurisdiction of the council, shall be informed, in writing, of the subject matter to be discussed. The mayor shall personally, or through the head of a department or a member of a board, attend such meeting and publicly answer all such questions. The person so attending shall not be obliged to answer any questions relating to any other matter. The mayor may attend and address the city council in person or through the head of a department, or a member of the board, upon any subject.

Section 3-9. Adoption of measures, mayor's veto.

Every measure relative to the affairs of the city adopted by the city council, except such measures as relate to the internal affairs of the city council, the election of officers whose election by the city council is authorized by law or by the charter, or budgets submitted under section thirty-two of chapter forty-four of the General Laws or to appropriations by the city council under section thirty-three of said chapter, shall be presented to the mayor for his approval. If the mayor does approve it, he shall signify his approval by signing it. If he does not approve of it, he shall return it, with his objections in writing, to the city council. The city council shall enter the objections of the mayor upon its records and shall again consider the measure. If the city council, notwithstanding such disapproval of the mayor, shall pass such measure by a two-thirds vote of all its members, it shall be considered approved and shall then be in force, but such vote shall not be taken for at least seven (7) days after the measure has been returned to the city council. If any measure is not returned by the mayor within ten (10) days following the date it is presented to him, it shall be considered approved. A filing with the clerk of the council shall be considered a return by the mayor to the city council. All votes taken on measures returned by the mayor shall be by roll call.

Section 3-10. Call of special council meeting by mayor.

The mayor may at any time call a special meeting of the city council by causing a notice of such meeting, specifying the matters which he desires to be considered, to be delivered in hand or to the place of residence of each councillor. Public notice of said meeting shall be posted at least forty-eight (48) hours in advance of the time set for such meeting; however, in the event of an emergency, of which the mayor shall be the judge, a lessor period shall suffice and no other business except as provided shall be in order.

Section 3-11. Employees in mayor's office not subject to civil service.

The civil service laws shall not apply to the appointment of the mayor's secretaries or of the stenographers, clerks, administrative assistant, and other employees in the mayor's office, and the mayor may remove such appointees without a hearing and without making a statement of the cause of their removal.

Section 3-12. Approval of contracts by mayor.

All contracts made by any department, board or commission where the amount involved is two thousand dollars ($2,000.00) or more shall be in writing, and no such contract shall be deemed to have been made or executed until the approval of the mayor is affixed thereto. Any construction contract shall, and all other contracts may, where the amount exceeds five thousand dollars ($5,000.00) be required to be accompanied by a bond with sureties satisfactory to the mayor or by a deposit of money, certified check or other security for the faithful performance thereof, and such bonds or other securities shall be deposited with the city treasurer until the contract has been carried out in all respects; and no such contract shall be altered except by a written agreement of the contractor, the sureties on his bond, if any, and the officer, department or board, as the case may be,

making the contract, with the approval of the mayor affixed thereto. Any cash deposit or check payable to a city received as security for performance under this section may be deposited by said treasurer in any bank or trust company under a separate account to be known as a performance deposit account.

The provisions of this section shall be deemed to have been complied with on all purchases made under the provisions of sections twenty-two A and twenty-two B of chapter seven of the General Laws when one municipality acting on behalf of other municipalities complies with the provisions of this section, or when purchases are made for a vendor holding a contract with the commonwealth for the item or items being purchased.

ARTICLE 4. SCHOOL COMMITTEE

Section 4-1. Composition, election, terms, organization, dual employment.

The school committee shall consist of seven (7) members, one (1) of whom shall be the mayor, who shall be chairman. The remaining six (6) members shall be elected at large, each to serve four (4) years, three (3) of whom shall be elected biennially. The members of the school committee shall elect one (1) of its members to serve as vice chairperson annually. The committee shall organize annually on the first Sunday in January, and shall elect one of its members as vice chairman, who shall preside at all meetings of the committee at which the mayor is not present. No member of the school committee shall, while a member thereof, hold any other office or position in the school department the salary or compensation for which is payable out of the city treasury.

Section 4-2. Powers and duties.

Except as otherwise provided in this charter and subject to any laws which limit the amount of money that may be appropriated in any city for school purposes, the school committee, in addition to the powers and duties conferred and imposed by law on school committees, may provide, when necessary, temporary accommodations for school purposes, may make all repairs, the expenditures for which are made from the regular appropriation for the school department, shall have control of all school buildings and grounds connected therewith and shall make all reasonable rules and regulations, consistent with law, for the management of the public schools of the city and for conducting the business of the committee.

Section 4-3. School committee vacancy.

If a vacancy occurs at any time in the office of school committee by failure to elect, or otherwise, the city council and the remaining members of the school committee shall meet in joint convention, which shall be called by the city clerk forthwith, and elect a suitable person to fill the vacancy until the first Sunday in January following the next regular municipal election; and, if there would be a vacancy on said first Sunday, it shall be filled at such regular municipal election for the balance of the unexpired term. The mayor, if present, shall preside at the convention.

Section 4-4. Open and public meetings, roll call vote.

All meetings of the school committee shall be open to the press and to the public, except as otherwise authorized by section twenty-three A and twenty-three B of chapter thirty-nine of the General Laws. The vote in any particular measure taken in open session shall be recorded by roll call vote when requested by two (2) members. All votes taken in executive session shall be recorded by roll call vote.

Section 4-5. Superintendent of schools, selections, appointment, duties and compensation of other school employees.

The school committee shall elect a superintendent of schools annually, except as provided in section forty-one of chapter seventy-one of the General Laws, and may under chapter thirty-one of the General Laws appoint, suspend, or remove at pleasures such subordinate officers or assistants, including janitors of school buildings, as it may deem necessary for the proper discharge of its duties and the conduct of its business; it shall define their terms of service and their duties and shall fix their compensation.

SECTION 00 06 10

PERFORMANCE BOND

CITY OF WALTHAM

NOW ALL MEN BY THESE PRESENT THAT,

as

principal and as surety, are held and firmly bound unto the CITY OF WALTHAM and to such persons, firms, and corporations, who may furnish materials for or perform labor on the work, construction or improvements contemplated in the Contract hereinafter mentioned, or who may have any suits or claims for injury or damage to persons or property resulting from or arising out of the work done under this Contract, in the

SUM OF DOLLARS ( )
(lawful money of the United States of America) for the payment whereof the Contractor and the Surety of Sureties bind themselves and their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, THAT for the above burden (the Contractor) its

heirs, executors, administrators and assigns, shall faithfully perform the Contract, on his part and during the life of any guaranty or warranty, for defective materials and workmanship required under this Contract, and satisfy all claims and demands incurred for the same and shall fully indemnify and save harmless the City from all cost and damage which it may suffer by reason of failure so to do, and shall fully reimburse and repay the City all outlay and expense which the City may incur in making good any such default, and shall promptly make payment to all persons supplying labor or materials for use in the prosecution of the work provided for in said Contract and shall indemnify and save harmless the said City, its officers and agents from any and all suits or claims for injury or damage to persons or property resulting from or arising our of the work done under this Contract, then this obligation shall be null and void otherwise it shall remain in full force and effect.

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

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

This Bond is made for the use and benefit of all persons, firms, and corporations who may furnish materials, or perform any labor for or on account of said work, construction or improvements, or who may have any suits or claims for injury or damage to persons or property resulting from or arising our of the work done under this Contract, and they and each of them are hereby made obligees hereunder the same as if their own proper names were written herein as such, and they and each of them may sue hereon in their own names for their own use and benefit.

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

IN WITNESS WHEREOF, said Contractor and Surety have hereunto set their respective names this

_____ day of _____, 20_____.

WITNESSES:

(CONTRACTOR) (SEAL)

NAME _____ BY _____
(SIGNATURE AND TITLE)

ADDRESS _____
(SURETY) (SEAL)

NAME _____ BY _____
(SIGNATURE AND TITLE)

ADDRESS _____ BY _____
(ATTORNEY-IN-FACT)

POWER OF ATTORNEY
Attorneys-in-fact who sign bonds must file with each bond a certified copy of their power of attorney to sign said bonds.

SECTION 00 50 20

PAYMENT BOND

CITY OF WALTHAM

NOW ALL MEN BY THESE PRESENT THAT,

as

principal and as surety, are held and firmly bound unto the CITY OF WALTHAM and to such persons, firms, and corporations, who may furnish materials for or perform labor on the work, construction or improvements contemplated in the Contract hereinafter mentioned, or who may have any suits or claims for injury or damage to persons or property resulting from or arising out of the work done under this Contract, in the

SUM OF DOLLARS ( )
(lawful money of the United States of America) for the payment whereof the Contractor and the Surety of Sureties bind themselves and their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, THAT for the above burden (the Contractor) its

heirs, executors, administrators and assigns, shall faithfully perform the Contract, on his part and during the life of any guaranty or warranty, for defective materials and workmanship required under this Contract, and satisfy all claims and demands incurred for the same and shall fully indemnify and save harmless the City from all cost and damage which it may suffer by reason of failure so to do, and shall fully reimburse and repay the City all outlay and expense which the City may incur in making good any such default, and shall promptly make payment to all persons supplying labor or materials for use in the prosecution of the work provided for in said Contract and shall indemnify and save harmless the said City, its officers and agents from any and all suits or claims for injury or damage to persons or property resulting from or arising our of the work done under this Contract, then this obligation shall be null and void otherwise it shall remain in full force and effect.

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

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

This Bond is made for the use and benefit of all persons, firms, and corporations who may furnish materials, or perform any labor for or on account of said work, construction or improvements, or who

may have any suits or claims for injury or damage to persons or property resulting from or arising our of the work done under this Contract, and they and each of them are hereby made obligees hereunder the same as if their own proper names were written herein as such, and they and each of them may sue hereon in their own names for their own use and benefit.

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

IN WITNESS WHEREOF, said Contractor and Surety have hereunto set their respective names this

_____ day of _____, 20_____.

WITNESSES:

(CONTRACTOR) (SEAL)

NAME _____ BY _____
(SIGNATURE AND TITLE)

ADDRESS _____
(SURETY) (SEAL)

NAME _____ BY _____
(SIGNATURE AND TITLE)

ADDRESS _____ BY _____
(ATTORNEY-IN-FACT)

POWER OF ATTORNEY
Attorneys-in-fact who sign bonds must file with each bond a certified copy of their power of attorney to sign said bonds.

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PREVAILING WAGES

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TECHNICAL SPECIFICATIONS

TABLE OF CONTENTS

DIVISION 0 - BIDDING AND CONTRACT REQUIREMENTS

Section	Title	Page
00700	General Conditions	00700-1

DIVISION 1 - GENERAL REQUIREMENTS

Section	Title	Page
01010	Summary of Work	01010-1
01045	Cutting, Coring and Patching	01045-1
01046	Control of Work	01046-1
01050	Coordination	01050-1
01080	Abbreviations and Definitions	01080-1
01105	Rodent Control	01105-1
01150	Measurement and Payment	01150-1
01170	Special Provisions	01170-1
01200	Project Meetings	01200-1
01300	Submittals	01300-1
01310	Construction Schedules	01310-1
01320	Safety and Health Plan	01320-1
01370	Schedule of Values	01370-1
01380	Construction Photographs	01380-1
01400	Quality Assurance	01400-1
01500	Temporary Facilities and Control	01500-1
01562	Dust Control	01562-1
01570	Traffic Regulation	01570-1
01576	Policing	01576-1
01601	Control of Materials	01601-1
01710	Contract Closeout	01710-1
01720	Project Record Documents	01720-1

DIVISION 2 - SITE WORK

Section	Title	Page
02020	Erosion & Sediment Control	02020-1
02050	Demolition	02050-1
02080	Soil and Waste Management	02080-1
02095	Transportation and Disposal of Soil and Waste	02095-1
02100	Site Preparation	02100-1
02101	Site Investigation	02101-1
02112	AC Pipe	02112-1

02140	Dewatering	02140-1
02200	Earthwork	02200-1
02212	Rock Excavation	02212-1
02221	Trenching, Backfilling and Compacting	02221-1
02222	Clearing and Grubbing	02222-1
02225	Flowable Fill	02225-1
02273	Geotextile Fabrics	02273-1
02510	Hot Mix Asphalt Pavement	02510-1
02515	Concrete Sidewalks, Walkways and Driveway Aprons	02515-1
02576	Pavement Repair and Resurfacing	02576-1
02577	Pavement Markings	02577-1
02609	Reinforced-Concrete Drain Pipe	02609-1
02622	Polyvinyl Chloride Gravity Pipe	02622-1
02650	Buried Utility Markings	02650-1
02700	Erosion and Sedimentation Control	02700-1
02721	Storm Drainage System	02721-1
02900	Landscaping	02900-1
02901	Miscellaneous Work and Cleanup	02901-1
02950	Wetland and Riparian Restoration	02955-1

DIVISION 3 - CONCRETE

Section	Title	Page
03300	Cast-In-Place Concrete	03300-1
03600	Grout	03600-1

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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

TABLE OF CONTENTS

Page

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

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

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

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

Article 5 – Bonds and Insurance 16
5.01 Performance, Payment, and Other Bonds 16
5.02 Licensed Sureties and Insurers 16
5.03 Certificates of Insurance 17
5.04 Contractor's Insurance 17
5.05 Owner's Liability Insurance 19
5.06 Property Insurance 19
5.07 Waiver of Rights 20
5.08 Receipt and Application of Insurance Proceeds 21

5.09 Acceptance of Bonds and Insurance; Option to Replace 21
5.10 Partial Utilization, Acknowledgment of Property Insurer 22

Article 6 – Contractor's Responsibilities 22
6.01 Supervision and Superintendence 22
6.02 Labor; Working Hours 22
6.03 Services, Materials, and Equipment 22
6.04 Progress Schedule 23
6.05 Substitutes and "Or-Equals" 23
6.06 Concerning Subcontractors, Suppliers, and Others 25
6.07 Patent Fees and Royalties 27
6.08 Permits 27
6.09 Laws and Regulations 28
6.10 Taxes 28
6.11 Use of Site and Other Areas 28
6.12 Record Documents 29
6.13 Safety and Protection 29
6.14 Safety Representative 30
6.15 Hazard Communication Programs 30
6.16 Emergencies 30
6.17 Shop Drawings and Samples 31
6.18 Continuing the Work 32
6.19 Contractor's General Warranty and Guarantee 33
6.20 Indemnification 33
6.21 Delegation of Professional Design Services 34

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

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

Article 9 – Engineer's Status During Construction 37
9.01 Owner's Representative 37

9.02 Visits to Site 37
9.03 Project Representative 38
9.04 Authorized Variations in Work 38
9.05 Rejecting Defective Work 38
9.06 Shop Drawings, Change Orders and Payments 39
9.07 Determinations for Unit Price Work 39
9.08 Decisions on Requirements of Contract Documents and Acceptability of Work 39
9.09 Limitations on Engineer's Authority and Responsibilities 39
9.10 Compliance with Safety Program 40

Article 10 – Changes in the Work; Claims 40
10.01 Authorized Changes in the Work 40
10.02 Unauthorized Changes in the Work 41
10.03 Execution of Change Orders 41
10.04 Notification to Surety 41
10.05 Claims 41

Article 11 – Cost of the Work; Allowances; Unit Price Work 42
11.01 Cost of the Work 42
11.02 Allowances 45
11.03 Unit Price Work 45

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

Article 13 – Tests and Inspections; Correction, Removal or Acceptance of Defective Work 48
13.01 Notice of Defects 48
13.02 Access to Work 48
13.03 Tests and Inspections 49
13.04 Uncovering Work 49
13.05 Owner May Stop the Work 50
13.06 Correction or Removal of Defective Work 50
13.07 Correction Period 50
13.08 Acceptance of Defective Work 51
13.09 Owner May Correct Defective Work 52

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

14.09 Waiver of Claims 58

Article 15 – Suspension of Work and Termination 59
15.01 Owner May Suspend Work 59
15.02 Owner May Terminate for Cause 59
15.03 Owner May Terminate For Convenience 60
15.04 Contractor May Stop Work or Terminate 60

Article 16 – Dispute Resolution 61
16.01 Methods and Procedures 61

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

ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

30. *PCBs*—Polychlorinated biphenyls.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

1.02 *Terminology*

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

B. *Intent of Certain Terms or Adjectives:*

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

C. *Day:*

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

D. *Defective:*

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

a. does not conform to the Contract Documents; or

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

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

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

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

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

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

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

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

ARTICLE 2 – PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

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

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

2.02 *Copies of Documents*

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

2.03 *Commencement of Contract Times; Notice to Proceed*

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

2.04 *Starting the Work*

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

2.05 *Before Starting Construction*

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

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

2. a preliminary Schedule of Submittals; and

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

2.06 *Preconstruction Conference; Designation of Authorized Representatives*

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

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

2.07 *Initial Acceptance of Schedules*

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

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

Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.

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

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

ARTICLE 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 *Intent*

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

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

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

3.02 *Reference Standards*

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

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

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

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies:*

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

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

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

B. *Resolving Discrepancies:*

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

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

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

3.04 *Amending and Supplementing Contract Documents*

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

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

1. A Field Order;

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

3. Engineer's written interpretation or clarification.

3.05 *Reuse of Documents*

A. Contractor and any Subcontractor or Supplier shall not:

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

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

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

3.06 *Electronic Data*

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

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

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

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

4.01 *Availability of Lands*

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

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

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

4.02 *Subsurface and Physical Conditions*

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

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

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

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

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

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

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

4.03 *Differing Subsurface or Physical Conditions*

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

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

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

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

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

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

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

C. *Possible Price and Times Adjustments:*

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

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

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

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

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

b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and

contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such final commitment; or

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

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

4.04 *Underground Facilities*

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

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

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

a. reviewing and checking all such information and data;

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

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

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

B. *Not Shown or Indicated:*

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

consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.

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

4.05 *Reference Points*

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

4.06 *Hazardous Environmental Condition at Site*

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

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

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

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

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

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

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

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

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

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

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

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

ARTICLE 5 – BONDS AND INSURANCE

5.01 *Performance, Payment, and Other Bonds*

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

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

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

5.02 *Licensed Sureties and Insurers*

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

meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

5.03 *Certificates of Insurance*

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

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

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

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

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

5.04 *Contractor's Insurance*

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

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

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

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

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

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

b. by any other person for any other reason;

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

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

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

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

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

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

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

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

6. include completed operations coverage:

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

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

5.05 *Owner's Liability Insurance*

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

5.06 *Property Insurance*

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

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

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

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

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

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

6. include testing and startup; and

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

B. Owner shall purchase and maintain such equipment breakdown insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors,

members, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee.

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

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

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

5.07 *Waiver of Rights*

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

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

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

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

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

5.08 *Receipt and Application of Insurance Proceeds*

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

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

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

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

interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

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

ARTICLE 6 – CONTRACTOR'S RESPONSIBILITIES

6.01 *Supervision and Superintendence*

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

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

6.02 *Labor; Working Hours*

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

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

6.03 *Services, Materials, and Equipment*

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

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

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

6.04 *Progress Schedule*

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

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

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

6.05 *Substitutes and "Or-Equals"*

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

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

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

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

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

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

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

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

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

2. *Substitute Items:*

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

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

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

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

1) shall certify that the proposed substitute item will:

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

b) be similar in substance to that specified, and

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

2) will state:

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

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

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

3) will identify:

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

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

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

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

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

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

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

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

6.06 *Concerning Subcontractors, Suppliers, and Others*

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

required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.

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

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

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

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

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

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

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

G. All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer. Whenever any such agreement is with a Subcontractor or Supplier who is listed as a loss payee on the property insurance provided in Paragraph 5.06, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner,

Contractor, Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.

6.07 *Patent Fees and Royalties*

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

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

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

6.08 *Permits*

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

6.09 *Laws and Regulations*

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

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

C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work shall be the subject of an adjustment in Contract Price or Contract Times. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

6.10 *Taxes*

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

6.11 *Use of Site and Other Areas*

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

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

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

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

by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.

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

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

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

6.12 *Record Documents*

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

6.13 *Safety and Protection*

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

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

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

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

B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and

shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.

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

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

E. All damage, injury, or loss to any property referred to in Paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).

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

6.14 *Safety Representative*

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

6.15 *Hazard Communication Programs*

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

6.16 *Emergencies*

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

required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

6.17 *Shop Drawings and Samples*

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

1. *Shop Drawings:*

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

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

2. *Samples:*

a. Submit number of Samples specified in the Specifications.

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

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

C. *Submittal Procedures:*

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

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

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

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

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

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

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

D. *Engineer's Review:*

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

2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

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

E. *Resubmittal Procedures:*

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

6.18 *Continuing the Work*

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

6.19 *Contractor's General Warranty and Guarantee*

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

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

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

2. normal wear and tear under normal usage.

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

1. observations by Engineer;

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

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

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

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

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

7. any correction of defective Work by Owner.

6.20 *Indemnification*

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

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

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

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

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

6.21 *Delegation of Professional Design Services*

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

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

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

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

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

ARTICLE 7 – OTHER WORK AT THE SITE

7.01 *Related Work at Site*

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

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

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

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

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

7.02 *Coordination*

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

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

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

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

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

7.03 *Legal Relationships*

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

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

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

ARTICLE 8 – OWNER'S RESPONSIBILITIES

8.01 *Communications to Contractor*

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

8.02 *Replacement of Engineer*

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

8.03 *Furnish Data*

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

8.04 *Pay When Due*

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

8.05 *Lands and Easements; Reports and Tests*

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

8.06 *Insurance*

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

8.07 *Change Orders*

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

8.08 *Inspections, Tests, and Approvals*

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

8.09 *Limitations on Owner's Responsibilities*

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

8.10 *Undisclosed Hazardous Environmental Condition*

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

8.11 *Evidence of Financial Arrangements*

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

8.12 *Compliance with Safety Program*

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

ARTICLE 9 – ENGINEER'S STATUS DURING CONSTRUCTION

9.01 *Owner's Representative*

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

9.02 *Visits to Site*

A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or

continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.

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

9.03 *Project Representative*

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

9.04 *Authorized Variations in Work*

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

9.05 *Rejecting Defective Work*

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

9.06 *Shop Drawings, Change Orders and Payments*

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

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

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

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

9.07 *Determinations for Unit Price Work*

A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of Paragraph 10.05.

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

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

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

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

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

9.09 *Limitations on Engineer's Authority and Responsibilities*

A. Neither Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by Engineer in good faith either to exercise

or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

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

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

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

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

9.10 *Compliance with Safety Program*

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

ARTICLE 10 – CHANGES IN THE WORK; CLAIMS

10.01 *Authorized Changes in the Work*

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

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

10.02 *Unauthorized Changes in the Work*

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

10.03 *Execution of Change Orders*

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

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

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

3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Engineer pursuant to Paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.

10.04 *Notification to Surety*

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

10.05 *Claims*

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

B. *Notice:* Written notice stating the general nature of each Claim shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data

shall be delivered to the Engineer and the other party to the Contract within 60 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Times shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Engineer and the claimant within 30 days after receipt of the claimant's last submittal (unless Engineer allows additional time).

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

1. deny the Claim in whole or in part;

2. approve the Claim; or

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

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

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

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

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

11.01 *Cost of the Work*

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

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

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

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

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

5. Supplemental costs including the following:

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

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

    c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of

said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.

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

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

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

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

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

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

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

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

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

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

4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not

limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.

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

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

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

11.02 *Allowances*

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

B. *Cash Allowances:*

1. Contractor agrees that:

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

b. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.

C. *Contingency Allowance:*

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

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

11.03 *Unit Price Work*

A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to

the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.

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

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

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

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

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

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

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

12.01 *Change of Contract Price*

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

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

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

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

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

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

1. a mutually acceptable fixed fee; or

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

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

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

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

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

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

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

12.02 *Change of Contract Times*

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

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

12.03 *Delays*

A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in Paragraph 12.02.A. Delays beyond the control of Contractor shall include, but not be limited to, acts or

neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.

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

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

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

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

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

13.01 *Notice of Defects*

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

13.02 *Access to Work*

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

13.03 *Tests and Inspections*

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

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

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

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

3. as otherwise specifically provided in the Contract Documents.

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

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

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

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

13.04 *Uncovering Work*

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

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

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

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

13.05 *Owner May Stop the Work*

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

13.06 *Correction or Removal of Defective Work*

A. Promptly after receipt of written notice, Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Engineer, remove it from the Project and replace it with Work that is not defective. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).

B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

13.07 *Correction Period*

A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents) or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor's use by Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:

1. repair such defective land or areas; or

2. correct such defective Work; or

3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and

4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom.

B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by Contractor.

C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.

D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

E. Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

13.08 *Acceptance of Defective Work*

A. If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to Engineer's recommendation of final payment, Engineer) prefers to accept it, Owner may do so. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness) and for the diminished value of the Work to the extent not otherwise paid by Contractor pursuant to this sentence. If any such acceptance occurs prior to Engineer's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and Owner shall be entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner.

13.09 *Owner May Correct Defective Work*

A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer in accordance with Paragraph 13.06.A, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, Owner may, after seven days written notice to Contractor, correct, or remedy any such deficiency.

B. In exercising the rights and remedies under this Paragraph 13.09, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this Paragraph.

C. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 13.09 will be charged against Contractor, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, Owner may make a Claim therefor as provided in Paragraph 10.05. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 13.09.

ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 *Schedule of Values*

A. The Schedule of Values established as provided in Paragraph 2.07.A will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed.

14.02 *Progress Payments*

A. *Applications for Payments:*

1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an

Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.

3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

B. *Review of Applications:*

1. Engineer will, within 10 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Owner or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.

2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:

   a. the Work has progressed to the point indicated;

   b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and any other qualifications stated in the recommendation); and

   c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.

3. By recommending any such payment Engineer will not thereby be deemed to have represented that:

   a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or

involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract Documents; or

b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:

   a. to supervise, direct, or control the Work, or

   b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or

   c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or

   d. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, or

   e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.

5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 14.02.B.2. Engineer may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:

   a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;

   b. the Contract Price has been reduced by Change Orders;

   c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or

   d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

C. *Payment Becomes Due:*

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended will (subject to the provisions of Paragraph 14.02.D) become due, and when due will be paid by Owner to Contractor.

D. *Reduction in Payment:*

1. Owner may refuse to make payment of the full amount recommended by Engineer because:

   a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;

   b. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;

   c. there are other items entitling Owner to a set-off against the amount recommended; or

   d. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.

2. If Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor remedies the reasons for such action.

3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C.1 and subject to interest as provided in the Agreement.

14.03 *Contractor's Warranty of Title*

A. Contractor warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to Owner no later than the time of payment free and clear of all Liens.

14.04 *Substantial Completion*

A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Engineer issue a certificate of Substantial Completion.

B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.

C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before

final payment. Owner shall have seven days after receipt of the tentative certificate during which to make written objection to Engineer as to any provisions of the certificate or attached list. If, after considering such objections, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the tentative certificate to Owner, notify Contractor in writing, stating the reasons therefor. If, after consideration of Owner's objections, Engineer considers the Work substantially complete, Engineer will, within said 14 days, execute and deliver to Owner and Contractor a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as Engineer believes justified after consideration of any objections from Owner.

D. At the time of delivery of the tentative certificate of Substantial Completion, Engineer will deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Engineer in writing prior to Engineer's issuing the definitive certificate of Substantial Completion, Engineer's aforesaid recommendation will be binding on Owner and Contractor until final payment.

E. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the tentative list.

14.05 *Partial Utilization*

A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:

1. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 14.04.A through D for that part of the Work.

2. Contractor at any time may notify Owner and Engineer in writing that Contractor considers any such part of the Work ready for its intended use and substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.

3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 14.04 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 5.10 regarding property insurance.

14.06 *Final Inspection*

A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

14.07 *Final Payment*

A. *Application for Payment:*

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, marked-up record documents (as provided in Paragraph 6.12), and other documents, Contractor may make application for final payment following the procedure for progress payments.

2. The final Application for Payment shall be accompanied (except as previously delivered) by:

   a. all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.6;

   b. consent of the surety, if any, to final payment;

   c. a list of all Claims against Owner that Contractor believes are unsettled; and

   d. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.

3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien.

B. *Engineer's Review of Application and Acceptance:*

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying

documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of payment and present the Application for Payment to Owner for payment. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of Paragraph 14.09. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. *Payment Becomes Due:*

1. Thirty days after the presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by Engineer, less any sum Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages, will become due and will be paid by Owner to Contractor.

14.08 *Final Completion Delayed*

A. If, through no fault of Contractor, final completion of the Work is significantly delayed, and if Engineer so confirms, Owner shall, upon receipt of Contractor's final Application for Payment (for Work fully completed and accepted) and recommendation of Engineer, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if bonds have been furnished as required in Paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by Contractor to Engineer with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

14.09 *Waiver of Claims*

A. The making and acceptance of final payment will constitute:

1. a waiver of all Claims by Owner against Contractor, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and

2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION

15.01 *Owner May Suspend Work*

A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by notice in writing to Contractor and Engineer which will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be granted an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if Contractor makes a Claim therefor as provided in Paragraph 10.05.

15.02 *Owner May Terminate for Cause*

A. The occurrence of any one or more of the following events will justify termination for cause:

1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule established under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);

2. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;

3. Contractor's repeated disregard of the authority of Engineer; or

4. Contractor's violation in any substantial way of any provisions of the Contract Documents.

B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving Contractor (and surety) seven days written notice of its intent to terminate the services of Contractor:

1. exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion);

2. incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere; and

3. complete the Work as Owner may deem expedient.

C. If Owner proceeds as provided in Paragraph 15.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when

so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this Paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

D. Notwithstanding Paragraphs 15.02.B and 15.02.C, Contractor's services will not be terminated if Contractor begins within seven days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of said notice.

E. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.

F. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B and 15.02.C.

15.03 *Owner May Terminate For Convenience*

A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):

1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;

2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;

3. all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and

4. reasonable expenses directly attributable to termination.

B. Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

15.04 *Contractor May Stop Work or Terminate*

A. If, through no act or fault of Contractor, (i) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (ii) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (iii) Owner fails for 30 days

to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the Contract and recover from Owner payment on the same terms as provided in Paragraph 15.03.

B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this Paragraph 15.04 are not intended to preclude Contractor from making a Claim under Paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this Paragraph.

ARTICLE 16 – DISPUTE RESOLUTION

16.01 *Methods and Procedures*

A. Either Owner or Contractor may request mediation of any Claim submitted to Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association and the other party to the Contract. Timely submission of the request shall stay the effect of Paragraph 10.05.E.

B. Owner and Contractor shall participate in the mediation process in good faith. The process shall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.

C. If the Claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:

1. elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions; or

2. agrees with the other party to submit the Claim to another dispute resolution process; or

3. gives written notice to the other party of the intent to submit the Claim to a court of competent jurisdiction.

ARTICLE 17 – MISCELLANEOUS

17.01 *Giving Notice*

A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:

1. delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended; or

2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

17.02 *Computation of Times*

A. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

17.03 *Cumulative Remedies*

A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents. The provisions of this Paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

17.04 *Survival of Obligations*

A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

17.05 *Controlling Law*

A. This Contract is to be governed by the law of the state in which the Project is located.

17.06 *Headings*

A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

SECTION 01010

SUMMARY OF WORK

PART 1 – GENERAL

1.1 DESCRIPTION OF WORK

A. The purpose of this Contract shall consist of daylighting a buried stream, approximately 1,800 LF and creation of wetland ponds and associated features as shown on the contract drawings and technical specifications within Fernald Center in the City of Waltham, Massachusetts. The project requires all work necessary or incidental to this purpose including providing all necessary supervisors, personnel, equipment and materials.

B. The Contractor shall comply with all applicable performance and safety requirements specifically related to the work under this Contract. In addition, all things not expressly mentioned in these Specifications but involved in carrying out their intent are required by these Specifications, and the Contractor shall perform the same as though they were specifically delineated and described.

C. It is the Contractor's responsibility to verify physical conditions and components of the work at each specific location of Work.

D. Work performed under this contract is located on property owned by the City of Waltham, Massachusetts.

1.2 VISITS TO THE SITE

Before submitting a bid, the Contractor shall visit the various sites, examine their conditions and thoroughly acquaint himself with the conditions for performing the work. He shall also study the drawings and compare the same with the information gathered during his examination of the sites, as no extra compensation will be authorized for extra work caused by his unfamiliarity with the sites and/or drawings or the conditions peculiar to this job.

1.3 PERSONNEL REQUIREMENTS

A. The Contractor (and any subcontractor) shall furnish sufficiently trained and competent personnel to perform the Work required of the Contractor under this Contract.

B. The Contractor shall provide adequate contract orientation for all staff to be assigned on a permanent, temporary, or call-in basis. This shall include familiarization of equipment type and the respective locations of work. All staff involved in executing this Contract should be familiar with their contractual responsibilities pertaining to security, safety, inspection guidelines, and activities around all work locations.

C. If any Contractor's personnel is deemed unsatisfactory or does not perform the services to be furnished hereunder in a proper manner and satisfactory to the City, or in the determination of the City has taken action which constitutes a conflict of interest or which is inconsistent with the highest level of honesty, ethical conduct or public trust or which the City determines is adverse to the public interest or to the best interest of the City, the Contractor shall remove any such personnel and replace them with personnel satisfactory to the City within twenty-four (24) hours following the

Contractor's receipt of a request for such replacement.

1.4 PERMITS, FEES AND BONDS

A. The Contractor shall obtain and comply with all required permits, pay all fees and provide all bonds necessary to complete the work as specified.
B. A City of Waltham Street Opening Permit must be issued before work is started.

1.5 FIELD LAYOUT

The Contractor shall be responsible for the initial layout of control (if required). The Contractor shall also be responsible for layout of the proposed work and appurtenances as shown on the drawings. Site and grading adjustments may be made in the field, subject to review and approval by the Engineer.

1.6 SAFETY

The Contractor shall be responsible for compliance with all applicable regulations of OSHA.

1.7 TRAFFIC DETOURS AND ROAD ACCESSIBILITY

A. Traffic Management Plan - The Contractor shall prepare, and submit a plan that shows the routing of traffic during construction. The plan shall show the area and dimensions of the roadway pavement available for traffic during each stage of the work. The plan shall include all temporary barriers, signs, pavement markings, drums and other traffic control devices required to maintain traffic together with the limits of temporary pavement and necessary steel plates. The plan shall include all the requirements contained in the City of Waltham Policy on Street Opening Permits.
B. The Contractor shall contact the responsible heads of the Fire, Police, Highway, Sewer, School, Parks and Recreation and other appropriate governing bodies of the municipality in order to obtain necessary permits and determine the requirements of said departments with respect to traffic control, alternate vehicular access routes, etc. Wherever detours are permitted the size, construction and location of signs shall conform to local and state requirements and/or standards. Detour routes shall be adequately posted to assist the motorist to return to his route of travel. Where the roadway under construction is the only means of vehicular access to a particular area, the Contractor shall provide continual access to the area for residents and emergency vehicles.
C. When Work is performed along roadways, all operations shall be planned so as to cause minimum interference with traffic and with maximum precautions at all times.
D. The Contractor shall have due regard to the location of detours and to the provisions for handling traffic, and shall not open up Work to the prejudice or detriment of Work already started. When it is required under the Contract that traffic be detoured around the Work, the Contractor shall provide and maintain suitable detours in accordance with the Contract Documents, and as approved by the City.
E. The Contractor shall be responsible for the maintenance of traffic over, through or around the Work during the life of the Contract, and whether or not work thereon has been suspended temporarily. The Contractor shall take all precautions for preventing injuries to persons or damage to property in or about the Work. The Contractor shall provide and maintain temporary bypasses as may be necessary to accommodate traffic on the roadway under construction or repair.
F. All Work sites and adjacent areas shall be adequately protected. Roadways shall be

closed to traffic only as approved by the City. Whenever the closing of any lane is permitted by the City, the Contractor shall comply with all pertinent provisions of the Contract Documents.

All personnel shall observe safety rules and regulations and shall wear suitable safety equipment, at all times. Personnel who disregard safety regulations will be barred from the Work by the City and the Contractor shall be without recourse.

G. All vehicles and construction equipment shall be properly registered and comply with the City's Rules and Regulations. All vehicles shall be equipped with such safety devices as flags, markings, beacons, strobes, and lights, in good working order. No separate compensation will be allowed for this work or equipment.

H. At the end of each work day, the Contractor shall remove its equipment from the roadway, and if applicable, shall store such equipment in areas as approved by the City. No equipment shall be stored on the roadway during non-work periods. Construction or repair materials shall not be stored on the roadway except as approved by the City.

1.8 PUBLIC SAFETY - POLICE DETAILS AND FLAGGERS

A. In general, local police details or certified traffic flaggers will be required on all local streets for public safety and for maintaining two-way traffic during construction.

B. The use of police details or flaggers shall be at the sole discretion of the City. The need for uniformed police officers will be made by the City prior to the start of work.

C. Flaggers will be used in accordance with Mass regulation 701 CMR 7.00.

1.9 HOURS of WORK

A. No work shall be started before 7:00 A.M. and no work shall be performed on restricted roads between the hours of 7:00 A.M. and 9:00 A.M. and between 4:00 P.M. and 6:00 P.M. Also, no construction vehicles shall be parked waiting to perform work during these hours on restricted roads.

The following roads located within the project limits of work are classified as restricted roads: Trapelo Road.

B. No work shall be done on Saturday or Sunday or Holidays observed by the City of Waltham.

C. All work shall be completed by the time stipulated by the City. **These hours include the time for clean-up of the site and restoration of the roads to normal traffic flow.**

D. The work areas are located in close proximity to private homes. The Contractor will need to pay particular attention to noise generation during early and late times of day, traffic flow, erosion control and dust generation to abutting properties, and the removal of soils, placement of stockpiles, etc. in order to maintain access through the work area. Any detours, if required, must be arranged through the local Police and Fire Departments and the Massachusetts Department of Transportation.

1.10 SCHEDULE

A. Prior to beginning operations, the Contractor shall submit a schedule of the proposed work for review and approval. The schedule shall show the work broken down into logical

and specifically executable tasks necessary to meet the completion date.

B. All tasks shall include estimated time duration and be shown on a timeline type chart. In addition, tasks shall be depicted in terms of their relationship to tasks before and after.

C. The schedule shall be developed in Microsoft Project format or other approved schedule software and shall be submitted in either electronic or hardcopy form. The schedule shall be updated bi-monthly and updated more frequently whenever the project schedule changes. In addition, the schedule shall be submitted with the monthly payment requisition.

D. The Contractor may deviate from the above sequence provided he can demonstrate to the Engineer that the continuity of the project will not be adversely affected.

1.11 DIG SAFE

Prior to commencing excavation work, the Contractor shall notify Dig- Safe (1-800-322-4844) to have all existing public and private utility lines and underground structures marked out.

1.12 OPERATION OF EXISTING WATER INFRASTRUCTURE

The Contractor shall not operate any hydrants, valves, curb stops or corporations, nor shall they draw any water from the system without specific approval of the City of Waltham Engineering Department. Only City personnel will operate valves, hydrants corporations and curb stops unless otherwise directed by the City. Should operation of such items be necessary, the Contractor shall contact the City a minimum of 48 hours in advance of such facility to coordinate this work.

1.13 HANDLING OF ASBESTOS PRODUCTS

If the Contractor should encounter asbestos products during construction, the Contractor shall conform with all applicable provisions of OSHA, Federal, State and Local Regulations regarding the handling and/or disposing of asbestos products.

1.14 SOILS MANAGEMENT PLAN

A. The Contractor shall prepare and submit prior to the start of work, a SOILS MANAGEMENT PLAN detailing the contractors procedures for handling suitable and unsuitable materials transported to and from the work area(s).
   1. At a minimum, the plan is to include:
      a. Sampling requirements
      c. Requirements for handling soil with no analyte concentrations detected
      d. Analyte concentrations detected between laboratory detection limits and reportable limits
      e. Concentrations above reportable limits.
   2. Soil Management plan shall be signed by a Massachusetts Licensed Site Professional.

B. All surplus unsuitable material removed from the excavations shall remain at the property of the Contractor and shall be properly disposed by the Contractor with approval by the ENGINEER. The Contractor is responsible for the disposal fees for the deposition of all waste, unsuitable and hazardous materials from the work performed.

C. All surplus suitable material removed from the excavations may be incorporated into

the project upon approval. Surplus suitable material not used in the work, is the responsibility of the Contractor including disposal fees.

1.15 REMOVALS, RELOCATIONS AND REARRANGEMENTS

Examine the existing site for the work of all trades which will influence the cost of the work under the general bid. This work shall include removals, relocations and rearrangements which may interfere with, disturb or complicate the performance of the work under the general bid involving systems, equipment and related service lines, which shall continue to be utilized as part of the finished project. The Contractor is responsible for all coordination in this regard.

A. Include all removals, relocations, rearrangements and reconnections herein specified, necessary or required to provide approved operation and coordination of the combined new and existing systems and equipment.

1.16 RESTORATION OF DISTURBED AREAS

The Contractor is responsible for the restoration of all areas disturbed by the work to an equal or better condition than that encountered prior to construction. This requirement is especially important to the City and will be enforced.

1.17 EXISTING UTILITIES, MAINTAINING SERVICE AND ACCESS

A. The Contractor is advised that protection of the existing utilities in the vicinity of the project, and the assurance of uninterrupted service during the contract period is of the essence. Existing utilities must remain in service throughout the entire project, except in the case of tying in services and/or making connections to existing equipment. This is particularly critical in the case of cutting over existing utilities.
B. Interruptions in service will be allowed only during scheduled shutdowns approved in advance.
C. The location and size of some existing underground facilities such as sewers, drains, culverts, water mains, gas mains, cables, service pipes, etc., are shown on the plans, based on results of surveys and existing records, and are shown as approximate only. The plans do not show the exact location and depth of all utilities, nor do they show all utilities that may be encountered.
D. The Contractor shall assume that there are existing underground utility connections to each and every building or structure along the line of work, whether they appear on the drawings or not. The Contractor shall notify the proper utility companies and obtain and preserve the locations as marked for all existing gas, electric and other utilities that may be encountered along the line of work, until such time as such markings are no longer required.
E. Experimental trench excavations are to be made prior to commencing pipe laying operations. The experimental trench locations shall be where requested by the Contractor and/or as directed by the Engineer, and shall be paid for under the applicable bid item.
F. The Contractor shall dig by hand in advance of the trenching machinery to determine the exact location and depth of each utility to be encountered. Excavating machinery shall be stopped at least two feet away from each side of the utility to be crossed and the Contractor shall tunnel by hand under these utilities after he has ascertained their exact location and depth.
G. The use of steel plates will be permitted by the City. Should the Contractor choose to

use steel plates to cover trenches during the daytime or at night, the plates must be keyed into the surrounding pavement and the edges secured with spikes.

1.18 BLASTING

In the event that blasting or other operations undertaken by the Contractor under this contract result in damages to, all necessary repairs to water piping, valves, hydrants, fittings, cables, etc., shall be done by the Contractor. The Contractor shall provide, at no extra cost to the Owner, all necessary materials, equipment and labor necessary to satisfactorily excavate backfill, repair, etc., in conjunction with such repair work.

1.19 TRASH REMOVAL

The Contractor shall arrange to dispose of all liquid and solid refuse in a lawful, safe and efficient and anti-pollutant manner subject to the prior approval of the City.

A. The Contractor shall remove daily from the Location(s) of Work by means provided by the Contractor, all garbage, debris, and other waste materials (whether solid or liquid) arising out of or in connection with its operations hereunder, and any such garbage, debris and other waste materials not immediately removed shall be temporarily stored in a clean and sanitary condition, approved by the City, in suitable garbage and waste receptacles, also approved by the City and shall be kept covered except when filling and emptying them.
B. The Contractor shall exercise care in removing such garbage, debris and other waste materials from the Location(s) of Work. The manner of such storage and removal shall always be subject in all respects to the continual approval of the City. No equipment or facilities of the City shall be used in such removal unless prior written consent is given by the City. No such garbage, debris, or other waste materials shall be or be permitted to be thrown, discharged or disposed into or upon waters or bounding the Location(s) of Work.

1.20 CHANGES IN AMOUNT OF WORK

The Owner reserves the right to increase or decrease the amount of any item of the work listed as may be found desirable or necessary during the carrying out of this contract and the unit prices quoted in the Proposal shall apply without change to such variation in the quantity of each of the Items.

1.21 SEQUENCE OF CONSTRUCTION

A. For the protection of life and property all backfill operations shall follow closely behind pipe laying. The Contractor shall insure that no excavation be left open, unguarded, or water filled during any period of time when work is not actually in progress. It is the purpose and intent that all excavations and backfill, including consolidation operations, the installation of service connections and temporary surfacing and pavements within an area be accomplished expeditiously before proceeding to other work areas. Construction scheduling and methods will be discussed at the pre-construction conference.
B. The Owner reserves the right to schedule the Contractor to construct at any locations within the project area. At the same time the Owner may order the suspension of construction at any location. Construction in seasonally heavily traveled roads shall be avoided during the peak traffic periods.

C. Staging of Construction material outside of the trench prior to installation may be required while working within heavily traveled intersections in order to minimize traffic disruptions and maintain emergency vehicle access, particularly at the intersections of Hazel St. & Dale St.

1.22 PROGRESS OF WORK

The Contractor shall promptly start pipe installation and continue actual construction work under this contract with the necessary crews and equipment to properly execute and complete this contract in the specified time. No cessation of Contractor's operations will be allowed without the approval of the Owner. The rate of progress shall be satisfactory to the Owner.

1.23 TECHNICAL SPECIFICATIONS

All technical specifications such as ASTM, AWWA, AASHTO, etc, referred to in these specifications refer to the latest revision of such technical specifications.

1.24 STATE AND LOCAL HIGHWAY BOUNDS AND PROPERTY MARKERS

When encountered, the Contractor shall engage a Professional Land Surveyor to provide permanent reference points for all bounds and private property markers along the line of the work, which in the opinion of the Engineer, may be disturbed during construction. The Contractor shall submit copies of all ties to the bounds and property markers to the Engineer prior to excavation at the site. Any bounds or markers disturbed by the Contractor shall be replaced utilizing the services of a Professional Land Surveyor. The cost of replacing markers negligently disturbed shall be at the Contractor's expense.

1.25 TWENTY-FOUR (24) HOUR EMERGENCY SERVICE

A. The Contractor shall maintain a 24-hour, 7-day a week telephone service and a local facility to handle emergency requirements such as settled trenches, clogged drains, rain damage, etc. The Contractor's emergency personnel shall be able to respond to emergency calls within thirty minutes. A list of the personnel and their telephone numbers shall be submitted to the Engineer and Owner. This requirement shall apply during the entire length of the project.
B. This list shall be submitted on the Contractor's letterhead and shall state that should an emergency arise during the implementation of this project, these people are to be contacted. The Contractor shall submit this letter at the Pre-Construction Conference.

1.26 CONTRACTORS LAYDOWN/STORAGE

The Contractor is responsible for securing property for his operations including storage of materials and equipment.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.1 COORDINATION

A. Utility location and coordination shall be the responsibility of the Contractor. Dig Safe shall be contacted prior to the layout or excavation of any work.

B. The Contractor shall coordinate his schedule such that construction does not affect local school bus schedules. If it is expected that a construction event may impact the ability of the school bus to maintain their schedule, the Contractor shall notify the School Department 48 hours prior to the event.

C. The Contractor shall contact the responsible heads of the Fire, Police, and other appropriate governing bodies of the municipality in order to obtain necessary permits and determine the requirements of said departments with respect to traffic control, alternate vehicular access routes, and other requirements. Wherever detours are permitted, traffic plans, procedures and signage shall conform with local and state requirements and/or standards. Detour routes shall be adequately posted to assist the motorist to return to the primary route of travel. Where the roadway under construction is the only means of vehicular access to a particular area, the Contractor shall provide continual access to the area for residents and emergency vehicles.

3.2 WORK CONDITIONS

Contractor shall utilize extreme care to prevent any contamination when working in proximity to natural water bodies. No oil, fuel, solvents, chemicals, or other type of potential liquid contaminants shall be stored on site. All equipment shall be checked daily for any type of fluid leak. Contractor shall immediately notify Owner and Engineer of any type of leak or spill. Contractor shall take all necessary measures to contain and clean up any type of leak or spill.

3.3 MAINTAIN EXISTING WORKS

A. Maintain Flows:

1. The responsibility of the Contractor shall be to provide, maintain and operate all temporary facilities required to maintain sewerage flows and drainage collection and flow such as pumping equipment, piping, and all other labor and equipment necessary to maintain flows.

B. Minimize Interference

1. The Contractor shall at all times conduct his operations so as to interfere as little as possible with existing works. The Contractor shall develop a program, in cooperation with the Owner, which shall provide for the construction and putting into service of the new works in the most orderly manner possible. This program shall be adhered to except as deviations there-from are expressly permitted.
2. Work of connecting with, cutting into and reconstructing existing pipes or structures shall be planned to interfere with the operation of the existing facilities for the shortest possible time and when the demands on the facilities best permit such interference. It may be necessary to work outside of normal working hours to minimize interference. Before starting work, which will interfere with the operation of existing facilities, the Contractor shall do all possible preparatory work and shall see that all tools, materials, and equipment are made ready and at hand.

END OF SECTION 01010

SECTION 01045

CUTTING, CORING AND PATCHING

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, apply to this section.

1.2 SUMMARY

A. This section specifies administrative and procedural requirements for cutting, coring, rough and finish, and patching.

B. Refer to other sections for specific requirements and limitations applicable to cutting, and patching individual parts of the Work.

1. Requirements of this section do not apply to mechanical and electrical installations. Refer to Division 15 and 16 Specification Sections for requirements and limitations applicable to cutting and patching mechanical and electrical installations.

1.3 SUBMITTALS

A. For informational purposes only, submit proposed cutting and patching well in advance of the time cutting and patching will be performed. Include the following information, as applicable:

2. Describe the extent of cutting and patching required and how it is to be performed; indicate why it cannot be avoided.

3. Describe anticipated results in terms of changes to existing construction; include changes to structural elements and operating components as well as changes in the building's appearance and other significant visual elements.

4. List products to be used and firms or entities that will perform Work.

5. Indicate dates when cutting and patching is to be performed.

6. List utilities that we be disturbed or affected, including those that will be relocated and those that will be temporarily out-of-service. Indicate how long service will be disrupted.

7. Where cutting and patching involves addition of reinforcement to structural elements, submit details to show how reinforcement is integrated with the original structure.

8. Review by the Engineer prior to proceeding with cutting and patching does not waive the Engineer's right to later require complete removal and replacement of a part of the Work found to be unsatisfactory.

8. Refer to Paragraph 1.4 - Quality Assurance and submit the information specified.

1.4 QUALITY ASSURANCE

A. No structural members shall be cut without the approval of the Engineer. No holes shall be drilled in beams or other structural members without the approval of the Engineer.

B. Requirements for Structural Work: Do not cut and patch structural elements in a manner that would reduce their load-carrying capacity or load-deflection ratio.

C. Operational and Safety Limitations: Do not cut and patch operating elements or safety related components that would result in reducing their capacity to perform as intended, or result in increased maintenance, or decreased operational life or safety.

D. Visual Requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces, in a manner that would, in the Engineer's opinion, reduce the building's aesthetic qualities, or result in visual evidence of cutting and patching. Remove and replace Work cut and patched in a visually unsatisfactory manner.

1. If possible retain the original installer or fabricator to cut and patch the following categories of exposed Work, or if it is not possible to engage the original installer or fabricator, engage another recognized experienced and specialized firm:

a. Unit masonry.
b. Stucco and plaster.
c. Aggregate wall coating.
d. HVAC enclosures, cabinets or covers.

PART 2-GENERAL

2.1 MATERIALS

A. Provide materials that are identical to existing materials. If identical materials are not available or cannot be used where exposed surfaces are involved, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials whose installed performance will equal or surpass that of existing materials.

B. Plaster Soffits: Comply with ASTM C 842.

1. Base Coat: Ready-mixed, sand aggregate gypsum plaster base.

2. Finish Coat Ready-mixed gypsum finish plaster.

C. Concrete and grout for rough patching shall be as specified in Divisions 3 and 4.

PART 3 -EXECUTION

3.1 INSPECTION

A. Before cutting existing surfaces examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed. Take corrective action before proceeding, if unsafe or unsatisfactory conditions are encountered.

1. Before proceeding, meet at the site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

3.2 PREPARATION

A. Temporary Support and Bracing: Provide temporary support and bracing of area to be cut, prior to start of cutting.

B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Project that might be exposed during cutting and patching operations.

C. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Take all precautions to avoid cutting existing conduit or ductwork serving the building, but scheduled to be removed or relocated until provisions have made to bypass them.

E. Check area during sawing operations for partial cracking and provide additional

support and bracing to prevent a partial release of cut area during sawing operations.

F Provide equipment of adequate size to remove cut panels.

3.3 PERFORMANCE

A. General: Employ skilled workmen to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.

1. Cut existing construction to provide for installation of other components or performance of other construction activities and the subsequent fitting and patching required to restore surfaces to their original condition.

2. All cutting and coring shall be performed in such a manner as to limit the extent of patching.

B. Cutting: Cut existing construction using methods least likely to damage elements to be retained or adjoining construction. Where possible review proposed procedures with the original installer; comply with the original installer's recommendations.

1. In general, where cutting is required use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots neatly to size required with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.

2. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.

3. Cut through concrete and masonry using a cutting machine such as a carborundum saw or diamond core drill.

3. Comply with requirements of applicable sections of Division 2 where cutting and patching requires excavating and backfilling.

4. By pass utility services such as pipe or conduit, before cutting, where services are shown or required to be removed, relocated or abandoned. Cut-off pipe or conduit in walls or partitions to be removed. Cap, valve or plug and seal the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after by-passing and cutting.

6. Provide full control of slurry generated by sawing operations on both

sides of wall

7. When cutting a reinforced concrete wall, the cutting shall be done so as not to damage bond between the concrete and reinforcing steel left in structure. Cut shall be made so that steel neither protrudes nor is recessed from face of the cut.

C. Coring

1. All holes cut through concrete and masonry walls, slabs or arches shall be core drilled unless otherwise approved.

2. If holes are cored through floor slabs they shall be drilled from below.

2. Rough patching shall be such as to bring the cut or cored area flush with existing construction unless otherwise shown. Finish patching shall match existing surfaces as approved.

4. Coring shall be performed with an approved non-impact rotary tool with diamond core drills. Size of holes shall be suitable for pipe, conduit, sleeve, equipment or mechanical seals to be installed.

5. All equipment shall conform to OSHA standards and specifications pertaining to plugs, noise and fume pollution, wiring and maintenance.

6. Provide protection for existing equipment, utilities and critical areas against water or other damage caused by drilling operation.

7. Slurry or tailings resulting from coring operations shall be vacuumed or otherwise removed from the area following drilling.

D. Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.

1. Where feasible, inspect and test patched areas to demonstrate integrity of the installation.

2. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction a n1anner that will eliminate evidence of patching and refinishing.

3. Where removal of walls or partitions extends one finished area into another, patch and repair floor and wall surfaces in the new space to provide an even surface of uniform color and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary to achieve uniform color and appearance.

4. Where patching occurs in a painted surface, extend final paint coat over entire unbroken area or surface containing the patch, after the patched area has received primer and second coat.

5. Finish patching shall be the responsibility of the Contractor and shall be performed by the trade associated with the application of the particular finish.

E. Plaster Installation: Comply with manufacturer's instructions and install thickness and coats as indicated.

1. Unless otherwise indicated provide 3-coat Work.

2. Finish gypsum plaster with smooth-troweled finish. Sand lightly to remove trowel marks and arises.

3. Cut, patch, point-up and repair plaster to accommodate other construction and to restore cracks, dents and imperfections.

3.4 CLEANING

A. Thoroughly clean areas and spaces where cutting and patching is performed or used as access. Remove completely paint, mortar, oils, putty and items of similar nature. Thoroughly clean piping, conduit and similar features before painting or other finishing is applied. Restore damaged pipe covering to its original condition.

END OF SECTION 01045

SECTION 01050

COORDINATION

PART 1 - GENERAL

M$M DESCRIPTION

!$ Contractor is required to work in close proximity to Owner's existing facilities. The Contractor, under this Contract, will be responsible for coordinating construction activities with Owner to ensure that services, facilities, and safe working conditions are maintained.

.$ The Contractor shall coordinate construction under this Contract with homeowners, utilities and roadway owners.

/$ Any damage to existing structures, equipment and property, accepted equipment or structures, and property or work in progress by others; as a result of the Contractor's or his subcontractor's operations shall be made good by the Contractor at no additional cost to the Owner.

5$ All work shall be in accordance with the Standards of the City of Waltham, Massachusetts and shall meet all state and local standards.

9$ A minimum of 48 hours advanced notice is required for all coordination.

M$H COORDINATION WITH OTHERS

!$ City of Waltham:

1. Contractor shall coordinate access, egress, detours and traffic control, if required, at each site with the City of Waltham Police Department. The Contractor shall notify Waltham Police, Fire Department and Rescue Squad at least 24 hours in advance of any street closings or detours.
2. The Contractor shall be responsible for coordinating and maintaining public services to all public and private properties.
3. The Contractor shall not operate any hydrants, valves, curb stops and corporations without specific approval of the City of Waltham Engineering Department.

.$ Waltham Consolidated Public Works (CPW)

1. Contractor shall be responsible for coordinating all work related to the roadway, sidewalks and curbing with the Waltham Consolidated Public Works. Contractor shall bear all costs for the CPW’s inspection requirements, temporary facilities, any adjustments and other requirements.

/$ NStar Electric:

1. The Contractor shall be responsible for coordinating and providing power to all construction sites both temporary and permanent services. The Contractor shall be responsible for coordinating all work in and around NStar facilities with NStar and bear all costs for NStar inspection, temporary facilities relocation and all other requirements.

5$ National Grid Gas:

1. The Contractor shall be responsible for coordinating all work around gas mains and gas services with National Grid Gas. The Contractor shall bear all costs for National Grid inspection, temporary facilities relocation and all other requirements.

9. Other Public Services:
   1. The Contractor shall be responsible for coordinating and maintaining public services to all properties.

END OF SECTION 01050

SECTION 01046

CONTROL OF WORK

PART I-GENERAL

1.1 EQUIPMENT

A. Furnish equipment which will be efficient, appropriate and large enough to secure a satisfactory quality of work and a rate of progress which will insure the completion of the work within the Contract Time. If at any time such equipment appears to the Engineer to be inefficient, inappropriate or insufficient for securing the quality of work required or for producing the rate of progress aforesaid, he/she may order the Contractor to increase the efficiency, change the character or increase the plant equipment and the Contractor shall conform to such order. Failure of the Engineer to give such order shall in no way relieve the Contractor of his/her obligations to secure the quality of the work and rate of progress required.

1.2 PRIVATELAND

A. The Contractor shall not enter or occupy private land outside of easements, except by permission of the land owner.

1.3 HAULING, HANDLING, AND STORAGE OF MATERIALS

A. The Contractor shall, at his own expense, handle and haul all materials furnished by him and shall remove any and all of his surplus materials at the completion of the work. The Contractor shall provide suitable and adequate storage for equipment and materials furnished by him that are liable to injury, and shall be responsible for any loss or damage to any equipment or materials by theft, breakage, or otherwise. The Contractor shall be responsible for all damages to the work under construction during its progress and until final completion and acceptance, even though partial payments have been made under the Contract.

1.4 PROTECTION AND RELOCATION OF EXISTING STRUCTURES AND UTILITIES

A. The Contractor shall assume full responsibility for the protection of all buildings, structures, and utilities, public or private, including poles, fences, guardrails, signs, services to buildings, utilities in the street, gas pipes, water pipes, hydrants, sewers, drains, and electric and telephone cables, whether or not they are shown on the Drawings. The Contractor shall carefully support and protect all such structures and utilities from injury of any kind. The Contractor is required to comply with all provisions of General Laws Chapter 353 entitled "Excavations-Public Ways-Notice Requirements", otherwise known as DigSafe. Any damage resulting from the Contractor's operations shall be repaired by him at his expense.

B. Assistance will be given the Contractor in determining the location of existing services. The Contractor, however, shall bear full responsibility for obtaining all locations of underground structures and utilities (including, but not limited to existing water services, drain lines, and sewers). Services to buildings shall be maintained, and all costs or charges resulting from damage thereto shall be paid by the Contractor.

C. Protection and temporary removal and replacement of existing utilities and structures, as described in this Section, shall be a part of the work under the Contract, and all costs in connection therewith shall be included in the unit prices established in the Contract.

D. If, in the opinion of the Engineer, permanent relocation of a utility owned by the City is required, which is not shown on the Plans or the Specifications, he may direct the Contractor, in writing, to perform the work. Work so ordered will be paid for as extra work under Articles of the General Conditions. If relocation of a privately- owned utility is required, the Town will notify the utility to perform the work as expeditiously as possible. The Contractor shall fully cooperate with the City and utility, and shall have no claim for delay due to such relocation. The Contractor shall notify public utility companies, in writing, at least 72 hours (excluding Saturdays, Sundays, and legal holidays) before excavating in any public way.

1.5 PIPE LOCATIONS

A. Pipelines shall be located substantially as indicated on the Drawings, but the Engineer reserves the right to make such modifications in locations as may be found desirable to avoid interference with existing structures or for other reasons. Where fittings are noted on the Drawings, such notation is for the Contractor's convenience and does not relieve him/her from laying and jointing different or additional items where required.

1.6 OPEN EXCAVATIONS

A. All open excavations shall be adequately safeguarded by providing temporary barricades, caution signs, lights and other means to prevent accidents to persons and damage to property. The Contractor shall, at his/her own expense, provide suitable and safe bridges and other crossings for accommodating travel by pedestrians and workmen. Bridges provided for access during construction shall be removed when no longer required. The length or size of excavation will be controlled by the particular surrounding conditions, but shall always be confined to the limits prescribed by the Engineer. If the excavation becomes a hazard, or if it excessively restricts traffic at any point, the Engineer may require special construction procedures such as limiting the length of the open trench, prohibiting stacking excavated n1aterial in the street requiring that the trench shall not remain open oven1ight.

B. The Contractor shall take precautions to prevent injury to the public due to open trenches. All trenches, excavated material, equipment, or other obstacles which could be dangerous to the public shall be well lighted at night.

I.7 TEST PITS

A. Test pits for the purpose of locating underground pipeline or structures in advance of the construction shall be excavated and backfilled by the Contractor at the direction of the Engineer. Test pits shall be backfilled and compacted immediately after their purpose has been satisfied and the surface restored and maintained in a manner satisfactory to the Engineer.

1.8 MAINTENANCE OF TRAFFIC

A. Unless permission to close a street is received in writing from the proper authority, all excavated material shall be placed so that vehicular and pedestrian traffic may be maintained at all times. If the Contractor's operations cause traffic hazards, he/she shall repair the road surface, provide temporary ways, erect wheel guards or fences, or take other measures for safety satisfactory to the Engineer.

B. Detours around construction will be subject to the approval of the Owner and the Engineer. Where detours are permitted the Contractor shall provide all necessary barricades and signs as required to divert the flow of traffic. While traffic is detoured the Contractor shall expedite construction operations and periods when traffic is being detoured will be strictly controlled by the Owner.

C. The Contractor shall take precautions to prevent injury to the public due to open trenches. Night watchmen may be required where special hazards exist, or police protection provided for traffic while work is in progress. The Contractor shall be fully responsible for damage or injuries whether or not police protection has been provided.

D. When, in the opinion of the Police Department, public safety requires the services of police, the Safety Officer may direct the Contractor to provide manpower to direct traffic within the location of work under this Contract.

E. Under normal circumstances the City of Waltham shall coordinate the scheduling of all police activities, however, when so directed, the Contractor shall make all arrangements in obtaining the manpower and all invoices for policing.

F. The intent is to insure public safety by police direction of traffic. Police are not to serve as watchmen to protect the Contractor's equipment and materials, or to warn pedestrians of such hazards as open trenches.

G. Nothing contained herein shall be construed as relieving the Contractor of any of his/her responsibilities for protection of persons and property under the terms of the Contract.

H. All payments shall be made to police for work under this Contract as described in Section 01024, MEASUREMENT AND PAYMENT, and shall be supported by the proper documentation.

I. Contractor shall furnish and maintain traffic control signage throughout the project and at all construction areas. Signs shall be standard signs in compliance with Massachusetts

Highway standards. In general the following signs and devices shall be placed and maintained at each side of all work areas:

1. Construction Ahead - 1000 feet
2. Construction Ahead - 500 feet
3. Keep Left/Keep Right
4. End Construction
5. Left/Right Lane Closed Ahead
6. Safety Barrels with flashers
7. Detour Ahead
8. Detour (as required)

J. It is the intent of this contract that traffic be maintained at all times in the areas of construction. The contractor may be required to halt operations and/or transport material to areas beyond immediate work locations in order to allow minimum traffic disruptions. Access to the site by emergency vehicles, school buses and residents shall be maintained at all times.

K. The contractor shall be responsible for providing property owners with written notification of proposed construction which may require detours or road closures.

1.9 PROTECTION OF CONSTRUCTION AND EQUIPMENT

A. All newly-constructed work shall be carefully protected from injury in any way. No placing of heavy loads on it shall be allowed, and all portions injured shall be reconstructed by the Contractor at its own expense.

B. All structures shall be protected in a manner approved by the Engineer. All such damaged portions of the work shall be completely repaired and made good by the Contractor, at his own expense, and to the satisfaction of the Engineer.

C. If, in the final inspection of the work, any defects, faults, or omissions are found, the Contractor shall cause the same to be repaired or removed and replaced by proper materials and workmanship, without extra compensation for the materials and labor required. Further, the Contractor shall be fully responsible for the satisfactory maintenance and repair of the construction, and other work undertaken herein, for at least the guarantee period described in the Contract Documents.

D. The Contractor shall take all necessary precautions to prevent damage to any work during and after construction, and until such work is accepted and taken over by the Owner.

1.10 CARE AND PROTECTION OF PROPERTY AND SURVEY MONUMENTS

A. The Contractor shall be responsible for the preservation of all public and private property, and shall use every precaution necessary to prevent damage thereto. If any direct or indirect damage is done to public or private property, by or on account of any act, omission, neglect, or misconduct in the execution of the work on the part of the Contractor, such property shall be restored by the Contractor, at his expense, to a

condition similar or equal to that existing before the damage was done, or he shall make good the damage in another manner acceptable to the Engineer.

B. Along the location of this work, all fences, walks, bushes, trees, shrubbery, and other physical features shall be protected and restored in a thoroughly workmanlike manner. Fences and other features removed by the Contractor shall be replaced in the location indicated on the Drawings as soon as conditions permit. All grass areas beyond the limits of construction, which have been damaged by the Contractor, shall be graded and seeded.

C. Trees close to the work shall be boxed or otherwise protected against injury. The Contractor shall trim all branches that are liable to damage because of his operations, but in no case shall any trees be cut or removed without prior notification of the Town or other person in charge. All injuries to bark, trunk, limbs, and roots of trees shall be repaired by dressing, cutting, and painting according to approved methods using only approved tools and materials.

D. The protection, removal, and replacement of existing physical features along the line of work shall be a part of the work under the Contract, and all costs in connection therewith shall be included in the Bid Proposal. The Contractor is responsible for protecting and, if required, re-setting survey monuments (bounds). If a bound is in the way of required excavation, the Contractor will notify the Engineer/Inspector and/or the City Engineering Division with as much notice as possible prior to performing excavation near the bound.

1.11 REJECTED MATERIALS AND DEFECTIVE WORK

A. Materials furnished by the Contractor and condemned by the Engineer as unsuitable or not in conformity with the Specifications shall forthwith be removed from the work by the Contractor, and shall not be made use of elsewhere in the work. Any errors, defects, or omissions in the execution of the work or in the materials furnished by the Contractor, even though they may have been passed or overlooked or have appeared after the completion of the work, discovered at time before the final payment is made hereunder, shall be forthwith rectified and made good by and at the expense of the Contractor, and in a manner satisfactory to the Engineer. The Contractor shall reimburse the Owner for any expenses, losses, or damages incurred in consequence of any defect, error, omission, or act of the Contractor or his employees, as determined by the Engineer, occurring previous to the final payment.

1.12 COORDINATION WITH LOCAL AGENCIES

A. The Contractor shall attend a Pre-Construction Meeting to be held at the Engineering Department approximately two weeks prior to start of work. City departments who will also be invited to this meeting include Police, Fire and Conservation. Electric, gas and phone utility companies will also be invited. The contractor will provide the proposed schedule at that time (see Submittals, Section 01300). Any proposed detours will be reviewed with all parties at the Pre-Construction Meeting. If any additional detours are considered after the Pre-Construction Meeting, the Contractor must first get approval from the Engineer.

B. The Contractor will immediately notify the utility owner of any utility main breaks.

C. The Contractor will be required to reimburse the Owner for the actual cost of the services of the Department of Public Works Personnel required during other than regular working hours. This includes the cost of the Engineer/ Site Inspectors when inspection is required outside the normal business hours. This cost shall be at the rate of time and one-half of the Inspector's pay rate, to be paid to the City by the Contractor.

D. The Contractor shall notify the City at least 72 hours prior to the construction of any public improvement so that the City can have an inspector present if work requires inspection. In general, inspection will be required:

1. For Road Construction:
   a. When the subgrade is established,
   b. while placing gravel,
   c. when final grade of base course is established, and
   d. during paving operations.

2. For Drainage, Water and Sewer Construction:
   a. While laying pipe, but before backfilling, and
   b. during backfilling operations. (In the case of water main installations, final pressure test will be monitored by the Engineer after disinfection tests have been successfully completed.)
   c. during paving operations.

E. The Contractor will be r4equried to reimburse the Owner/City for inspections or other City Personnel required to perform their duties after normal working hours.

F. The Engineer will have the authority to reject any work or materials that do not constitute approval by the City and shall not relieve the Contractor of his obligations to perform the work in accordance with the Plans and Specifications.

G. The Contractor shall maintain pavement as specified in Section 02576 and shall provide the Engineering Department and Department of Public Works with contact information at which he/she can be contacted when he/she is not at the site. Upon notification by the Owner or the Engineer the Contractor shall promptly make repairs to the construction site as may be necessary.

H. The Contractor shall assume full responsibility for the protection of all buildings, structures, and utilities, public or private, including poles, signs, services to buildings, utilities in the street, gas pipes, water pipes, hydrants, sewers, drains, curbing, electric and telephone cables, whether or not they are shown on the drawings. The Contractor shall carefully support and protect all such structures and utilities from injury of any kind. Any damage resulting from the Contractor’s operations shall be repaired by him/her at his/her expense.

I. Assistance will be given the Contractor in determining the location of existing services. The Contractor, however, shall bear full responsibility for obtaining all locations of underground structures and utilities (including existing water services, drain lines and

sewers). Services to buildings shall be maintained, and all costs or charges resulting from damage thereto shall be paid by the Contractor.

J. Protection and temporary removal and replacement of existing utilities and structures as described in this Section shall be a pat1 of the work under the Contract and all costs in connection therewith shall be included in the Total Price Bid in the Bid Form.

K. The Contractor shall coordinate the removal and replacement of traffic loops and signals, if required for the performance of the work, at no additional cost to the Owner.

L. If, in the opinion of the Engineer, permanent relocation of a utility owned by the City of Waltham is required, he/she may direct the Contractor, in writing, to perform the work. Work so ordered will be paid for as extra work under Article II of the Supplementary Conditions. If relocation of a privately owned utility is required, the Department of Public Works will notify the Utility to perform the work as expeditiously as possible. The Contractor shall fully cooperate with the Waltham Engineering Department and the Utility and shall have no claim for delay due to such relocation. The Contractor shall notify all utility companies in writing at least 72 hours (excluding Saturdays, Sundays and Legal holidays) before excavating in any public way. Contractor shall also notify Massachusetts Dig Safe, telephone 1-800-322-4844 at least 72 hours prior to start of work.

The following is a partial list of Owners of Utilities: Water, Storm Drain and Sewer:

Waltham Department of Public Works
Rhodes Municipal Center
167 Lexington Street
Waltham, MA 02452
Telephone: (781) 314-3800

Electric:
NStar Electric
Telephone: (800)592-2000

Gas:
National Grid
Telephone: (800) 233-5325

DIGSAFE: (800) 344-7233

1.13 WATER FOR CONSTRUCTION PURPOSES

A. In locations where water is in sufficient supply, the Contractor may be allowed to use water without charge for jetting backfill and other construction purposes. The express approval of the Owner shall be obtained before water is used. Waste of water by the Contractor shall be sufficient cause for withdrawing the privilege of unrestricted use.

B. The Contractor shall furnish all water required for and in connection with work to be done under this Contract including but not limited to: water for cleaning and testing all

pipelines, manholes and structures: temporary potable water: sanitation and toilet facilities: disinfection: and including water curing, heating, chemical mixing and testing for permanent pipeline liner rehabilitation system.

C. No separate measurement and payment shall be made for temporary water and all costs Shall be incidental to and included with each applicable item.

1.14 MAINTENANCE OF FLOW

A. The Contractor shall maintain the flow in all watercourses, whether open channels or in pipes, in all sewers and other pipes interfered with in the line of work and convey the flow to a suitable point of discharge so as not to flow upon the work or create a nuisance. In the discharge of water removed from the excavations by pumping or by gravity similar precautions shall be observed.

1.15 COOPERATION WITHIN THIS CONTRACT

A. All firms or persons authorized to perform any work under this Contract shall cooperate with General Contractor and his/her Subcontractors or trades and shall assist in incorporating the work of other trades where necessary or required.

B. Cutting and patching, drilling and fitting shall be carried out where required by the trade or subcontractor having jurisdiction, unless otherwise indicated herein or directed by the Engineer.

1.16 CLEANUP AND DISPOSAL OF EXCESS MATERIAL

A. During the course of the work, the Contractor shall keep the site of his/her operations in as clean and neat a condition as is possible. He/She shall dispose of all residue resulting from the construction work and at the conclusion of the, he/she shall remove and haul away any surplus excavation, broken pavement, lumber, equipment, temporary structures and any other refuse remaining from the construction operations and shall leave the entire site of the work in a neat and orderly condition.

B. In order to prevent environmental pollution arising from the construction activities related to the performance of this Contract, the Contractor and his/her subcontractors shall comply with all applicable Federal, State and local laws and regulations concerning waste material disposal, as well as the specific requirements stated in this Section and elsewhere in the Specifications.

C. The Contractor is advised that the disposal of excess excavated material in wetlands, stream corridors and plains is strictly prohibited even if the permission of the property owner is obtained. Any violation of this restriction by the Contractor or any person employed by him, will be brought to the immediate attention of the responsible regulatory agencies, with a request that appropriate action be taken against the offending parties. Therefore, the Contractor will be required to remove the fill at his/her own expense and restore the area impacted.

D. Outdoor burning of rubbish and waste material on the site will not be permitted.

E. Disposal of volatile fluid wastes (such as mineral spirits, oil, gasoline, or paint thinner) in storm or sanitary sewer systems or into streams or waterways is not permitted.

F. The Contractor shall restore or replace, when and as directed, any public or private property damaged by his work, equipment, or employees, to a condition at least equal to that existing immediately prior to the beginning of operations. To this end the Contractor shall do as required all necessary highway or driveway, walk, and landscaping work. Suitable materials, equipment, and methods shall be used for such restoration. The restoration of existing property or structures shall be done as promptly as practicable as work progresses and shall not be left until the end of the contract period.

1.17 INTERRUPTION OF WATER SERVICE

A. The Contractor shall plan his work and shall follow a procedure so as not to inconvenience the general public.

B. All affected customers shall be notified with a minimum of 24 hours notice prior to interruption of water service. Residential notification cards shall be obtained from the Waltham Engineering Department. It shall be the Contractor's responsibility to request and obtain the Residential notification cards from the Waltham Engineering Department

C. A list of all recipients of notices will be provided to the Waltham Engineering Department immediately.

D. Failure to comply with notification requirements may result in temporary tem1ination of work until such time that notification is issued. Such termination of work will not be reason for extending contract time limits (see Articles 3 & 7 of the Agreement).

E. The 24 hour notice requirement is for planned interruptions. Unplanned interruptions require immediate notification of the Waltham Engineering Department (781) 314-3844. Unplanned interruptions are those that could not possibly have been foreseen. Interruptions such as failure of an isolation valve to provide a tight seal when there are personnel such as the Engineer or other City staff who could provide information as to the reliability of a valve are considered interruptions that should be planned.

END OF SECTION 01046

SECTION 01050

COORDINATION

PART 1 - GENERAL

M¢M DESCRIPTION

!¢ Contractor is required to work in close proximity to Owner's existing facilities. The Contractor, under this Contract, will be responsible for coordinating construction activities with Owner to ensure that services, facilities, and safe working conditions are maintained.

.¢ The Contractor shall coordinate construction under this Contract with homeowners, utilities and roadway owners.

/¢ Any damage to existing structures, equipment and property, accepted equipment or structures, and property or work in progress by others; as a result of the Contractor's or his subcontractor's operations shall be made good by the Contractor at no additional cost to the Owner.

5¢ All work shall be in accordance with the Standards of the City of Waltham, Massachusetts and shall meet all state and local standards.

9¢ A minimum of 48 hours advanced notice is required for all coordination.

M¢H COORDINATION WITH OTHERS

!¢ City of Waltham:

1. Contractor shall coordinate access, egress, detours and traffic control, if required, at each site with the City of Waltham Police Department. The Contractor shall notify Waltham Police, Fire Department and Rescue Squad at least 24 hours in advance of any street closings or detours.
2. The Contractor shall be responsible for coordinating and maintaining public services to all public and private properties.
3. The Contractor shall not operate any hydrants, valves, curb stops and corporations without specific approval of Water and Sewer Superintendent of the City of Waltham Public Works Department.

.¢ Waltham Consolidated Public Works (CPW)

1. Contractor shall be responsible for coordinating all work related to the roadway, sidewalks and curbing with the Waltham Consolidated Public Works. Contractor shall bear all costs for the CPW's inspection requirements, temporary facilities, any adjustments and other requirements.

/¢ NStar Electric:

1. The Contractor shall be responsible for coordinating and providing power to all construction sites both temporary and permanent services. The Contractor shall be responsible for coordinating all work in and around NStar facilities with NStar and bear all costs for NStar inspection, temporary facilities relocation and all other requirements.

5¢ National Grid Gas:

1. The Contractor shall be responsible for coordinating all work around gas mains and gas services with National Grid Gas. The Contractor shall bear all costs for National Grid inspection, temporary facilities relocation and all other requirements.

9. Other Public Services:
   1. The Contractor shall be responsible for coordinating and maintaining public services to all properties.

END OF SECTION 01050

SECTION 01080

ABBREVIATIONS AND DEFINITIONS

PART I-GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.

1.2 ABBREVIATIONS:

A. Where any of the following abbreviations are used in the Contract Documents, they shall have the meaning set forth opposite each.

AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AISC	American Institute of Steel Construction
ANSI	American National Standards Institute
ASCE	American Society of Civil Engineers
ASTM	American Society for Testing and Materials
AWWA	American Water Works Association
Fed. Spec.	Federal Specifications issued by the Federal Supply Service of the General Services Administration, Washington, D. C.
125-lb. ANSI or 250 lb. ANSI	American National Standard Institute for Cast-iron 250-lb. ANS Pipe Flanges and Flanged Fittings, Designation B16.1, for the Appropriate class
AWG	American or Brown and Sharpe Wire Gage
NPT	National Pipe Thread
OSHA	Occupational Safety and Health Act.
OS&Y	Outside screw and yoke
Stl. WG	U. S. Steel Wire, Washburn and Moen, American Steel and Wire or

	Roebling Gage
USS Gage	United States Standard Gage
UL	Underwriters' Laboratories

1.3 DEFINITIONS:

A. Wherever the words defined in this section or pronouns used in their stead occur in the Contract Documents, they shall have the meanings herein given.

B. General: Basic Contract definitions are included in the Conditions of the Contract

C. Indicated: The term indicated refers to graphic representations, notes, or schedules on the Drawings, or other Paragraphs or Schedules in the Specifications, and similar requirements in the Contract Documents. Terms such as shown, noted, scheduled, and specified are used to help the reader locate the reference. There is no limitation on location.

D. Directed: Terms such as directed, requested, authorized, selected, approved, required, and permitted mean directed by the Engineer, requested by the Engineer, and similar phrases.

E. Approve: The term approved, when used in conjunction, with the Engineer's action on the Contractor's submittals, applications, and requests, is limited to the Engineer's duties and responsibilities as stated in the Conditions of the Contract.

F. Regulation: The term regulations includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.

G. Furnish: The term furnish means supply and deliver to the Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

H. Install: The term install describes operations at the Project site including the actual unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

I. Provide: The term provide means to furnish and install, complete and ready for the intended use.

1. The term experienced, when used with the term Installer means having a minimum of five previous projects similar in size and scope to this project, being familiar with the special requirements indicated, and having complied with requirements of the authority having jurisdiction.

2. Trades: Using terms such as carpentry is not intended to imply that certain

construction activities must be performed by accredited or unionized individuals of a corresponding generic nan1e, such as carpenter. It also does not imply that

requirements specified apply exclusively to tradespersons of the corresponding generic name.

J. Project Site is the space available to the Contractor for performing construction activities, either exclusively or in conjunction, with others performing other work as part of the Project. The extent of the Project Site is shown on the Drawings and may or may not be identical with the description of the land on which the Project is to be built.

K. Testing Agencies: A testing agency is an independent entity engaged to perform specific inspections or tests, either at the Project Site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.

L. Elevation: The figures given on the Drawings or in the other Contract Documents after the word "elevation" or abbreviation of it shall mean the distance in feet above the datum adopted by the Engineer.

M. Rock: The word "rock,11 wherever used as the name of an excavated material or material to be excavated, shall mean only boulders and pieces of concrete or masonry exceeding 1 cu. yd. in volume, or solid ledge rock which, in the opinion of the Engineer, requires, for its removal, drilling and blasting, wedging, sledging, barring, or breaking up with a power-operated tool. No soft or disintegrated rock which can be removed with a hand pick or power-operated excavator or shovel, no loose, shaken, or previously blasted rock or broken stone in rock fillings or elsewhere, and no rock exterior to the maximum limits of measurement allowed, which may fall into the excavation, will be measured or allowed as "rock."

N. Earth: The word "earth", wherever used as the name of an excavated material or material to be excavated, shall mean all kinds of material other than rock as above defined.

PART 2 -PRODUCTS (NOT USED)

PART 3 -EXECUTION (NOT USED)

END SECTION 01080

SECTION 01105

RODENT CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. This section specifies rodent control and general pest control requirements within project areas, and bordering areas as designated by the Owner and Engineer. This work is to be performed prior to demolition, excavation, and site preparation and throughout the Contract, so that rodents and other pests do not disperse from or infest the project area.

B. The Contractor shall develop and implement an Integrated Pest Management (IPM) approach. As part of that approach, the Contractor shall maintain a cooperative dialogue with appropriate agencies and management/representatives of neighboring properties.

C. The Contractor shall perform the rodent control tasks described in this Scope of Work and also respond to other pest control needs when directed by the Owner.

1.2 SUBMITTALS

A. Submit to the Engineer copies of pesticide applicator certifications and licenses within ten (10) days of the start of Rodent Control activities and ten (10) days prior to their issuance or renewal for the duration of this Contract.

B. After performing the survey described in Paragraph 3.2 below and before initiating baiting, submit to the Engineer a written description of proposed pest control procedures, indicating materials, quantities, methods, and time schedule. For all pesticides to be used, submit a copy of the pesticide manufacturer's EPA-approved pesticide label with application directions.

C. After performing the survey described in Paragraph 3.2 below and before initiating baiting, submit to the Engineer a written description of proposed pest control procedures, indicating materials, quantities, methods, and time schedule. For all pesticides to be used, submit a copy of the pesticide manufacturer's EPA-approved pesticide label with application directions.

1. Weekly - Submit data sheets with locations of sites treated, amounts and types of pesticide used, number and types of traps set, survey and inspection results, sanitation conditions, complaint calls investigated, and any problem that occurred.
2. Monthly - Submit a written summary that includes determinable results of the IPM program and recommendations.
3. Quarterly - Submit a map that shows bait stations, manholes, and catch basins where rodent baits are being maintained.

1.3 QUALIFICATIONS

A. The Contractor shall perform this work at all times in accordance with the following minimum standards and as acceptable to the Owner and Engineer.

1. The Contractor and key personnel shall have experience with commercial and residential accounts and construction projects; have experience and technical training in vertebrate pest management and integrated pest management; have experience with various rodent control techniques, equipment, and strategies; have training and experience with insect control; and have knowledge of and experience with techniques to reduce non-target hazards.

2. The supervisor shall be licensed and certified by the Massachusetts Pesticide Bureau and certified in General Pest Control (category 41) and Vertebrate Pest Control (category 44). The supervisor shall have specific training and experience in vertebrate pest management, commercial rodent control, general pest control, and integrated pest management.
3. Applicators shall be licensed by the Massachusetts Pesticide Bureau and certified in General Pest Control (category 41). Applicators shall have specific training and experience in commercial rodent control and integrated pest management.

1.4 COORDINATION

A. Perform this Work in cooperation with the other Work performed under the Contract.
B. Initiate the work on or before field mobilization begins for the Contract and with adequate timing to achieve control before environmental disruptions. Provide a maintenance program until Contract is completed and all equipment and materials are removed.
C. Perform the Work according to the preliminary schedule described in this section and as accepted or revised by the Owner and Engineer. Estimated durations and start dates may be changed by the Owner or Engineer to suit changes in construction schedules and field conditions. The Work could potentially require performance any day of the week and any hour of the day or night, regardless of weather.
D. Perform this work in such a manner that toxicant or other control tools do not pose a hazard to persons, domestic animals, or non-target wildlife.

1.5 PERMITS

A. Obtain and maintain in coordination with the Contractor appropriate permit(s) from city or state agencies for pest control activities associated with this Work.
B. Obtain and maintain in coordination with the Contractor all right of entry permits required for the performance of this Work. This includes all utilities and private properties to which entrance is required.

PART 2 - PRODUCTS

A. Furnish and use only pesticide formulations registered by the U.S. Environmental Protection Agency (EPA) and the Massachusetts Department of Food and Agriculture, where appropriate according to label directions and as acceptable to the Engineer.
B. Furnish and use devices and supplies (e.g., traps and bait stations) to facilitate the management and effectiveness of the pest control program, where appropriate and as acceptable to the Engineer.

PART 3 - EXECUTION

3.1 MEETINGS

A. Before proceeding with the Work, all pest control personnel shall attend a Work Shop held by the Contractor and Engineer to discuss planned pest control methods and coordination.
B. The supervisor shall meet with the Contractor and Engineer weekly to discuss pest control activities.

3.2 SURVEY

A. Prior to baiting, survey the proposed construction area and accessible or observable bordering areas and record signs of rodent activity and sanitation conditions. Closely inspect all embankments, edge areas, and properties within and abutting the construction area. Maintain survey records in the manner described in Paragraph 3.7 below.

B. Thoroughly inspect construction area and accessible or observable bordering areas and any nearby areas designated by the Owner or Engineer, for rodent activity and sanitation deficiencies weekly throughout the duration of this Contract and in accordance with the work schedule. Maintain inspection records in the manner described in Paragraph 3.7 below.

C. Plan the control program and allocate resources based on survey and inspection data and as acceptable to the Owner.

3.3 APPLICATION FOR RODENT CONTROL

A. Apply rodenticide in strict accordance with EPA-approved label directions and the Rules and Regulations of the Massachusetts Department of Food and Agriculture. Maintain records of all bait placements in the manner described in Paragraph 3.7below.

B. Where appropriate, especially for surface placements of rodent baits, use properly secured and tamper-resistant bait stations consistent with EPA regulation. Individually number and properly identify all bait stations.

C. Surface Applications

1. Initial Surface Baiting. Rid the construction area of all detectable rodents before construction begins, or as acceptable to the Owner. Bait all observable rodent burrows. Install and secure bait stations at regular and appropriate intervals and locations, and document rodent activity (burrows, droppings, bait consumed, and dead rodents). Replenish bait and shift bait stations as necessary to ensure complete control of rodent populations. Bait edge and accessible bordering areas as necessary to ensure that rodents will not be dispersed by construction activities and that rodents will not infest work areas.

2. Maintenance Surface Baiting. Establish a maintenance baiting program prior to mobilization by the Contractor, including construction areas and accessible bordering areas, as acceptable to the Owner. Check bait placements weekly. Use survey and baiting data to determine the most effective distribution of baiting locations and bait quantities. Shift and distribute bait and bait stations as appropriate to ensure continued control.

D. Subsurface Applications

1. General. For situations involving underground construction/demolition, utility relocation, or utility construction, and for other situations when determined necessary by the Owner or Engineer, initiate subsurface baiting and rid underground environments of all detectable rodents before construction begins. Assign an identifying number to each manhole and catch basin where bait is placed so that locations of bait placements can be identified and rodent activity (droppings, bait consumed, dead rats) can be documented. Conduct bait applications during off- peak traffic hours unless otherwise directed by the Engineer. Access manholes according to the requirements of appropriate agencies and utility companies. Coordinate the Work with appropriate municipal agencies and utility companies.

2. Initial Subsurface Baiting. Apply appropriate baits to control rodent populations in manholes and catch basins. This will involve suspending and securing bait using

noncorrosive wire (e.g., 24-gauge plastic coated). Place bait in all accessible manholes and catch basins within the construction work area. In addition, bait an appropriate set of manholes and catch basins in the blocks bordering the work area and as acceptable to the Owner. Identify all baited manholes and catch basins with a standardized paint mark on the street and a numbered tag to be attached to the suspending wire. Approximately seven days after completion of the first baiting, check all manhole and catch basin baits and record estimates on the amount of bait consumed. Replenish or increase the amount of bait applied according to the amount consumed or as acceptable to the Owner and Engineer. Repeat this process again approximately fourteen days later and until there is little or no bait consumed. Check manholes and catch basins weekly when they repeatedly have 100 percent of the bait consumed.

3. Maintenance Subsurface Baiting. Prior to mobilization by the Contractor, establish a maintenance baiting program appropriate for the rodent infestation patterns identified during initial subsurface baiting. This program shall ensure continued control and shall be performed in a manner acceptable to the Owner and Engineer. Maintain bait in manholes and catch basins that have rodent activity and those that had activity during initial baitings. Check each bait according to rodent activity levels. This could range from weekly to approximately every three months, depending upon the recent history of bait consumption. Use utility maps and baiting data to determine the most effective distribution of baiting locations and bait quantities. Shift and distribute baiting locations as necessary to ensure adequate interception points for controlling immigrating rodents.

E. Cleanup

1. Remove visible rodent carcasses and dispose of them daily consistent with the pesticide label directions and applicable codes, laws, and regulations.
2. Upon completion of any pest control operations at the site, remove remaining bait and dispose of it according to the pesticide label and applicable codes, laws, and regulations. Also remove all wires used for subsurface baiting and any bait stations or traps.

3.4 SANITATION

A. Prior to construction and throughout the duration of this Contract, identify and document harborage and food sources available to rodents on the construction site and in observable bordering areas. This includes any littering or improper or insufficient use of trash receptacles in construction areas. It also includes any bordering areas with sanitation conditions or structural deficiencies that violate City or State sanitation codes.

B. Maintain records of sanitation conditions in the manner described in Paragraph 3.7 below.

3.5 COMPLAINT CALLS

A. During construction, respond to pest-related complaints from the "adjacent" neighborhood (i.e. within 200 feet of the project limits) within 12 hours when directed by the Owner or Engineer. Inspect the particular premises and adjacent areas for sanitation and structural deficiencies and also signs of historic and recent pest activity. Provide sanitation and structural maintenance information to the property owner or manager. Use pesticides or traps as necessary and appropriate to resolve the complaint when there is a relationship between the pest infestation and construction activities, or when directed by the Owner or Engineer.

B. Maintain records of all complaints investigated, including location, contact person, inspection results, and actions taken. Document the relatedness of the pest infestation to construction activities.

3.6 GENERAL PEST CONTROL

A. When directed by the Owner or Engineer, the Contractor shall determine appropriate methods for any pest control task not specifically identified above and shall submit them in writing to the Owner and Engineer for approval in advance. Such pest control tasks would relate to unanticipated pest control needs within construction areas or adjacent areas. This could include control of insects or vertebrates other than rats and mice.

B. Maintain records of general pest control activities and results in the manner described in Paragraph 3.7 below.

3.7 RECORD KEEPING

A. Use standardized data sheets acceptable to the Owner and Engineer to maintain accurate records of date, placement, type, and amount of pesticides or other control tools (e.g., traps) applied. Similarly, maintain records of surveys, inspections, changes in pest activity, sanitation conditions, and complaint calls. Submit data in a format acceptable to the Owner and Engineer and as required under Paragraph 1.3 (C) above.

END OF SECTION

SECTION 01150

MEASUREMENT AND PAYMENT

PART 1 - GENERAL

M¢M DESCRIPTION

!¢ For lump sum items, payment shall be made to the contractor in accordance with an accepted progress schedule and schedule of values on the basis of actual work completed.

.¢ For unit-price items, payment shall be based on the actual amount of work accepted and for the actual amount of materials in place, as shown by final measurements.

1. All units of measurement shall be standard United States convention as applied to the specific items of work by tradition and as interpreted by the Engineer.
2. At the end of each day's work, the Contractor's Superintendent or other authorized representative of the Contractor shall meet with the Resident Project Representative and determine the quantities of unit price work accomplished and/or completed during the work day.
3. The Resident Project Representative will then prepare two "Daily Progress Reports" which shall be signed by both the Resident Project Representative and Contractor's Representative.
4. Once each month the Resident Project Representative will prepare two "Monthly Progress Summation" forms from the month's accumulation of "Daily Progress Reports" which shall also be signed by both the Resident Project Representative and Contractor's Representative.
5. These completed forms will provide the basis of the Engineer's monthly quantity estimate upon which payment will be made. Items not appearing on both the Daily Progress Reports and Monthly Progress Summation will not be included for payment. Items appearing on forms not properly signed by the Contractor will not be included for payment.
6. After the work is completed and before final payment is made, the Engineer will make final measurements to determine the quantities of various items of work accepted as the basis for final settlement.

M¢H SCOPE OF PAYMENT

!¢ Payments to the Contractor will be made for the actual quantities of the Contract items performed and accepted in accordance with the Contract Documents. Upon completion of construction, if these actual quantities show either an increase or decrease from the quantities given in the Proposal Form, the Contract Unit Prices will still prevail.

.¢ The Contractor shall accept in compensation, as herein provided, in full payment for furnishing all materials, labor, tools, equipment, and incidentals necessary to complete the work and for performing all work contemplated and embraced by the Contract; also for all loss or damage arising from the nature of the Work, or from the action of the elements, or from any unforeseen difficulties which may be encountered during the prosecution of the Work and until its final acceptance by the Engineer, and for all risks of every description connected with the prosecution of the work, except

as provided herein, also for all expenses incurred in consequence of the suspension of the Work as herein authorized.

/. The payment of any partial estimate or of any retained percentage except by and under the approved final invoice, in no way shall affect the obligation of the Contractor to repair or renew any defective parts of the construction or to be responsible for all damage due to such defects.

M.O PAYMENT FOR INCREASED OR DECREASED QUANTITIES

!. When alterations in the quantities of work not requiring supplemental agreements, as hereinbefore provided for, are ordered and performed, the Contractor shall accept payment in full at the Contract price for the actual quantities of work done. No allowance will be made for anticipated profits. Increased or decreased work involving supplemental agreements will be paid for as stipulated in such agreements.

M.P OMITTED ITEMS

!. Should any items contained in the bid form be found unnecessary for the proper completion of the work contracted, the Engineer may eliminate such items from the Contract, and such action shall in no way invalidate the Contract, and no allowance will be made for items so eliminated in making final payment to the Contractor.

M.p PARTIAL PAYMENTS

Partial payments shall be made monthly as the work progresses. Partial payments shall be made subject to the provisions of the Supplemental and General Conditions.

M.C PAYMENT FOR MATERIAL DELIVERED

!. When requested by the Contractor and at the discretion of the Owner, payment may be made for all or part of the value of acceptable, non-perishable materials and equipment which are to be incorporated into bid items, have not been used and have been delivered to the construction site, or placed in storage places acceptable to the Owner. Payment shall be subject to the provisions of the General and Supplemental Conditions.

.. No payment shall be made upon fuels, supplies, lumber, false work, or other materials, or on temporary structures of any kind which are not a permanent part of the Contract.

M.T FINAL PAYMENT

!. The Engineer will make, as soon as practicable after the entire completion of the project, a final quantity invoice of the amount of the Work performed and the value of such Work. Owner shall make final payments of the sum found due less retainages subject to provisions of the General and Supplemental Conditions.

M.y INCIDENTAL WORK

!. Incidental work items for which separate payment will not be made includes, but is not limited to, the following items:

1. Construction schedules, bonds, insurance, shop drawings, warranties, guarantees, certifications, and other submittals required by the Contract Documents.
2. Permits not otherwise paid for or provided by the Owner.

3. Clearing, grubbing, and stripping.
4. Visits to the Project site or elsewhere by personnel or agents of the Contractor, including manufacturer's representatives, as may be required.
5. Preconstruction Photos and Videos.
6. Coordination with the Owner, Utilities and others, including related inspection cost (refer to Section 01050)
7. Earthwork (except ledge)
8. Dust control. Contractor shall have watering equipment on site for the duration of the construction. Watering shall take a place a minimum of two times per day or at the direction of the Engineer.
9. Dewatering and disposal
10. Temporary utilities for construction and to maintain existing service during construction, payment is otherwise made.
11. Temporary construction and other facilities not to be permanently incorporated into the Work necessary for construction sequencing and maintenance of operations.
12. Steel and/or wood sheeting as required, including that left in place
13. Materials testing
14. Quality assurance testing
15. Utility crossings and relocations, unless payment is otherwise made
16. Traffic Regulation except uniformed police detail.
17. On-site and other facilities acceptable to Engineer for the storage of materials, supplies and equipment to be incorporated into the Work
18. Pipe Markings
19. Utility crossings and relocations, unless payment is otherwise made.
20. Engineer's Temporary Field Office.
21. Weather protection, winter construction equipment and fuel.
22. Restoration of property, and replacement of fences, curbs, structures and other minor items disturbed by the construction activities.
23. Repair and replacement of utilities damaged by construction activities and corresponding proper disposal of removed materials.
24. Clean-up.
25. Loam and seeding.
26. Facilities start-up services required by the Contract Documents.
27. Construction Administration and Insurance.
28. GPS location of all structures
29. Demobilization
30. Project record documents.

M DESCRIPTION OF PAY ITEMS

! The following sections describe the measurement of and payment for the work to be done under the respective items listed in the Bid Form.

. Each unit or lump-sum price stated in the Bid Form shall constitute full compensation, as herein specified, for each item of the work completed.

Item 1: Mobilization and Demobilization

1. For the lump sum bid price for this Item, the Contractor shall mobilize and demobilize to and from the site all labor, materials, and equipment to complete all work associated with this contract. Demobilization from the site includes, but is not limited to: removal of all equipment and final cleanup to the satisfaction of the City.

2. Payment for the mobilization and demobilization shall be by lump sum. Fifty percent of the lump sum price shall be paid to the Contractor upon completing mobilization activities, and the remaining fifty percent shall be paid upon demobilization from the site.

3. Mobilization and Demobilization Costs cannot exceed 5 percent of the total Bid Price.

Item 2: Traffic Management

1. For the lump sum bid price for this Item, the Contractor shall prepare a Traffic Management Plan in conformance with all current and applicable requirements and implement the plan throughout the execution of the project. This will include all the signs, electronic displays, safety devices, labor, materials, and equipment to complete all work associated with this contract.

2. Payment for the item shall be on a lump sum basis.

Item 3: Test Pits

1. The Contractor shall conduct test pits as identified on the drawings and as directed by the Engineer to obtain information on the location and elevations of existing utilities.

2. Payment for this item shall be by Cubic Yard of excavation.

Item 4: Abandon and Controlled Density Fill of Existing Utility Pipes

1. The quantity of abandoned and filled existing utility pipes to be paid for under these items shall be the linear foot of pipes abandoned and filled complete in place as measured by the engineer from the beginning of the abandonment to the end.
2. Abandon and Controlled Density Fill of existing utility pipes shall be paid for at the unit price per linear foot as stated in the Bid Schedule and as required by the engineer. Said unit price shall be full compensation for all labor, materials and equipment necessary to complete the pipe abandonment and filling including excavation, dewatering, Controlled Density Fill (CDF), masonry plugs and bulkheads and all else incidental thereto for which payment is not provided under other items.

Item No. 5– Abandon and Controlled Density Fill of existing Drain Structures

1. The quantity of abandoned and filled existing drainage structures to be paid for under these items shall be per each structure abandoned and filled complete in place.

2. Abandon and Controlled Density Fill of existing Drainage Structures shall be paid for at the unit price per each as stated in the Bid Schedule and as required by the engineer. Said unit price shall be full compensation for all labor, materials and equipment necessary to complete the structure abandonment and filling including saw cutting, removing and disposing of castings, removing and disposing of the top 3' from finished grade of the structure, excavation, dewatering, Controlled Density Fill (CDF), masonry plugs and bulkheads, providing 2-2" min. holes at the structure invert or sump and all else incidental thereto for which payment is not provided under other items.

Items No. 6 - Erosion and Sedimentation Control

1. Payment for erosion control shall be on a lump sum basis.
2. Payment of the lump sum amount for erosion control shall be full compensation for installation, maintenance and removal of the type and quantity of erosion control devices as required and shown on the drawings.

Item No. 7 - Tree and Shrubs Plantings

1. Tree and shrub plantings shall be measured as lump sum for all work as called for on the drawings.
2. The bid price shall be full compensation for furnishing all labor, materials, and equipment required to plant trees and shrubs as indicated on the plans and as directed by the Engineer. Trees, shrubs and other flora disturbed for the Contractor's convenience shall be restored at no additional cost to the Owner.

Item No. 8: Rock Excavation and Disposal

1. Under the unit bid price for this Item, the Contractor shall provide all necessary materials equipment and labor to execute the work as specified and as shown on the drawings.

2. Measurement for payment will be on the basis of cubic yards of ledge or rock excavated as measured by the Engineer.

3. Under the unit price bid for this item, the Contractor shall excavate, remove, and dispose of ledge and rock from trenches and excavated areas. Included in the price bid per cubic yard shall be related costs such as drilling, blasting, and replacement with suitable gravel borrow material, removal, and disposal of excavated material.

Item No. 9 : Furnish and Install 18-inch RCP Storm Drain

1. Storm drain pipe measured for payment under these items shall be the number of linear feet installed measured along the center line of the pipe as laid, regardless of materials of construction. Pipes shall be measured between centers of manholes or structures minus half the inside diameter of each structure. Pipe installed into the structure will not be measured for payment.
2. The contract unit price per linear foot for storm drain pipe installed shall be full compensation for all labor, materials, and equipment necessary to complete this work including excavation, dewatering, bedding, furnishing and installing pipe and fittings, backfill, compaction, cleaning

pipes and sumps, impervious clay and concrete dams, removal and disposal of existing storm drain pipes, catch basins, and drain manholes being replaced, connection to existing piping and structures as required, restoration of surfaces, temporary pavement and all else incidental thereto for which payment is not provided under other items.

Item No. 10: 5-foot Diameter Precast Concrete Manhole

1. The units for measurement for payment under these items shall be the number of precast concrete manholes installed at each location as called for on the drawings.
2. The contract unit price per each drain manhole installed shall be full compensation for all labor, materials, and equipment necessary to complete this work including excavation, dewatering, bedding, furnishing and installing pipe and fittings, backfill, compaction, cleaning pipes and sumps, impervious clay and concrete dams, removal and disposal of existing storm drain pipes, catch basins, and drain manholes being replaced, connection to existing piping and structures as required, restoration of surfaces, temporary pavement and all else incidental thereto for which payment is not provided under other items.

Item No. 11: Precast Concrete Headwall

1. The units for measurement for payment under these items shall be the number of liner feet of precast concrete headwalls and flow control weirs installed at each location as called for on the drawings.
2. The contract unit price per each linear feet of headwall installed shall be full compensation for all labor, materials, and equipment necessary to complete this work including excavation, dewatering, bedding, furnishing and installing pipe and fittings, backfill, compaction, cleaning pipes and sumps, impervious clay and concrete dams, removal and disposal of existing storm drain pipes, catch basins, and drain manholes being replaced, connection to existing piping and structures as required, restoration of surfaces, temporary pavement and all else incidental thereto for which payment is not provided under other items.

Item No. 12: Stone Spillways

1. The units for measurement for payment under these items shall be the number of stone spillways installed at each location as called for on the drawings.
2. The contract unit price per each spillway installed shall be full compensation for all labor, materials, and equipment necessary to complete this work including excavation, dewatering, bedding, backfill, compaction, restoration of surfaces and all else incidental thereto for which payment is not provided under other items.

Item No. 13: Stone Weir Walls

1. The units for measurement for payment under these items shall be the number of linear feet of stone weir wall installed at each location as called for on the drawings.
2. The contract unit price per linear feet of stone weir wall installed shall be full compensation for all labor, materials, and equipment necessary to complete this work including excavation, dewatering, bedding, backfill, compaction, restoration of surfaces and all else incidental thereto for which payment is not provided under other items.

Item Nos. 14: Prefabricated Pedestrian Foot Bridges

1. The units for measurement for payment under these items shall be the number of prefabricated pedestrian foot bridges installed at each location as called for on the drawings.
2. The contract unit price per pedestrian footbridge installed shall be full compensation for all labor, materials, and equipment necessary to complete this work including excavation, dewatering, bedding, backfill, compaction, restoration of surfaces and all else incidental thereto for which payment is not provided under other items.

Item No. 15: Stream J-hooks

1. The units for measurement for payment under these items shall be the number of stream j-hooks installed at each location as called for on the drawings.
2. The contract unit price per stream j-hooks installed shall be full compensation for all labor, materials, and equipment necessary to complete this work including excavation, dewatering, bedding, backfill, compaction, restoration of surfaces and all else incidental thereto for which payment is not provided under other items.

Item No. 16: Stream Cross Veins

1. The units for measurement for payment under these items shall be the number of stream cross veins installed at each location as called for on the drawings.
2. The contract unit price per stream cross veins installed shall be full compensation for all labor, materials, and equipment necessary to complete this work including excavation, dewatering, bedding, backfill, compaction, restoration of surfaces and all else incidental thereto for which payment is not provided under other items.

Item No. 17: Stream Channel

1. The units for measurement for payment under this item shall be the number of linear feet of stream channel installed as called for on the drawings.
2. The contract unit price shall be full compensation for all labor, materials, and equipment necessary to complete this work including excavation, lining, installation of base material, stabilization, plantings, stone placements, dewatering, bedding, backfill, compaction, restoration of surfaces and all else incidental thereto for which payment is not provided under other items.

Item No. 18: Stormwater Wetland Ponds

1. For the lump sum bid price the contractor shall provide for all work necessary to create stormwater wetland ponds as called for on the drawings.
2. The lump sum contract price shall be full compensation for all labor, materials, and equipment necessary to complete this work including excavation, lining, installation of base material, stabilization, plantings, stone placements, dewatering, bedding, backfill, compaction, restoration of surfaces and all else incidental thereto for which payment is not provided under other items.

Item No. 19: Rebuild Existing Pond Berm and Grading

1. For the lump sum bid price the contractor shall provide for all work necessary to rebuild existing pond berm as called for on the drawings.

2. The lump sum contract price shall be full compensation for all labor, materials, and equipment necessary to complete this work including demolition of existing berm, excavation and grading as necessary, dewatering and flow control, foundation, bedding, backfill, compaction, restoration of surfaces and all else incidental thereto for which payment is not provided under other items.

Item No. 20: Management of Contaminated Soils/Fill

1. Management of contaminated soils/fill measured for payment shall be based on the lump sum price stated in the Bid Schedule.
2. Management of contaminated materials and soil/fill shall be paid for at the lump sum price stated in the Bid Schedule. Said unit price shall be full compensation for furnishing all labor, materials, tools, equipment, and incidentals required for managing contaminated materials and soil/fill; segregating, handling, staging, testing, and characterization of all soil and fill material suspected of being contaminated as well as the costs associated with characterizing the destination site as required to assess background conditions; all controls necessary to maintain compliance with regulatory requirements relative to handling contaminated soils and materials; submittal and approval of all required and specified Plans; analytical testing and characterization of all excavated soil and fill material handled; development of a template URAM; health and safety equipment; securing a staging area for stockpiling soil pending analytical testing, reuse, or disposal; protecting the excavation and stockpile areas. All costs related to transporting soils to and, if not disposed of offsite, and reused, from the staging area shall be included for payment in this item; air monitoring; controlling the spread of airborne contaminants; all notifications, fees, permits, and taxes; and all other requirements specified in other sections of the Contract Documents; and all other requirements specified in other sections of the Contract Documents and any other work not covered by other bid items.

Item No. 21: Removal and Disposal of Soil (Class A-1)

1. Removal and Disposal of Soil (Class A-1) measured for payment shall be based on each cubic yard of soil removed and disposed of as measured in place prior to excavation.
2. Soil (Class A-1) removed and disposed of shall be paid for at the unit price per cubic yard stated in the Bid Schedule. Said unit price shall be full compensation for furnishing all labor, materials, tools, equipment, and incidentals required for removal, transportation and disposal of soil (Class A-1); all other requirements specified in other sections of the Contract Documents; and any other work not covered by other bid items.
3. Contractor will not be paid any additional costs under this item resulting from improper removal activities that result in soil contamination.
4. Disposal of material excavated outside of the pay limits as defined elsewhere in the Contract Documents shall be done at the Contractor's expense, at no additional cost to the Owner.

Item No. 22: Removal and Disposal of Excess Contaminated Soil and Waste Materials

1. Payment for the final transport of excess contaminated soil and waste material shall be full compensation for all labor, equipment, and materials necessary to complete the work including environmental controls to safely handle the material, and disposal of the material offsite in accordance with all federal, state, and local regulations. Contractor shall take all reasonable efforts to reuse excavated soils within the project in accordance with 310 CMR 40.0000 Massachusetts Contingency Plan.
2. All work for this item shall be paid based on Contractor's actual costs based on actual invoices submitted for the final transport and disposal of excess soil and waste materials. Contractor will not be paid any additional costs under this item resulting from improper removal activities that result in soil contamination. Disposal of material excavated outside of the pay limits as defined elsewhere in the Contract Documents shall be done at the Contractor's expense, at no additional cost to the Owner. Disposal of Class A-1 soils is not included in this item, and will be paid for under the appropriate pay item.

Item No. 23: Tree Cutting and Stump Grinding

1. Tree Cutting and Stump Removal will be measured for at the Contract lump sum price.

2. The payment will be full compensation for all labor, material, equipment, tools, wood disposal and chipping, cleanup and restoration, damage repair, disposal fees and incidentals necessary to complete the work.

Item No. 24: Stabilization, Loam and Seed

1. Stabilization, loaming and seeding as called for on the Drawings will be measured for at the Contract lump sum price.
2. The payment will be full compensation for all labor, material, equipment, tools, cleanup and restoration incidental thereto for which payment is not provided under other items.

Item No. 25: Police Detail Allowance

1. Uniformed police details will be paid based on actual invoices submitted by the Contractor and will be paid from the Bid Item allocation.
2. Cash allowance as compensation for fees associated with providing uniformed police officer in accordance with the requirements of the City of Waltham Police Department. The cost associated, MUTCD signage, and other traffic control requirements shall be considered incidental to the work. Adjustment to the final cost for this item will be made as follows. Prior to final payment, Contractor shall present all receipts for this work (if not previously presented to the Engineer), and the amount due will be deducted from the allowance.
3. There will be no markup allowed on the police detail invoices.

Item No. 26: Miscellaneous Work and Cleanup

1. Under the lump sum price for this Item, the Contractor shall provide all general construction services, labor, materials, supplies, consumables, and equipment necessary to complete all work required to construct the work identified on the Drawings and in the Specifications, which is not included in all other Bid Items. This shall include, but is not limited to, the following:

    a. Attending the pre-construction conference and all required job progress and community meetings, and coordination of all construction activities with the appropriate local authorities and utilities.
    b. Submission of all schedules, lists, laboratory test results, materials and sources, and shop drawings, photographs before and after construction, as required, in a timely manner to the Engineer for review and approval.
    c. Maintenance and repair of all work for one (1) year period.
    d. Providing a Site-Specific Health and Safety Plan for the Contractor's employees in accordance with the minimum standards set forth in OSHA 29 CFR 1910.120 and 29 CFR 1926.
    e. Implementation of the Health and Safety Plan.
    f. Construction, maintenance, and removal of equipment from any staging or wash down areas.
    g. Erosion Control measures to prevent exposed fill, excavated material, or other materials from washing away or otherwise eroding from slopes or into wetlands.
    h. Preparation of SWPPP and implementation, preparation and submission of an NOI to seek coverage under USEPA NPDES Construction General Permit.
    i. Coordination of all construction activities with the City of Waltham.
    j. Preparation of As-Built Record Drawings
    k. All other project related direct and indirect costs not described above.

2. Payment for this lump sum item will be based on a percentage of the work completed, as determined by the Engineer.

END OF SECTION 01150

SECTION 01170

SPECIAL PROVISIONS

PART 1-GENERAL

1.1 GENERAL OBLIGATIONS OF THE CONTRACTOR

A. General obligations of the Contractor shall be as set forth in the Contract Documents. Unless special payment is specifically provided in the payment paragraphs of the specifications, all incidental work and expense in connection with the completion of work under the Contract will be considered a subsidiary obligation of the Contractor and all such costs shall be included in the appropriate items in the Bid Form in connection with which the costs are incurred.

1.2 SITE INVESTIGATION

A. The Contractor shall satisfy himself/herself as to the conditions existing within the project area, the type of equipment required to perform the work, the character, quality and quantity of the subsurface materials to be encountered insofar as this information is reasonably ascertainable from an inspection of the site, as well as from information presented by the Drawings and Specifications. Any failure of the Contractor to acquaint himself/herself with the available information will not relieve him/her from the responsibility for estimating properly the difficulty or cost of successfully performing the work. The Owner assumes no responsibility for any conclusions or interpretation made by the Contractor on the basis of the information made available by the Owner.

1.3 CONTRACTOR'S EMERGENCY CONTACT AND RESPONSE REQUIREMENT

A. The Contractor will be required to designate a contact person as well as an emergency response crew who can be notified by the City of Waltham and the Engineer during Contract related emergencies, 7 days a week, 24 hours a day throughout the length of this Contract.

B. The name of the designated person, a daytime contact telephone number, an evening contact telephone number, and a portable cellular telephone number must be furnished to the City of Waltham at the pre-construction meeting. In addition, the contact person will be required to carry a City of Waltham approved paging device (beeper) at all times during the Contract. The beeper number shall also be supplied at the pre construction meeting. The Contractor must also provide a mobile cellular telephone that will remain at the construction site during the hours of construction. The phone will be in a location that will allow the Contractor to respond to calls as well as the Owner or Engineer.

C. The contact person shall be required to respond to any City of Waltham notification in this regard within one hour of such notice by calling (781) 314-3844 Upon being

advised by the City of Waltham of the location and nature of the emergency, the Contractor will be required to provide an emergency coordinator or contact at the site within one hour of the initial notification and to mobilize the necessary response crew(s) and have them at the site of the emergency within two hours of the initial notification.

D. The Contractor's failure to comply with the above notification and response requirements shall result in a five-hundred dollar ($500.00) fine for each failure to respond as indicted in 1.3.C. In addition the Contractor shall be liable for any and all damages, liabilities and costs which result from his/her failure to respond to any emergency within the designated time periods. The City of Waltham assumes no responsibility or costs for the Contractor's negligence in complying with these requirements. If the subject fine or other liabilities are not paid by the Contractor upon request, it shall be deducted from any payment(s) which may be due the Contractor by the City of Waltham, solely at the discretion of the City of Waltham.

E. The Contractor shall not use any City of Waltham personnel to fulfill these requirements.

F. This requirement shall be considered an incidental part of the Contract, no matter how many times the Contractor is alerted during this Contract, and no payment will be made for any costs incurred or associated with the emergency contact and response requirements.

1.4 PUBLIC UTILITIES

A. The Contractor shall comply with the requirements of the Commonwealth of Massachusetts Statute - Chapter 82, Section 40, for excavations in public and private property. Compliance shall include the following:

1. The Contractor shall notify public utility companies in writing at least 72 hours (excluding Saturdays, Sundays and legal holidays) but not more than 30 days before excavating in areas where underground utility plant (pipes, cables, manholes, etc) exist.

2. The Contractor shall be responsible for providing the Utility Companies with a schedule of his/her activities in areas where the utilities exist.

3. The Contractor shall immediately notify utility companies of any damage to their utilities resulting from construction operations.

4. The express approval of the Owner shall be obtained before public water is used. Hydrants shall only be operated under the supervision of the Owner's personnel. The water is to be metered. A meter must be attained by the Water Division. The Contractor will be responsible for all associated fees and charges for water use.

B. The Contractor shall notify DIGSAFE at 1-800-322-4844 at least 72 hours before digging, trenching, blasting, demolishing, boring, backfilling, grading, landscaping or other earth moving operations in any public ways, rights of way and easements.

1.5 PERMITS

A. The Contractor shall be required to obtain all necessary permits for proper execution of certain phases of the project. The Contractor shall fill out all forms and furnish all drawings required to obtain the permits. A copy of the approved permit shall be submitted to the Engineer. All fees associated with these permits shall be paid by the Contractor as part of the project. Work shall not commence on any phase of the work requiring a permit until the permit is obtained.

B. The Contractor shall obtain the required street opening permit from the Department of Public Works for excavations within the street or sidewalk area.

1.6 TRAFFIC AT STREET INTERSECTIONS

A. The Contractor shall minimize interferences with the normal flow of traffic. The Contractor shall take all actions ordered by the Engineer to minimize the disruption of normal traffic flow.

PART 2 -PRODUCTS (NOT USED)

PART 3- EXECUTION (NOT USED)

END OF SECTION 01170

SECTION 01200

PROJECT MEETINGS

PART 1-GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.

1.2 COORDINATION WITH THE CITY

A. As part of this Contract, the Contractor shall coordinate his activities with the City. In addition, the Contractor will give the City significant notice on any work that may be required to meet the contract schedule.

1.3 PRECONSTRUCTION CONFERENCE

A. A pre-construction conference will be held between the Contractor, the Engineer, the Owner, and applicable agency representatives to review the Contractor's proposed methods of complying with the requirements of the Contract Documents.

B. Contractor will be notified of the time, date and place where the pre-construction conference will be held.

1.4 PROGRESS MEETINGS WITH ENGINEER

A. In addition to other regular project meetings for other purposes (as indicated elsewhere in the Contract Documents), hold general progress meetings twice each month with times coordinated with preparation of payment requests. Meeting dates shall be established by the Engineer. Require every entity then involved in the planning, coordination or performance of work to be properly represented at each meeting. Include (when applicable) consultants, separate contractors (if any), principal subcontractors, suppliers/ manufacturers/fabricators, governing authorities, insurers, special supervisory personnel and others with an interest or expertise in the progress of the work Review each entity's present and future needs including interface requirements, time, sequence, deliveries, access, site utilization, temporary facilities and services, hours of work, hazards and risks, housekeeping, submittals, change orders, and documentation of information for payment requests. Discuss whether each element of current work is ahead of schedule. Determine how behind-time work will be expedited, and secure commitments from the entities involved in doing so. Discuss whether schedule revisions are required to ensure that current and subsequent work will be completed within the Contract Time. Review everything of significance which could affect the progress of the work.

B. Within seven days after each progress meeting date, the Engineer will forward copies of the minutes-of-the-meeting, to the Contractor.

C. Immediately following each progress meeting where revisions to the Progress Schedule/Critical Path Schedule have been made or recognized (regardless of whether agreed to by each entity represented), revise the Schedule. Reissue revised Schedule within 10 days after meeting. At intervals matching the preparation of payment requests, revise and reissue the Schedule to show actual progress of the work in relation to the latest revision of the Schedule.

PART 2- PRODUCTS (NOT USED)

PART 3- EXECUTION (NOT USED)

END OF SECTION 01200

SECTION 01300

SUBMITTALS

PART 1- GENERAL

1.1 DESCRIPTION OF REQUIREMENTS

A. This Section specifies the general methods and requirements of submissions applicable to the following work-related submittals: Shop Drawings, Product Data, Samples, Construction Photographs, and Construction Schedules. Additional general submission requirements are contained in Paragraphs 6.24 and 6.25 of the General Conditions. Detailed submittal requirements will be specified in the technical specifications sections.

B. All submittals shall be clearly identified by reference to Specification Section, Paragraph, Drawing No. or Detail as applicable. Submittals shall be clear and legible and of sufficient size for sufficient presentation of data.

1.2 SHOP DRAWINGS PRODUCT DATA, SAMPLES

A. Shop Drawings

1. Shop drawings, as defined in the General Conditions, and as specified in individual work Sections include, but are not necessarily limited to, custom-prepared data such as fabrication and erection/installation (working) scheduled information, setting diagrams, actual shopwork manufacturing instructions, custom templates, special. wiring diagrams, coordination drawings, individual system or equipment inspection and test reports including performance curves and certifications, as applicable to the Work.

2. All shop drawings submitted by subcontractors for approval shall be sent directly to the Contractor for checking. The Contractor shall be responsible for their submission at the proper time so as to prevent delays in delivery of materials.

3. The Contractor shall check all subcontractor's shop drawings regarding measurements, size of members, materials, and details to satisfy himself that they conform to the intent of the Drawings and Specifications. Shop drawings found to be inaccurate or otherwise in error shall be returned to the subcontractors for correction before submission thereof.

4. All details on shop drawings submitted for approval shall show clearly the relation of the various parts to the main members and lines of the structure, and where correct fabrication of the work depends upon field measurements, such measurements shall be made and noted on the drawings before being submitted for approval.

5. Submittals for equipment specified under Division 2 shall include a listing of all installations where identical or similar equipment has been installed and been in operation for a period of at least one year.

B. Product Data

1. Product data as specified in individual Sections, include, but are not necessarily limited to, standard prepared data for manufactured products (sometimes referred to as catalog data), such as the manufacturer's product specification and installation instructions, availability of colors and patterns, manufacturer's printed statements of compliance's and applicability, roughing in diagrams and templates, catalog cuts, product photographs, standard wiring diagrams, printed performance curves and operational-range diagrams, production or quality control inspection and test reports and certifications, mill reports, product operating and maintenance instructions and recommended spare-parts listing and printed product warranties, as applicable to the Work.

C. Samples

1. Samples specified in individual Sections, include, but are not necessarily limited to, physical examples of the work such as sections of manufactured or fabricated work, small cuts or containers of materials, complete units of repetitively-used products, color/texture/pattern swatches and range sets, specimens for coordination of visual effect, graphic symbols and units of work to be used by the Engineer or Owner for independent inspection and testing, as applicable to the Work.

1.3 CONTRACTOR'S RESPONSIBILITIES

A. The Contractor shall review shop drawings, product data and samples, including those by subcontractors, prior to submission to determine and verify the following:

1. Field measurements

2. Field construction criteria

3. Catalog numbers and similar data

4. Conformance with the Specifications

B. Each shop drawing, sample and product data submitted by the Contractor shall have affixed to it the following Certification Statement including the Contractor's Company name and signed by the Contractor: "Certification Statement: by this submittal, I hereby represent that I have determined and verified all field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data and I have checked and coordinated each item with other applicable approved shop drawings and all Contract requirements." Shop drawings and product data sheets 11-in x 17-in and smaller shall be bound together in an orderly fashion and bear the above Certification Statement on the cover sheet. The cover sheet shall fully describe the packaged data and

include a listing of all items within the package. Provide to the Resident Project Representative a copy of each submittal transmittal sheet for shop drawings, product data and samples at the time of submittal of said drawings, product data and samples to the Engineer.

C. The review and approval of shop drawings, samples or product data by the Engineer shall not relieve the Contractor from his/her responsibility with regard to the fulfillment of the terms of the Contract. All risks of error and omission are assumed by the Contractor and the Engineer will have no responsibility therefor.

D. No portion of the work requiring a shop drawing, sample, or product data shall be started nor shall any materials be fabricated or installed prior to the approval or qualified approval of such item. Fabrication performed, materials purchased or on- site construction accomplished which does not conform to approved shop drawings and data shall be at the Contractor's risk. The Owner will not be liable for any expense or delay due to corrections or remedies required to accomplish conformity.

E. Project work, materials, fabrication, and installation shall conform with approved shop drawings, applicable samples, and product data.

1.4 SUBMISSION REQUIREMENTS

A. Make submittals promptly in accordance with approved schedule, and in such sequence as to cause no delay in the Work or in the work of any other contractor.

B. Each submittal, appropriately coded, will be returned within 30 working days following receipt of submittal by the Engineer.

C. Number of submittals required:

1. Shop Drawings as defined in Paragraph 1.2 A: Six copies.

2. Product Data as defined in Paragraph 1.2 B: Three copies.

3. Samples: Submit the number stated in the respective Specification Sections.

D. Submittals shall contain:

1. The date of submission and the dates of any previous submissions.

2. The Project title and number.

3. Contractor identification.

4. The names of:

a. Contractor

b. Supplier

c. Manufacturer

5. Identification of the product, with the specification section number, page and paragraph(s).

6. Field dimensions, clearly identified as such.

7. Relation to adjacent or critical features of the Work or materials.

8. Applicable standards, such as ASTM or Federal Specification numbers.

9. Identification of deviations from Contract Documents.

10. Identification of revisions on resubmittals.

11. An 8-in x 3-in blank space for Contractor and Engineer stamps.

1.5 REVIEW OF SHOP DRAWINGS, PRODUCT DATA, WORKING DRAWINGS AND SAMPLES

A. The review of shop drawings, data, and samples will be for general conformance with the design concept and Contract Documents. They shall not be construed:

1. as permitting any departure from the Contract requirements;

2. as relieving the Contractor of responsibility for any errors, including details, dimensions, and materials;

3. as approving departures from details furnished by the Engineer, except as otherwise provided herein.

B. The Contractor remains responsible for details and accuracy, for coordinating the work with all other associated work and trades, for selecting fabrication processes, for techniques of assembly, and for performing work in a safe manner.

C. If the shop drawings, data or samples as submitted describe variations and show a departure from the Contract requirements which Engineer finds to be in the interest of the Owner and to be so minor as not to involve a change in Contract Price or time for performance, the Engineer may return the reviewed drawings without noting an exception.

D. Submittals will be returned to the Contractor under one of the following codes.

Code 1 - "NO EXCEPTION TAKEN" is assigned when there are no notations or comments on the submittal. When returned under this code the Contractor may release the equipment and/or material for manufacture.

Code 2 - "MAKE CORRECTIONS AS NOTED". This code is assigned when a confirmation of the notations and comments IS NOT required by the Contractor. The Contractor may release the equipment or material for manufacture; however, all notations and comments must be incorporated into the final product.

Code 3 - "SUBMIT SPECIFIED ITEM". This combination of codes is assigned when a confirmation of the notations and comments IS required by the Contractor. This confirmation shall specifically address each omission and nonconforming item that was noted. Confirmation is to be received by the Engineer within I 0 calendar days of the date of the Engineer's transmittal requiring the confirmation.

Code 4 - "REVISE AND RESUBMIT". This combination of codes is assigned when notations and comments are extensive enough to require a resubmittal of the package. This resubmittal is to address all comments, omissions and non-conforming items that were noted. Resubmittal is to be received by the Engineer within I 0 calendar days of the date of the Engineer's transmittal requiring the resubmittal.

Code 5 - "REJECTED" is assigned when the submittal does not meet the intent of the Contract Documents. The Contractor must resubmit the entire package revised to bring the submittal into conformance. It may be necessary to resubmit using a different manufacturer/vendor to meet the Contract Documents.

E. Resubmittals will be handled in the same manner as first submittals. On resubmittals the Contractor shall direct specific attention, in writing on the letter of transmittal and on resubmitted shop drawings by use of revision triangles or other similar methods, to revisions other than the corrections requested by the Engineer, on previous submissions. Any such revisions which are not clearly identified shall be made at the risk of the Contractor. The Contractor shall make corrections to any work done because of this type revision that is not in accordance to the Contract Documents as may be required by the Engineer.

F. Partial submittals may not be reviewed. The Engineer will be the only judge as to the completeness of a submittal. Submittals not complete will be returned to the Contractor, and will be considered "Rejected" until resubmitted. The Engineer may at his/her option provide a list or mark the submittal directing the Contractor to the areas that are incomplete.

G. If the Contractor considers any correction indicated on the shop drawings to constitute a change to the Contract Documents, the Contractor shall give written notice thereof to the Engineer at least seven working days prior to release for manufacture.

H. When the shop drawings have been completed to the satisfaction of the Engineer, the Contractor shall carry out the construction in accordance therewith and shall make no further changes therein except upon written instructions from the Engineer.

1.6 DISTRIBUTION

A. Distribute reproductions of approved shop drawings and copies of approved product data and samples, where required, to the job site file and elsewhere as directed by the Engineer. Number of copies shall be as directed by the Engineer but shall not exceed 6.

1.7 CONSTRUCTION PHOTOGRAPHS

A. Where directed by the Engineer, the Contractor shall have an average of 20 color photographs per month made of the work during its progress and 20 color photographs of the completed facilities. The photographs shall be of such views and taken at such times as the Engineer directs. Photographs shall be taken at each property.

B. All photographic work shall be done by a qualified, established commercial photographer acceptable to the Engineer. Three prints of each photograph shall be furnished promptly to the Engineer, and each print shall have a glossy finish and be mounted in plastic sleeving on a substantial backing. The overall dimensions of each mounted print shall be 8 x 10-in with 1-1/4-in flexible binding margin on the long top side to permit storage in standard 3-ring binders.

C. The film negatives shall be retained in the files of the photographer until the completion of the project and shall then be turned over to the Owner.

D. Each photograph shall have attached to the backing a paper label, approximately 2-114-in wide by 1-3/4-in high containing thereon in neat lettering;

1. Contractor's name

2. Short Description of View

3. Photo No. and

4. Photographer's Firm Name

1.8 SCHEDULES

A. Provide all schedules required by Articles 2.6, 2.9, 14.1, and elsewhere in the General Conditions.

B. The Contractor shall submit a progress schedule before starting any work, in accordance with Article 2.6 of the General Conditions. The Contractor shall review the progress schedule with the Engineer periodically. Such review shall be made on a monthly basis or more frequently as required by the Engineer. The progress schedule shall be updated as required by the Engineer.

1.9 "OR EQUAL"

A. Should the Contractor seek approval of a product other than the brand or brands named in these specifications, it shall furnish written evidence that such product conforms in all respects to the specified requirements, and that it has been used successfully elsewhere under similar conditions. Where the specified requirements involve conformance to recognized codes or standards the Contractor shall furnish evidence of such conformance in the form of test or inspection reports, prepared by a recognized agency, and baring an authorized signature.

B. Manufacturers' standard data and catalog cut sheets will not be considered sufficient in themselves, and the Engineer will not be responsible for seeking further data from the manufacturer, or for otherwise researching the product. Failure to provide complete data will be cause for rejection of the product.

C. The Contractor shall be responsible for all additional costs including license fees, foundation, piping and electrical work necessary to accommodate the proposed "or equal" equipment. Items which result in a cost reduction shall be presented and a change order reflecting 65% of the cost savings will be prepared and the contract price modified.

1.10 PROFESSIONAL ENGINEER (P.E.) CERTIFICATION FORM

A. If specifically required in other Sections of these Specifications, the Contractor shall submit a P.E. Certification for each item required, in the form attached to this Section, completely filled in and stamped.

1.11 GENERAL PROCEDURES FOR SUBMITTALS

A. Coordination of Submittal Times: Prepare and transmit each submittal sufficiently in advance of performing the related work or other applicable activities, or within the time specified in the individual work sections, of the Specifications, so that the installation will not be delayed by processing times including disapproval and resubmittal (if required), coordination with other submittals, testing, purchasing, fabrication, delivery and similar sequenced activities. No extension of time will be authorized because of the Contractor's failure to transmit submittals sufficiently in advance of the Work.

PART 2- PRODUCTS (NOT USED)

PART 3- EXECUTION (NOT USED)

END OF SECTION 01300

SECTION 01310

CONSTRUCTION SCHEDULES

PART 1 - GENERAL

M¢M DESCRIPTION

!¢ Work Included: Within ten (10) days after the effective date of the Agreement between Owner and Contractor submit to the Engineer an estimated progress schedule as specified herein.

.¢ Form of Schedules:

1. Narrative: Completely describe the construction methods to be employed.
2. Network Analysis System (Gantt Chart):
    a. Provide a separate horizontal schedule line for each trade or operation and show concurrent and preceding activities.
    b. Present in chronological order the beginning of each trade or operation showing duration and float time.
    c. Scale: Identify key dates and allow space for updating and revision.
3. Mathematical Analysis:
    a. A mathematical analysis shall accompany the network diagram. A computer printout will be acceptable.
    b. Information shall be included on activity numbers, duration, early start, late start, etc. and float times.
4. The schedule shall be developed using Microsoft Project or other scheduling software approved by the ENGINEER and OWNER.

/¢ Content of Schedules:

1. Provide complete sequence of construction by activity:
    a. Shop Drawings, Project Data and Samples:
        1) Submittal dates.
        2) Dates reviewed copies will be required.
    b. Decision dates for:
        1) Products specified by allowances.
        2) Selection of finishes.
    c. Estimated product procurement and delivery dates.
    d. Dates for beginning and completion of each element of construction.
2. Identify work of separate phases and logically grouped activities.
3. Show the projected percentage of completion for each item of work as of the first day of each month.
4. Provide separate sub-schedules, if requested by the Engineer, showing submittals, review times, procurement schedules, and delivery dates.

5¢ Updating:

1. Show all changes occurring since previous submission.
2. Indicate progress of each activity, show completion dates.
3. Include:
    a. Major changes in scope.
    b. Activities modified since previous updating.
    c. Revised projections due to changes.
    d. Other identifiable changes.
4. Provide narrative report, including:

a. Discussion of problem areas, including current and anticipated delay factors.
b. Corrective action taken, or proposed.
c. Description of revisions that may affect schedules.

M◊H SUBMITTALS

!◊ Submit schedules in electronic format and hard copy as follows:
1. Prior to start of work
2. Bi-weekly
3. When there are changes in the schedule
4. With each progress payment request

.◊ Submit 4 copies of initial and updated schedules to the Engineer.

END OF SECTION 01310

SECTION 01320

SAFETY AND HEALTH PLAN

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Included:

1. The Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the work, as outlined herein and in the General and Special Conditions of the Contract Documents. Within (10) days after the effective date of the Agreement between Owner and Contractor, submit to the Engineer a Safety and Health Plan as specified herein.
2. Contractor shall comply with all applicable Laws and Regulations related to the safety of persons or property, or for the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection.
3. Contractor shall designate a qualified and experienced safety representative (OSHA defined "Competent Person") at the site whose duties and responsibilities shall be the prevention of accidents and maintaining and supervising of safety precautions and programs, including a "Job Hazards Analysis".
4. The Contractor shall be solely responsible to provide all labor, equipment, and utilities sufficient to ensure no construction noise, particulates, or odors, are allowed to accumulate to levels which adversely affect health or work in, or near the construction area.

B. Content of Safety and Health Plan:

1. Prepare complete safety and health plan in accordance with the requirements of CFR Title 29 Part 1926 - Safety and Health Regulations for Construction.
   a. Provide documentation that Contractor's hazardous communication program is up to date.
   b. Provide documentation that Contractor's safety training is up to date.
   c. Prepare a project specific Safety and Health Plan addressing construction safety issues, including but not limited to excavations, fall protection and egress, excavation adjacent to existing utilities, traffic and pedestrian safety, materials handling, and other potential safety issues.
2. Safety provisions for confined space entry shall follow General Industry Standard CFR Title 29 Part 1910.146 and will be incorporated into the Safety and Health Plan.
   a. The Contractor shall be responsible for all aspects of construction site safety including development of appropriate confined space entry procedures. The plan shall include, but not necessarily be limited to, the following:
      - Definitions
      - Confined Space Evaluations
      - Equipment Selection
      - Confined Space Entry Training Documentation
      - Permit Required Confined Space Entry Requirements
      - Testing (Monitoring) and Ventilation
      - Confined Space Entry Permit Form
      - Rescue and Emergency Procedures
      - Emergency Contact Information

ō The Contractor shall inform the Owner and Engineer's representative whenever work will be performed in a confined space and the permit space program that the Contractor will follow.

Ŏ The Contractor shall inform the Owner and Engineer's representative of any hazards confronted or created during entry operations, either through a briefing or during the entry operation.

Ř The Contractor will coordinate entry operations with the Owner when both Owner personnel and Contractor personnel will be working in or near permit spaces.

Ŝ The Owner, Engineer, their representatives, independent testing laboratories and government agencies, when inspecting the site, shall be supplied by the Contractor proper safety equipment when entry into a confined space is required.

/ Updating:

M Contractor shall be responsible for updating the Safety and Health Plan as appropriate throughout the course of the construction period.

M H SUBMITTALS

! **Contractor shall be responsible for all aspects of construction site safety.** Provide 3 copies of the Contractor's site specific Safety and Health Plan to the Engineer. The Safety and Health Plan is provided for information only to inform the Owner, Engineer (and Resident Project Representative) of the project specific safety program requirements. The Contractor will overview the plan with the Owner (and staff), Engineer (and Resident Project Representative) at the beginning of the project, and subsequently when the safety plan is updated.

. Provide updated Safety and Health Plans as necessary during the course of the project.

/ Contractor's most current Safety and Health Plan shall be available at the construction site throughout the construction project.

M O ON-SITE COORDINATION MEETINGS

! Contractor shall review key aspects of Safety and Health Plan at the Pre-Construction Meeting, and subsequent on-site safety informational meeting.

. Contractor shall report to Engineer and Owner at each progress meeting concerning compliance with the Safety and Health Plan for the most recent construction period and new considerations and requirements for the upcoming period.

END OF SECTION

SECTION 01370

SCHEDULE OF VALUES

PART 1 - GENERAL

M.M DESCRIPTION

!. Extent of Work:

M. Provide a detailed breakdown of the agreed Contract Sum showing values allocated to each of the various parts of the Work, as specified herein and in other provisions of the Contract Documents.

.. Related Work Specified Elsewhere:

M. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, and Sections of these Specifications.

H. Schedule of values is required under the General Conditions.

O. Schedule of values is required to be compatible with applications for progress payment.

M.H QUALITY ASSURANCE

!. Use required means to assure arithmetical accuracy of the sums described.

.. When so required by the Engineer, provide copies of the subcontracts or other data acceptable to the Engineer substantiating the sums described.

M.O SUBMITTALS

!. Prior to first application for payment, submit a proposed schedule of values to the Engineer.

M. Secure the Engineer's approval of the schedule of values prior to submitting first application for payment.

END OF SECTION 01370

SECTION 01380

CONSTRUCTION PHOTOGRAPHS

PART 1 - GENERAL

M¢M DESCRIPTION

!¢ Work Included:

M¢ Pre-Construction Record: Contractor shall utilize digital photographs and video to obtain a visual record of the project area; copies of same shall be given to the Engineer and Owner.

H¢ Notify Engineer at least three (3) working days prior to photographing or videoing the project area so Engineer may, at his option, observe.

M¢H QUALITY

!¢ Pre-Construction Record: Quality shall be such that the condition of existing pavement, curbing, driveway entrances, sidewalks, etc. can be readily determined.

M¢O SUBMITTAL OF PRINTS

!¢ Pre-Construction Record: Submit hard copy prints and electronic files on CD ROM, and video electronic files on DVD to the Engineer and Owner prior to any construction work.

.¢ The quality of the photos and video are subject to approval by the Engineer prior to the start of construction work in the areas shown by the photos.

END OF SECTION 01380

SECTION 01400

QUALITY ASSURANCE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

A. This section covers Quality Assurance and Control requirements for this contract.

B. The Contractor is responsible for controlling the quality of work, including work of its subcontractors, (filed sub-bidders) and suppliers and for assuring the quality specified in the Technical Specifications is achieved.

C. Refer to the Article 6 - Contractor's Responsibilities, paragraphs 6.01 6.02, 6.03, of the GENERAL CONDITIONS.

1.3 TESTING LABORATORY SERVICES

A. All tests which require the services of a laboratory to determine compliance with the Contract Documents, shall be performed by an independent commercial testing laboratory acceptable to the Engineer. The laboratory must be certified by the Commonwealth of Massachusetts for the parameters tested and required under the project. The laboratory shall be staffed with experienced technicians, properly equipped, and fully qualified to perform the tests in accordance with the specified standards.

B. Preliminary Testing Services: Unless otherwise specified, the Contractor shall be responsible for all testing laboratory services in connection with concrete materials and mix designs, the design of asphalt mixtures, gradation tests for structural and embankment fills, backfill materials, and all other tests and engineering data required for the Engineer's review of materials and equipment proposed to be used in the Work. The Contractor shall obtain the Engineer's acceptance of the testing laboratory before having services performed, and shall pay all costs for services.

C. Quality Control Testing Services: Perform all quality control tests in the field or in the laboratory on concrete, asphalt mixtures, moisture density (Proctor) gradation tests on structural and embankment fills, and backfill materials, in-place field density tests on structural and embankment fills, and other materials and equipment, during and after their incorporation in the Work. Field sampling and testing shall be performed in the general manner indicated in the specifications, with minimum interference with construction operations. The Engineer shall determine the exact time and location of field sampling and testing, and may require such additional sampling and

testing as necessary to determine that materials and equipment conform with data previously furnished by Contractor and with the Contract Documents.

D. Arrangements for delivery of samples and test specimens to the testing laboratory will be made by the Contractor. The laboratory tests shall be performed within a reasonable time consistent with the specified standards. Furnish a written report of each test to the Engineer.

E. Contractor shall furnish all sample materials and cooperate in the sampling and field testing activities, interrupting the Work when necessary. When sampling or testing activities are performed in the field, the Contractor shall furnish personnel and facilities to assist in the activities.

F. The Contractor shall not retain any testing laboratory against which the Owner or the Engineer have reasonable objection, and if at any time during the construction process the services become unacceptable to the Owner, or the Engineer, either the Owner or the Engineer may direct in writing that such services be terminated. The request must be supported with evidence of improper testing or unreasonable delay. If the Engineer determines that sufficient cause exists, the Contractor shall terminate the services and engage a different testing laboratory.

G. Transmittal of Test Reports: Written reports of testing and engineering data furnished by the Contractor for the Engineer's review of materials and equipment proposed to be used in the Work shall be submitted as specified for Shop Drawings.

H. The testing laboratory shall furnish four copies of a written report of each test performed by laboratory personnel in the field or laboratory to the Contractor. Distribution shall be two copies of each test report to the Engineer's Representative, one copy to the Owner, and one copy for the Contractor within three days after each test is completed.

1.4 QUALITY ASSURANCE

A. Codes and Standards: Refer to Article 3 .. Contract Documents, Intent, Amending, Reuse, paragraph 3.3 of the General Conditions.

Copies of applicable referenced standards are not included in the Contract Documents. Where copies of standards needed by the Contractor for Superintendence and quality control of the work, the Contractor shall obtain a copy or copies directly from the publication source and maintain at the jobsite, available to the Contractor's personnel, subcontractors, and Engineer.

B. Quality of Materials: Unless otherwise specified, all materials and equipment furnished for permanent installation in the Work shall conform to applicable standards and specifications and shall be new, unused, and free from defects and imperfections, when installed or otherwise incorporated in the Work. Material and equipment shall not be used by the Contractor for any purpose other than that intended or specified unless such use is authorized by the Engineer.

C. Where so specified, products or workmanship shall also conform to the additional performance requirements included within the Contract Documents to establish a higher or more stringent standard or quality than that required by the referenced standard.

1.5 OFFSITE INSPECTION

A. When the specifications require inspection of materials or equipment during the production, manufacturing, or fabricating process, or before shipment, such services shall be performed by an independent testing laboratory, or inspection organization acceptable to Engineer in conjunction with or by the Engineer.

B. The Contractor shall give appropriate written notice to the Engineer not less than 30 days before offsite inspection services are required, and shall provide for the producer, manufacturer, or fabricator to furnish safe access and proper facilities and to cooperate with inspecting personnel in the performance of their duties.

C. The inspection organization shall submit a written report to the Contractor who shall provide copies to the Engineer.

1.6 MATERIALS AND EQUIPMENT

A. The Contractor shall maintain control over procurement sources to ensure that materials and equipment conform to specified requirements in the Contract Documents.

B. The Contractor shall comply with manufacturer's printed instructions regarding all facets of materials and/or equipment movement, storage, installation, testing, startup, and operation. Should circumstances occur where the contract documents are more stringent than the manufacturer's printed instructions, the Contractor shall comply with the specifications. In cases where the manufacturer's printed instructions are more stringent than the contract documents, the Contractor shall advise the Engineer of the disparity and conform to the manufacturer's printed instructions. In either case, the Contractor is to apply the more stringent specification or recommendation, unless approved otherwise by the Engineer.

1.7 SHOP AND FIELD TESTING

A. The Contractor is also responsible for providing the shop and field testing specified in the technical specifications sections.

B. The Contractor and its Subcontractor shall perform inspections, tests, and other services as required by the Contract Documents.

C. Contractor shall provide twenty one days notice to the Engineer so that the Engineer may witness Contractor and for Subcontractors off site and on site tests. The Engineer's witnessing of tests does not relieve the Contractor and/or Subcontractors of their obligation to comply with the requirements of the Contract Documents.

1.8 MANUFACTURER’S FIELD SERVICES

A. When specified in the technical specifications sections, the Contractor shall arrange for and provide technical representation from manufacturers of respective equipment, items or components. The manufacturer's representative shall be a factory trained service engineer/technician with the type and length of experience specified in the technical specifications.

B. Services Furnished Under This Contract: An experienced, competent, and authorized factory trained service engineer/technician representative of the manufacturer of each item of equipment for which field services are indicated in the specifications shall visit the site of the Work and inspect, operate, test, check, adjust if necessary, and approve the equipment installation. In each case, the manufacturer's service representative shall be present when the equipment is placed in operation. The manufacturer's service representative shall revisit the jobsite as often as necessary until all problems are corrected and the equipment installation and operation are satisfactory to the Engineer.

1.9 CERTIFICATION FORMS AND CERTIFICATES

A. The Contractor shall be responsible for submitting the certification forms and certificates in conformance with the requirements specified in Section 01300 - Submittals.

PART 2 -PRODUCTS (NOT USED)

PART 3- EXECUTION

3.1 QUALITY CONTROL

A. Quality control is the responsibility of the Contractor, and the Contractor shall maintain control over construction and installation processes to assure compliance with specified requirements.

B. Certifications for personnel) procedures, and equipment associated with special processes (e.g., welding, cable splicing, instrument calibration, surveying) shall be maintained in the Contractor's field office, available for inspection by the Engineer. Copies will made available to the Engineer upon request.

C. Means and methods of construction and installation processes are the responsibility of the Contractor, and at no time is it the intent of the Engineer or Owner to supersede or void that responsibility.

END OF SECTION 01400

SECTION 01500

TEMPORARY FACILITIES AND CONTROL

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Included:

1. Provide and pay for all temporary applicable utilities required to properly perform the Work at no additional cost to the Owner including the placement and removal of the utilities.
2. Completely remove all temporary equipment and materials upon completion of the Work and repair all damage caused by the installation of temporary utilities.
3. Make all necessary applications and arrangements for electric power, light, water and other utilities with the local utility companies. Notify the local electric power company if unusually heavy loads, such as welders, will be connected.

1.02 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies:

1. Obtain permits as required by local governmental authorities.
2. Obtain easements, when required, across private property other than that of the Owner for temporary power service.
3. Comply with the latest National Electrical Code.
4. Comply with all local, State and Federal codes, laws, and regulations.

B. All temporary utilities are subject to the approval of the Engineer.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Electrical:

1. The General Contractor shall make necessary arrangements with the local power company for connection to the existing power supply and shall provide and pay for all temporary light and power requirements except as otherwise specified hereunder. In general, the temporary electrical service shall include all necessary switches, poles, wiring, cables, conduit, raceways, panelboards, fixtures, lamps and receptacles to supply construction power of adequate capacity for the project. Temporary transformers and meters shall be furnished and installed by the appropriate power authority, but paid for by the General Contractor, who shall be responsible for making all arrangements for their installation prior to using any existing power for temporary purposes.
2. The General Contractor will pay for the cost of energy consumed by all trades, including cost of lamp replacement. The General Contractor and Subcontractors of all trades shall furnish their own extension cords and such additional lamps as may be required for their work, shall pay for the cost of temporary wiring of a special nature for light and power required, other than that above mentioned.
3. All temporary work shall be furnished and installed in conformity with the National Electrical Code and in accordance with local ordinances and

requirements of the municipal power authority. All temporary wiring and accessories shall be removed after it has served its purpose.

B. Heating:
   1. The General Contractor shall furnish, install, and maintain a complete temporary heating system, including fuel therefore, which will provide heat and ventilation as required by the trades and for the protection of stored and installed materials from injury as can be caused by dampness and cold. The General Contractor shall employ, within the terms of the General Contract, a competent watchman who will maintain and operate the systems, as required. The General Contractor shall bear all costs incurred from the temporary heating and ventilation from the time the systems are first required until the date of Substantial Completion of the General Contract, as defined in the General Conditions and Supplementary Conditions.

C. Water and Sanitary:
   1. The General Contractor shall make necessary arrangements for connection to the municipal water supply and shall provide, at his own expense, any extensions as required for the operation of this project. The General Contractor shall bear all costs incurred for the temporary water services, including the costs of the water itself.
   2. All lines, temporary or permanent, shall be protected and maintained by the General Contractor. Temporary lines shall be removed by the General Contractor when the temporary service is no longer required.
   3. The General Contractor shall provide an adequate drinking water supply, satisfactorily cooled, for his employees.
   4. See Site Plan for nearest water hook-up.
   5. The General Contractor shall furnish, install, maintain and pay for adequate temporary chemical type toilet accommodations, for all persons employed on the work and located where approved by the Engineer. The accommodations shall be in proper enclosures and in accordance with Municipal Ordinances and shall be maintained in proper, safe and sanitary conditions and suitably heated when requested.
   6. Relocate temporary toilet facilities as required to facilitate the construction.
   7. Remove all temporary facilities at completion of work when directed by the Engineer.

PART 3 - EXECUTION

3.1 PERFORMANCE

A. Electrical:
   1. Provide electrical energy to:
      a. All necessary points on the construction site so that power can be obtained at any desired point with extension cords no longer than 100 feet.
      b. Construction site offices.
      c. Lighting as required for safe working conditions at any location on the construction site.
      d. Night security light.
      e. When applicable, Owner's present facilities during the changeover of electrical equipment.

H. Capacity:

Provide and maintain adequate electrical service for construction use by all trades during the construction period at the locations necessary, as specified herein.

O. Installation:

I. Install all work with a neat and orderly appearance.

O. Have all installations performed by a qualified electrician.

O. Modify service as job progress requires.

R. Locate all installations to avoid interference with cranes and materials handling equipment, storage areas, traffic areas and other work.

. Heating:

M. Maintain a heated environment for the work at the temperature and for the length of time specified or as directed by the Engineer.

H. Precaution:

I. Operate temporary heating apparatus in such a manner that finished work will not be damaged.

O. Repair all damage, caused by temporary heating operations, to the complete satisfaction of the Engineer.

/. Water:

M. Provide and maintain water for drinking and construction purposes as required for the proper execution of the Work.

5. Sanitary Accommodations:

M. Provide and maintain sanitary accommodations for the use of the employees of the General Contractor, subcontractors, and Engineer.

H. Sanitary accommodations shall meet the requirements of all local, State and Federal health codes, laws and regulations.

END OF SECTION 01500

SECTION 01562

DUST CONTROL

PART 1 - GENERAL

M¢M DESCRIPTIONS

!¢ Work Included:

M¢ Contractor to have watering equipment on site throughout construction duration.

H¢ Furnish and apply water on the road surfaces within the construction site, at a minimum of two times per day, to control dust and when directed by the Engineer.

O¢ When dust control is not included as a separate item in the Contract, the work shall be considered incidental to the appropriate items of the Contract.

PART 2 - PRODUCTS

H¢M MATERIALS

!¢ Water for Sprinkling:

.¢ Clean, free of salt, oil, and other injurious matter.

PART 3 - EXECUTION

O¢M APPLICATION

!¢ Water:

M¢ Apply water by methods approved by the Engineer.

H¢ Use approved equipment including a tank with gauge equipped pump and spray bar.

END OF SECTION 01562

SECTION 01570

TRAFFIC REGULATION

PART 1 - GENERAL

M¢M DESCRIPTION

!¢ Work Included:

- M¢ Provide all materials and perform all work necessary to completely regulate traffic in the area of Work.
- H¢ Perform all work in such a manner as to provide safe passage at all times for the public and with a minimum of obstruction to traffic.
- O¢ Do not close roads or streets to passage of the public without the permission of the proper authorities.
- Π¢ Refer to Section 01010 Summary of Work for additional requirements.

.¢ The local police department will decide if safe passage is being maintained and shall have the authority to require the Contractor to take any additional steps necessary to maintain safe passage.

/¢ Minimize the length of delays or traffic stoppage to the extent practicable. Maximum traffic stoppage time shall be 10 minutes.

M¢H SCHEDULING WORK

!¢ Schedule all work so that two adjacent parallel streets are not closed to passage by the public at any one time, if at all possible.

.¢ Revise the plan of work if it will create a traffic hazard or an unreasonably long detour. All detours shall be approved by the local police department.

/¢ Do not start work in any new location without the permission of the Engineer.

5¢ Notify all police and fire departments of all scheduled detours and when streets are reopened.

PART 2 - PRODUCTS

H¢M WARNING SIGNS AND BARRICADES

!¢ Provide adequate warning signs, barricades, signal lights, watchmen and take other necessary precautions for the safety of the public.

.¢ Provide and illuminate suitable warning signs to show where construction, barricades or detours exist.

/¢ Provide barricades of substantial construction and painted with a finish that increases visibility at night.

5¢ Keep signal lights illuminated at all barricades and obstructions from sunset to sunrise.

9¢ Maintain all necessary signs, barricades, lights, watchmen and other safety precautions during authorized suspension of the Work, weekends, holidays or other times when the Work is not in progress.

C¢ Traffic control signs for construction work shall be located and of the size and type as outlined in Manual on Uniform Traffic Control Devices for Streets and Highways as published by U. S. Department of Transportation.

H.H UNIFORMED POLICE OFFICER

!. A uniformed police officer is a police officer (local, county or state) on regular or special duty dressed in uniform with the necessary high visibility vest and apparel needed for traffic control.

.. Arrange the police detail with the local Chief of Police, County Sheriff, or State Police Captain depending on jurisdiction.

H.O FLAG PERSON

!. A flag person is a trained and certified individual assigned specifically to the task of directing traffic and is outfitted in the necessary high visibility vest and apparel needed for traffic control.

.. Flag persons shall be provided by the Contractor.

PART 3 - EXECUTION

O.M DETOURS

!. Provide, identify and maintain suitable detours when the project, or any part thereof, is closed to public travel.

.. When the closed part of the project is reopened, restore the detour area and any other disturbed areas to the original condition.

O.H INCONVENIENCE TO RESIDENTS OF VICINITY

!. Whenever a traveled way is closed, perform the Work in such a manner that local travel and residents in the vicinity of the Work will be inconvenienced as little as possible.

.. Allow access to residents and abutting land owners along the project to driveways and other normal outlets from their property.

O.O TRAFFIC CONTROL OFFICERS

!. Where required by the local, county or state police departments and/or when specified, traffic control officer shall be Uniformed Police Officers.

.. Where the local, county or state police departments do not wish to or are unable to furnish traffic control officers and/or when specified, the traffic control officers shall be flag person.

END OF SECTION 01570

SECTION 01576

POLICING

PART 1- GENERAL

1.1 SUMMARY

A. When, in the opinion of the Owner, public safety or convenience requires the services of police, the Owner may direct the Contractor to provide manpower to direct traffic within the location of work under this Contract.

B. When so directed, the Contractor shall make all arrangements in obtaining the manpower and all invoices for policing will be made to the Owner, the Owner shall approve the Daily Police Billing Verification Form, and the Owner shall pay all expenses incurred, including the salaries of the assigned personnel. Forms are available from Owner.

C. The intent is to insure public safety by police direction of traffic. Police are not to serve as watchmen to protect the Contractor's equipment and materials, or to warn pedestrians of such hazards as open tranches.

D. Nothing contained herein shall be construed as relieving the Contractor of any of his responsibilities for protection of persons and property under the terms of the Contract.

E. All payments to police for work under this Contract shall be in accordance with Section 34B of Chapter 149 of the General Laws of the Commonwealth of Massachusetts which states that reserve police officers shall receive the same prevailing wage rates as paid to the regular police officers.

F. The Policing shall be paid for on a weekly basis in accordance with an invoice from the Police Department, with payment sent directly to the Police Department.

END OF SECTION 01576

SECTION 01601

CONTROL OF MATERIALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and the following other Division 1 Specification Sections:

Section 01024 Measurement and Payment
Section 01046 Control of Work
Section 01300 Submittals
Section 01400 Quality Assurance

1.2 SUMMMARY

A. This section specifies the general requirements for the delivery, handling, storage and protection for all items required in the construction of the work. Specific requirements, if any, are specified with the related item.

1.3 APPROVAL OF MATERIALS

A. Unless otherwise specified, only new materials and equipment shall be incorporated in the work. All materials and equipment furnished by the Contractor shall be subject to the inspection and approval of the Engineer. No material shall be delivered to the work without prior approval of the Engineer.

B. As specified in Section 01300, the Contractor shall submit to the Engineer, data relating to materials and equipment he proposes to furnish for the work. Such data shall be in sufficient detail to enable the Engineer to identify the particular product and to form an opinion as to its conformity to the specifications.

C. Facilities and labor for handling and inspection of all materials and equipment shall be furnished by the Contractor. If the Engineer requires, either prior to beginning or during the progress of the work, the Contractor shall submit additional samples or materials for such special tests as may be necessary to demonstrate that they conform to the specifications. Such samples shall be furnished, stored, packed, and shipped as directed at the Contractor's expense. Except as otherwise noted, the Owner will make arrangements for and pay for the tests.

D. Any delay of approval resulting from the Contractor’s failure to submit samples or data promptly shall not be used at basis of a claim against the Owner or the Engineer.

E. In order to demonstrate the proficiency of workmen or to facilitate the choice among several textures, types, finishes, and surfaces, the Contractor shall provide such samples of workmanship or finish as may be required.

F. The materials and equipment used on the work shall correspond to the approved samples or other data.

1.4 TRANSPORTATION AND DELIVERY

A. Transport and handle items in accordance with manufacturer's printed instructions.

B. Schedule delivery to reduce long term on-site storage prior to installation and/or operation. Under no circumstances shall equipment be delivered to the site more than one month prior to installation without written authorization from the Engineer.

C. Coordinate delivery with installation to ensure minimum holding time for items that are hazardous, flammable, easily damaged or sensitive to deterioration.

D. Deliver products to the site in manufacturer's original sealed containers or other packing systems, complete with instructions for handling, storing, unpacking, protecting and installing.

E. All items delivered to the site shall be unloaded and placed in a manner which will not hamper the Contractor's normal construction operation or those of subcontractors and other contractors and will not interfere with the flow of necessary traffic.

F. Provide equipment and personnel to unload all items delivered to the site.

G. Promptly inspect shipment to assure that products comply with requirements, quantities are correct, and items are undamaged. For items furnished by others (i.e. Owner, other Contractors), perform inspection in the presence of the Engineer. Notify Engineer verbally, and in writing, of any problems.

1.5 HANDLING, STORAGE, AND PROTECTION OF MATERIALS

A. All materials and equipment to be incorporated in the work shall be handled and stored by the manufacturer, fabricator, supplier and Contractor before, during and after shipment in a manner to prevent warping, twisting, bending, breaking, chipping, rusting and any injury, theft or damage of any kind whatsoever to the material or equipment.

B. All pipe and other materials delivered to the job shall be unloaded and placed in a manner which will not hamper the no1mal operation of existing facilities or interfere with the flow of necessary traffic.

C. Only the materials and equipment required for the days operations will be allowed to stand within the limits of the rights-of-ways. All else shall be removed and stored by

the Contractor at a private off-site location to be acquired by the Contractor) or an agreed upon staging area arranged and approved by the Owner.

D. Store and protect products in accordance with the manufacturer's printed instructions, with seals and labels intact and legible. Storage instruction shall be studied by the Contractor and reviewed with the Engineer by him. Instructions shall be carefully followed and a written record of this kept by the Contractor. Arrange storage to permit access for inspection.

E. Store loose granular materials on solid flat surface in a well-drained area. Prevent mixing with foreign matter. Provide environmental protection measures as specified in Section 01110.

F. Cement and lime shall be stored under a roof and off the ground and shall be kept completely dry at all times. All structural, miscellaneous and reinforcing steel shall be stored off the ground or otherwise to prevent accumulation of dirt or grease, and in a position to prevent accumulations of standing water and to minimize rusting. Beams shall be stored with the webs vertical. Precast concrete shall be handled and stored in a manner to prevent accumulations of dirt, standing water, staining, chipping or cracking. Brick, block and similar masonry products shall be handled and stored in manner to reduce breakage, cracking and spalling to a minimum.

G. All mechanical and electrical equipment and instruments subject to corrosive damage by the atmosphere (even though covered by canvas) shall be stored in a weathertight building to prevent injury. The building may be a temporary structure on the site or elsewhere, but it must be satisfactory to the Engineer. Building shall be provided with ventilation to prevent condensation. Maintain temperature and humidity within range required by manufacturer.

H. All equipment shall be stored fully lubricated with oil, grease and other lubricants unless otherwise instructed by the manufacturer.

I. Moving parts shall be rotated a minimum of once weekly to insure proper lubrication and to avoid metal-to-metal Upon installation of the equipment, the Contractor shall start the equipment, at least half load, once weekly for an adequate period of time to ensure that the equipment does not deteriorate from lack of use.

J. Lubricants shall be changed upon completion of installation and as frequently as required thereafter during the period between installation and acceptance. New lubricants shall be put into the equipment at time of acceptance.

K. Prior to acceptance of the equipment, the Contractor shall have the manufacturer inspect the equipment and certify that its condition has not been detrimentally affected by the long storage period. Such certifications by the manufacturer shall be deemed to mean that the equipment is judged by the manufacturer to be in a condition equal to that of equipment that has been shipped, installed, tested and accepted in a minimum time period. As such, the manufacturer will guaranty the .

equipment equally in both instances. If such a certification is not given, the equipment shall be judged to be defective. It shall be removed and replaced at the Contractor's expense.

L. All materials which, in the opinion of the Engineer, have become so damaged as to be unfit for the use intended or specified shall be promptly removed from the site of the work and the Contractor shall receive no compensation for the damaged material or its removal

PART 2- PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01601

SECTION 01710

CONTRACT CLOSEOUT

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, apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for contract closeout, including, but not limited to:

1. Inspection procedures.
2. Project record document submittal.
3. Final cleaning.

B. Closeout requirements for specific construction activities are included in the appropriate Sections in Division 2.

1.3 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before the Contractor requests inspection for Certification of Substantial Completion of the project, the Contractor shall complete the following items. Exceptions to the listed items will be noted in the request.

B. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the portion of the work claimed as substantially complete. Include supporting documents for completion, as indicated in these Contract Documents, and a statement showing an accounting of changes to the Contract Sum.

1. If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the work is not complete.

2. Advise the Engineer and Owner of pending insurance change over requirements if applicable.

3. Submit specific Warranties, Workmanship Bonds, Maintenance Agreements, Final Certifications, As-Built Plans, and similar documents.

C. Complete final cleanup requirements.

D. Inspection Procedures: On receipt of a request for inspection, the Engineer will either proceed with inspection or advise the Contractor of unfulfilled requirements. The Engineer will prepare the Certificate of Substantial Completion following inspection, or

advise the Contractor of construction that must be completed or corrected before the certificate will be issued.

1. The Engineer will repeat inspection when requested and assure that the work has been substantially completed.

2. Results of the completed inspection will form the basis of requirements for final acceptance.

1.4 FINAL ACCEPTANCE

A. Preliminary Procedures: Before requesting final inspection for Certification of Final Acceptance and Final Payment, complete the following. List exceptions in the request.

1. Submit the Final Payment Request with releases and supporting documentation not previously submitted and accepted.

2. Include Certificates of Insurance for Products and Completed Operations, where required.

3. Submit an updated final statement, accounting for final additional changes to the contract sum, if any.

4. Submit a certified copy of the Engineer's final inspection list of items to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance, and the list has been endorsed and dated by the Engineer. This will include acceptance by the Engineer of any seeded areas.

B. Submit Consent of Surety to Final Payment.

1. Submit a final liquidated damages settlement statement, if applicable.

2. Submit evidence of final, continuing insurance for one year’s coverage complying with insurance requirements.

C. Re-inspection Procedure: The Engineer will re-inspect the work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been completed, except items whose completion has delayed because of circumstances acceptable to the Engineer.

1. Upon completion of re-inspection, the Engineer will prepare a Certificate of Final Acceptance, or advise the Contractor of work that is incomplete, or of obligations that have not been fulfilled, but are required for Final Acceptance.

2. If necessary, re-inspection will be repeated.

1.5 RECORD DOCUMENT SUBMITTALS

A. Record Drawings: Submit As-Built Drawings of the piping, storm drainage structures and all appurtenances. Drawings will be submitted to the Engineer at the completion of the

job as specified in Section 01300. Drawings shall be neat, accurate and thorough and submitted in hard copy format (8 1/2 x 11 sheets) and electronically as AutoCAD files.

PART 2- PRODUCTS (NOT USED)

PART 3 -EXECUTION

3.1 FINALCLEANING

A. During its progress, the work and the adjacent areas affected thereby shall be cleaned up and all rubbish, surplus materials, and unneeded construction equipment shall be removed and all damage repaired so that the public and property owners will be inconvenienced as little as possible.

B. Where material or debris has washed or flowed into or been placed in existing watercourses, ditches, gutters, drains, pipes structures, work done under this contract, or elsewhere during the course of the Contractor's operations, such material or debris shall be entirely removed and satisfactorily disposed of during the progress of the work, and the ditches, channels, drains, pipes, structures, and work, etc., shall, upon completion of the work, be left in a clean and neat condition.

C. On or before the completion of the work, the Contractor shall, unless otherwise especially directed or permitted in writing, tear down and remove all temporary buildings and structures built by him; shall remove all temporary works, tools, and machinery or other construction equipment furnished by him; shall remove, acceptably disinfect, and cover all organic matter and material containing organic matter in, under, and around privies, houses, and other buildings used by him; shall remove all rubbish from any grounds which he has occupied; and shall leave the roads and all parts of the premises and adjacent property affected by his operations in a neat and satisfactory condition.

D. Removal of Protection: Remove temporary protection and facilities installed for protection of the work during construction.

E. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Town's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from the site and dispose of in a lawful manner.

F. The Contractor shall restore or replace, when and as directed, any public or private property damaged by his work, equipment, or employees, to a condition at least equal to that existing immediately prior to the beginning of operations. To this end the Contractor shall do as required all necessary highway or driveway, walk, and landscaping work. Suitable materials, equipment, and methods shall be used for such restoration. The restoration of existing property or structures shall be done as promptly as practicable as work progresses and shall not be left until the end of the contract period.

END OF SECTION 01710

SECTION 01715

PROJECT CLEANING

PART 1 - GENERAL

M♦M DESCRIPTION

!♦ Work Included:

M♦ Maintain premises, private, and public properties free from accumulations of waste, debris, and rubbish, caused by operations.

H♦ At completion of work, remove waste materials, tools, equipment, machinery and surplus materials, and clean all sight-exposed surfaces. Leave project clean and ready for use.

M♦H QUALITY ASSURANCE

!♦ Requirements of Regulatory Agencies: Conduct cleaning and disposal operations in accordance with all applicable local and state laws, ordinances, and code requirements.

PART 2 - PRODUCTS

H♦M MATERIALS

!♦ Use only cleaning materials recommended by manufacturer of surfaces to be cleaned.

.♦ Use cleaning materials only on surfaces recommended by cleaning material manufacturers.

/♦ Mechanical sweeper – the sites shall be swept on a daily basis at the conclusion of each work day. Sweeping shall be performed by a mechanical power sweeper.

PART 3 - EXECUTION

O♦M PERFORMANCE

!♦ Cleaning During Construction:

M♦ Execute cleaning operations to ensure that buildings, grounds, private, and public properties are maintained free from accumulations of waste materials and rubbish.

H♦ Entirely remove and dispose of material or debris during the progress of the work that has washed into or has been placed in watercourses, ditches, lawns, gutters, drains, catch basins, or elsewhere as a result of the Contractor's operations.

O♦ Wet down dry materials and rubbish to lay dust and prevent blowing dust.

Π♦ At reasonable intervals during the progress of work, clean the site and dispose of waste materials, debris, and rubbish.

P♦ When applicable, schedule cleaning operations so that dust and other contaminants resulting from the cleaning process will not fall on wet, newly painted surfaces.

.♦ Control of Hazards:

M♦ Store volatile wastes in covered metal containers, and remove from premises daily.

H♦ Prevent accumulation of wastes which may create hazardous conditions.

- o. Provide adequate ventilation during use of volatile or noxious substances.

/. Disposal:

- M. Do not burn or bury rubbish and waste materials on project site.
- H. Do not dispose of volatile wastes, such as mineral spirits, oil, or paint thinner, in storm or sanitary drains.
- o. Do not dispose of wastes into streams or waterways.

5. Final Cleaning:

- M. Employ experienced workmen, or professional cleaners, for final cleaning.
- H. Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials, from all sight-exposed interior and exterior finished surfaces.
- o. Repair, patch and touch up marred surfaces to specified finishes.
- n. Rake clean non-paved surfaces of the project site.
- p. Restore to their original condition those portions of the site not designated for alterations by the Contract Documents.

END OF SECTION 01715

SECTION 01720

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

M¢M DESCRIPTION

!¢ Work Included:

M¢ Keep accurate record documents for all additions, substitutions of material, variations in work, and any other additions or revisions to the Contract.

M¢H MAINTENANCE OF DOCUMENTS

!¢ Maintain at job site, one copy of:

M¢ Contract Drawings

M¢ Specifications

H¢ Addenda

O¢ Reviewed Shop Drawings

P¢ Change Orders

p¢ Any other modifications to the Contract

C¢ Field Test Reports

.¢ Store documents in files and racks specifically identified for this use that are apart from documents used for construction.

/¢ File documents in a logical manner indexed for easy reference.

5¢ Maintain documents in clean, dry, legible condition.

9¢ Do not use record documents for construction purposes.

C¢ Make documents available at all times for inspection by the Engineer and Owner, and by the end of the project, transmit these documents to the Engineer.

M¢O RECORDING

!¢ Label each document "PROJECT RECORD" in large high printed letters.

.¢ Keep record documents current and do not permanently conceal any work until required information has been recorded.

/¢ General Field Recording Issues:

M¢ All ties should be taken from existing, permanent features such as utility poles, corners of houses and hydrants. Porches, sheds or other house additions should be avoided for they could be torn down. A minimum of two ties should be taken.

H¢ Stations should be recorded to the nearest foot.

O¢ Inverts should be recorded to the nearest hundredth of a foot.

P¢ Elevations should be recorded to the nearest hundredth of a foot.

p¢ Building dimensions should be recorded to the nearest 1/4".

5¢ Project Record Drawings - Legibly mark Contract Drawings to record existing utilities and actual construction of all work, including but not limited to the following (where applicable):

M¢ Existing Utilities

Water mains and services, water main gate valves, sewer mains and services, storm drains, culverts, steam lines, gas lines, tanks and other existing utilities encountered during construction must be accurately located and shown on the Drawings. In congested areas supplemental drawings or enlargements may be

required.

- l· Show any existing utilities encountered in plan and profile and properly labeled showing size, material and type of utility. Ties should be shown on plan. Utility should be drawn to scale in section (horizontally and vertically) and an elevation should be called out to the nearest hundredth of a foot.
- ō When existing utility lines are broken and repaired, ties should be taken to these locations.
- Ŏ If existing water lines are replaced or relocated, document the area involved and pipe materials, size, etc. in a note, and with ties.

н Manholes, Catch Basins, Valve Pits and other structures.

- l· Renumber structure stationing to reflect changes.
- ō Show ties to center of structure covers or hatches.
- Ŏ In general, show inverts at center of structures. However, for manholes with drop structures, or steep channels (greater than 0.2' change on slope), show inverts at face of manhole.
- Ř Show inverts for other structures at the face of the structure.
- Ŝ Draw any new structures that are added on plan and profile.
- Ŧ Show any field or office redesigns.
- Ǝ Redraw plan if the structure's location is moved more than 5 feet in any direction. [Note: It is important to show existing utilities, as outlined in Paragraph 1 above, especially if they were one reason for relocating the sewer, manholes and other structures.]
- Ƙ Redraw profile if inverts changed by more than 6 inches.

o Gravity Sewer Line

- l· Change sewer line slopes indicated on Drawings if inverts are changed.
- ō Draw any new gravity lines that are added on plan and profile.
- Ŏ Show any field or office redesigns.
- Ř Redraw the sewer line profile if manhole inverts are redrawn.
- Ŝ Redraw the sewer line on plan corresponding to relocated manholes.

п Water Mains and Force Mains

- l· Show ties to the location of all valves, bends (horizontal and vertical), tees and other fittings. The use of thrust blocks should be recorded.
- ō Revise elevations indicated on the Drawings to reflect actual construction.

p House Services

- l· Draw all house services (even to empty lots) on plan, and show ties.
- ō Show ties or distances to wyes from manhole.
- Ŏ Show chimneys heights in the profile.
- Ř The Wright-Pierce "Sanitary Sewer Service Location" forms shall be used to record sewer service information. A copy of these forms should be provided to the Owner, along with the Record Drawing Set.

c Septic Tanks

- l· Show ties to center of tank covers.
- ō Label size of septic tanks that are other than standard 1000 gallon capacity.
- Ŏ The Wright-Pierce "Sanitary Sewer Service Location" forms shall be used to record septic tank information. A copy of these forms should be provided to the Owner, along with the Record Drawing Set.

т Ledge

- l· Ledge profiles should be shown. Note whether the plotted ledge profile reflects undisturbed or expanded conditions.

8. Yard Piping and Buried Electrical Conduit
    a. Site piping should be drawn to reflect the installed locations, with ties and elevation of all bends (horizontal and vertical).
    b. Show routing for electrical conduits and pull boxes, especially in close proximity to buildings and when the conduits change direction or cross process piping.
9. Roads
    a. Show centerline road profile and level spot elevations.
    b. Show pavement widths.
    c. On road cross sections, show the pavement cross slope.
    d. Show any deviations from the design plans.
10. Buildings
    a. In general, small changes to structures should not be redrawn. If any dimensional changes were made in the field, the numerical change should be made on the Drawing and be properly labeled. Update dimensions and elevations on Drawings.
    b. Show finished concrete elevations (top of slab, top of wall, top of footing, etc.). Redraw any foundation, frost wall, etc. that was modified, deepened, or altered during construction.
    c. Adjust finished concrete horizontal dimensions that are shown on the Drawings.
    d. Adjust structural steel elevations and horizontal dimensions that are shown on the Drawings.
    e. Show location of anchors, construction and control joints, and waterstops, when they are different from those shown on Drawings.
    f. Any additions or major changes should be shown in both plan and elevation (i.e. relocated doors, opposite door swings, change in wall location, relocation of floor drains).
    g. Show approximate location and routing of electrical conduits in walls, slabs and ceilings. Most conduits are run in groups, therefore, use range of measurements to define location for entire section of conduits.
    h. Special circuits for computers, alarms and instrumentation should be shown.
    i. Show any changes in location and elevation of ductwork and devices, fuel piping and equipment, and heat piping and equipment.
    j. Location of gravity sewer system below slabs in buildings should be shown, if changes are made in the configuration.
    k. If wall mounted electrical switches, control boxes, thermostats, etc. have been relocated significantly, (other side of door, or to a wall other than indicated diagrammatically on electrical plans) make the revision accordingly.

E. Specifications and Addenda - Legibly mark up each section to record:
    1. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.

    2. Changes made by Change Order, Field Order, or other method.

1.4 SUBMITTALS

A. At the completion of the project, deliver record documents to the Engineer.

B. Accompany submittal with transmittal letter, in duplicate, containing:

1. Date, project title and number.
2. Contractor's name and address.
3. Title and number of each record document with certification that each document is completed and accurate.
4. Signature of Contractor, or his authorized representative.

C. Failure to supply all information on the Project Record Drawings as specified in Part 1.3 may result in additional retainage from monthly partial payment requests, and in non- approval of final payments of the Contract and/or if contract time (as specified in accordance with the Standard General Conditions of the Construction Contract) has elapsed, this shall be grounds for the enactment of the liquidated damages as specified.

END OF SECTION 01720

SECTION 02020

EROSION AND SEDIMENT CONTROL

PART 1 GENERAL

1.1 SUMMARY

A. This Section specifies equipment and materials for an erosion and sediment control program installation during the construction phase of the project. The erosion and sediment control provisions detailed on the Drawings and specified herein are the minimum requirements for an erosion control program. The Contractor shall provide additional erosion and sediment control materials and methods as required to affect the erosion and siltation control principles specified herein.

1.2 RELATED SECTIONS

A. Examine Contract Documents and Drawing Details for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:

1. Section 01110 Environmental Protection Procedures

1.3 SUBMITTALS

A. Proposed methods, materials to be employed, and schedule for effecting erosion and siltation control and preventing erosion damage shall be submitted for approval. Submittals shall include:

1. List of proposed materials including manufacturer's product data.

2. Erosion Controls shall be installed prior to construction. Schedule of erosion control program indicating specific dates from implementing programs in each major area of work, including Erosion Control installation and truck wheel wash station installation.

B. Samples

The following samples shall be submitted:

Sample	Size
Filter Fabric (Woven and Non-Woven)	12 X 12 in.

1 .4 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

1. Massachusetts Department of Public Works, and The Commonwealth of Massachusetts Department of Public Works; Construction Standards.

2. Massachusetts Department of Environmental Protection.

1.5 EROSION CONTROL PRINCIPLES

A. Erosion Control Principles

The following erosion control principles shall apply to the land grading and construction phases:

1. Stripping of vegetation, grading, or other soil disturbance shall be done in a manner which will minimize soil erosion.

2. Whenever feasible, natural vegetation shall be retained and protected.

3. Extent of area which is exposed and free of vegetation and duration of its exposure shall be kept within practical limits.

4. Temporary seeding, mulching, or other suitable stabilization measures shall be used to protect exposed critical areas during prolonged construction or other land disturbance. Prolonged exposure of unstabilized soil shall not exceed 60 days.

5. Drainage provisions shall accommodate increased runoff resulting from modifications of soil and surface conditions during and after development or disturbance. Such provisions shall be in addition to existing requirements.

6. Sediment shall be retained on-site.

7. Erosion control devices and truck wheel wash station shall be installed prior to start of clearing and grubbing operations and excavation work.

B. Erosion Protection

Cut and fill slopes and stockpiled materials shall be protected to prevent erosion. Slopes shall be protected with permanent erosion protection when erosion exposure period is expected to be greater than or equal to two months, and temporary erosion protection when erosion exposure is expected to be less than two months.

1. Permanent erosion protection shall be accomplished by seeding with grass and covering with an erosion protection material, as appropriate for prevailing conditions.

2. Temporary erosion protection shall be accomplished by covering with an erosion protection n1aterials, as appropriate for prevailing conditions.

3. Except where specified slope is indicated on Drawings, fill slopes shall be limited to a grade of 4:1 (horizontal: vertical) cut slopes shall be limited to a grade of 4:1.

PART 2 -PRODUCTS

2.1 HAY BALES

A. Hay bales for construction of erosion control devices shall be new, firm, bound salt marsh hay bound with biodegradable twine.

2.2 TEMPORARY SEED COVER

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

Quantity per 1000 sq. ft. Coverage	Material
27-1/2 lb.	Wood Fiber Mulch
4lb.	Seed
½ lb.	Annual Ryegrass
22lb.	10-6-4 Fertilizer
69 gal	Water

B. Hydroseeding Equipment

Hydroseeding equipment may be either portable or truck mounted, with dual agitation, a minimum working volume of 1000 gallons and a minimum spray range of 80 ft.

1. Hydroseeding equipment must be capable of uniformly applying the slurry mix including wood fiber mulch if required, at the specified rate, and at the required locations.

2. Hydromulching equipment, either trailer or truck mounted, must be capable of uniformly applying straw or hay mulch at a minimum mulching rate of 8 tons per hour, at a distance of not less than 80 ft.

2.3 FILTER BASKETS

A. Filter baskets shall be Metal-Era Inlet Baskets, manufactured by Metal-Era Inc., Wukesha, WI 53186, approved equal. Baskets shall be installed at all newly installed and existing catch basins and remain in place until vegetation on the site is stabilized. Filter basket shall include a nonwoven geotextile filter fabric material with a minimum Grab strength of 45 lb., Mullen Burst Strength of 60 psi minimum, a minimum permeability of 120 gpm/sq. ft., and an opening no greater than No. 20 U.S. Standard Sieve.

PART 3 EXECUTION

3.1 HYDROSEEDING

A. If required for long-term disturbance greater than 60 days, seed for temporary cover shall be spread by the hydroseeding method, utilizing power equipment commonly used for that purpose. Seed, fertilizer, mulch and water shall be mixed and applied to achieve application quantities specified. Material shall be applied in 2 equal applications, with the equipment during the second pass moving perpendicular to direction employed during the first pass. Hydroseeding shall not be done when it is raining or snowing, or when wind velocity exceeds 5 mph.

B. If the results of hydroseeding application are unsatisfactory, the mixture and/or application rate and methods shall be modified to achieve the required results.

C. After the grass has appeared, all areas and parts of areas which fail to show a uniform stand of grass, for any reason whatsoever, shall be reseeded and such areas and parts of areas seeded repeatedly until all areas are covered with a satisfactory growth of grass.

3.2 FILTER BASKETS

A. Filter baskets shall be installed at all newly installed and existing catch basins. Filter baskets shall be installed in accordance with manufacturer's recommendations. Maintain filter baskets as required and as follows. Baskets shall be inspected within 24 hours after each rainfall or daily during extended periods of precipitation. Repairs shall be made immediately, as necessary, to prevent particles from reaching the drainage system. Sediment deposits shall be removed after each storm event, or more often if the fabric becomes clogged. Clean clogged fabric and repair or replace damaged filter fabric as necessary.

3.3 MAINTENANCE AND REMOVAL OF EROSION CONTROL DEVICES

A. Wetland area, water courses, and drainage swales adjacent to construction activities shall be monitored continuously for evidence of silt intrusion and other adverse environmental impacts, which shall be corrected immediately upon discovery.

B. Culverts and drainage ditches shall be kept clean and clear of obstructions during construction period.

C. Erosion Control Devices

1. Sediment behind the erosion control device shall be checked twice each month and after heavy rain. Silt shall be re1noved if greater than 6 in. deep.

2. Condition of erosion control device shall be checked twice each month or more frequently as required. Damaged and/or deteriorated items shall be replaced. Erosion control devices shall be maintained in place and in effective condition.

3. Hay bales shall be inspected frequently and maintained or replaced as required to maintain both their effectiveness and essentially their original condition. Underside of bales shall be kept in close contact with the earth below at all times, as required to prevent water from washing beneath bales.

4. Sediment deposits shall be properly disposed of, in a location and manner which will not cause sediment nuisance elsewhere.

D. Removal of Erosion Control Devices

1. Erosion control devices shall be maintained until all disturbed earth has been paved or vegetated, at which time they shall be removed. After removal, areas disturbed by these devices shall be regraded and seeded.

2. Erosion protection material shall be kept securely anchored until acceptance of the entire Project.

END OF SECTION 02020

SECTION 02050

DEMOLITION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:

1. The Contractor shall furnish all labor, materials, tools, equipment and apparatus necessary and shall do all work required to complete the demolition, removal, and alterations of existing facilities as indicated on the Drawings, as herein specified, and/or as directed by the Engineer.
2. Demolition and alteration work within occupied areas shall be accomplished with minimum interference to the occupants and to the plant which shall be in continuous operation during construction.
3. All equipment, piping, and other materials that are not to be relocated or to be returned to the Owner shall become the property of the Contractor and shall be disposed of by him, away from the site of the work and at his own expense.
4. All demolition or removal of existing structures, utilities, equipment, and appurtenances shall be accomplished without damaging the integrity of existing structures, equipment, and appurtenances to remain, to be salvaged for relocation or stored for future use.
5. Such items that are damaged shall be either repaired or replaced at the Contractor's expense to a condition at least equal to that which existed prior to the start of his work.
6. Unless otherwise indicated, all items labeled to be "removed", "demolished" or "remove/demolish" shall be removed and disposed of off site in accordance with all Local, State and Federal Regulations.

1.2 JOB CONDITIONS

A. Condition of Structures:

1. The Owner assumes no responsibility for the actual condition of structures to be demolished.
2. Conditions existing at the time of inspection for bidding purposes will be maintained by the Owner as far as practicable. However, variations within the structures may occur due to Owner's removal and salvage operations prior to the start of demolition work (where applicable).

1.3 UTILITIES

A. Utility Locations:

1. Utility locations shown on the plans are approximate only.
2. The Contractor shall make all necessary arrangements and perform any necessary work to the satisfaction of affected utility companies and governmental divisions involved with the discontinuance or interruption of affected public utilities and services.

1.4 SUBMITTALS

A. Schedule - Demolition:

1. Submit two (2) copies of proposed methods and operations of demolition to the Engineer for review prior to the start of work. Include in the schedule the coordination for shut-off, capping and continuation of utility services as required.
2. Provide a detailed sequence of demolition and removal work to ensure the uninterrupted progress of the Owner's operations.
3. Provide detailed work plan including location of material disposal.

1.5 PROTECTIONS

A. Ensure the safe passage of persons around the area of demolition. Conduct operations to prevent injury to adjacent buildings, structures, other facilities and persons. Erect temporary, covered passageways as required by authorities having jurisdiction.

B. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement or collapse of structures to be demolished and adjacent facilities to remain.

1.6 DAMAGES

A. The Contractor shall promptly repair damages caused by demolition operations to adjacent facilities at no cost to the Owner.

PART 2 - PRODUCTS

Not
Applicable.

PART 3 - EXECUTION

3.1 PERFORMANCE

A. Remove and dispose of non-salvageable material in accordance with all applicable local and state laws, ordinances and code requirements.

B. Dispose of material daily as it accumulates.

C. Carefully remove, store and protect from damage all materials to be salvaged.

D. Buildings and Adjacent Property:

1. Protect all buildings and property adjacent to equipment to be removed from damage by erecting suitable barriers or by other suitable means.
2. Leave such buildings in a permanently safe and satisfactory condition.

F. Mechanical/Process Demolition:

1. Mechanical/Process demolition in general shall consist of the dismantling and removal of existing piping, tanks, pumps, motors, equipment and other appurtenances as specified, and indicated on the Drawings.
2. It shall also include, where necessary, the cutting of existing piping for the purpose of making connections thereto.
3. Piping not indicated to be removed but which may interfere with construction shall be removed to the nearest solid support, capped and left in place. Where piping that is to be removed passes through the wall of existing structures, it

shall be cut off and properly capped on each side of the wall.

4. When piping is to be altered or removed underground, the remaining piping shall be properly capped or plugged.
5. Abandoned underground piping shall be left in place unless it interferes with new structures or unless otherwise noted on the Drawings.

H. Salvage:

1. Salvaged items shall be stored on site for the Owner in an acceptable location and manner.

I. Demolition Sequence:

1. The demolition sequence is to conform the reviewed and approved project schedule, and restrictions outlined in Section 01310, Construction Schedules.

END OF SECTION 02050

SECTION 02080

SOIL AND WASTE MANAGEMENT

PART 1 - GENERAL

1.1 QUALIFICATIONS

A. The Contractor shall demonstrate the necessary skills, experience, training, and qualifications to conduct the work as specified herein.

B. The Contractor shall possess all required licenses, insurance, permits and trained employees to properly execute the work as specified herein.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

1.3 OBJECTIVE AND OVERVIEW

A. This Section includes furnishing all labor, equipment, and materials, and performing all operations in connection with the handling, stockpiling, and disposal and/or in-project reuse of soil and associated fill and waste material resulting from the construction operations as specified. In-project reuse shall be defined as material that is reused within the project, such as replacement of soil back into the excavation trench after installation of new utilities.

B. The soil management practices specified herein apply to all soil excavated during the course of this contract, including potentially contaminated soil and fill material. The objective of soil management practices detailed herein is to manage all soil excavated at the site during the course of this contract in compliance with applicable Federal, state and local laws and regulations and in a cost-effective manner.

C. This Section includes proper handling and management of waste materials, including, but not limited to, construction debris building demolition, municipal waste, boulders, soil, fill, ash, rubble, materials containing asbestos, and empty or crushed drums and/or drum parts.

D. Activities conducted under this Section shall be implemented in compliance with the Contractor's Site-Specific Health and Safety Plan (HASP).

E. This Section describes the general parameters and requirements for testing (including field screening and laboratory chemical analysis), excavation, handling, storage, tracking, transport, and disposal and/or in-project reuse of natural and fill soils.

F. In the course of the work, it may be necessary to excavate and handle potentially contaminated soil/solid waste. The soil/solid waste management practices specified herein apply to all soil/solid waste excavated during the course of this contract. The Contractor shall reuse geotechnically suitable excavated material prior to using imported backfill to reduce the volume of material to be disposed off-site. Imported backfill shall be used only as accepted by the Engineer. Historic fill soils and roadway base/subbase shall be re-used to the maximum extent before reusing naturally occurring soils. If off-site disposal is required, natural soils shall be preferentially disposed or reused.

G. To the extent possible, the Contractor shall reuse geotechnically suitable contaminated (B) or impacted (A-2) excavated material prior to using background (A-1) material to reduce the volume of impacted or contaminated soil to be disposed of off-site. The Contractor shall segregate fill from natural soils during excavation and shall segregate fill and natural

soil stockpiles to avoid mixing impacted and background soils prior to in-project reuse. Contamination at the disposal site shall not be exacerbated as a result of a URAM or as the result of structures placed within the area of identified contamination.

I. All work shall be conducted in compliance with the following Contractor-prepared plans:

M. Site-Specific Health and Safety Plan;
N. Soil and Waste Management Plan;
O. Dust, Vapor and Odor Control Plan;
P. Air Monitoring Plan;
Q. Dewatering Plan;
R. Stormwater Handling Plan;
S. Equipment and Personnel Decontamination Plan;
T. Quality Control Plan;
U. Spill and Discharge Control Plan
V. Asbestos Work Plan; and
W. Template URAM

M.P DEFINITIONS

A. Asphalt, Brick and Concrete (ABC): Asphalt, Brick and Concrete material that is waste from construction or found in fill material during excavation. ABC material found in clean, reusable fill may be reused onsite to the greatest extent possible. All excess ABC generated during construction shall be disposed of offsite at an appropriate, licensed facility that will accept ABC waste.

B. Area of Excavation: For the purposes of reusing soil/fill on-site, the *area of excavation* is considered to be the approximate area in which the soil/fill was removed provided that area is consistent in soil strata, color, texture, geotechnical properties and has substantially similar visual and olfactory characteristics. Soil/fill returned to the *area of excavation* shall be returned to approximately the same horizontal and vertical location from which it originated provided that it is not placed in an area that differs substantially in physical or chemical characteristics as can be observed and measured during excavation.

C. Authorized Excavation: Earth Excavation or "Excavation" consists of removal of materials encountered to the elevations and widths indicated in the Contract Drawings, Specifications, or as directed by the Engineer.

D. Background: (see Section 1.4-K-1)

E. Competent Person: for purposes of this Specification, the term shall mean one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them [29 CFR 1926.32(f)].

F. Fill (Historic Fill): Fill, also known as urban, historic, or miscellaneous fill, is defined as a mixture of soil and other materials which have been located in the area through man- made processes primarily for the purpose of grading, backfilling or filling in low areas. Material commonly associated with historic fill includes, but are not limited to; coal, glass, brick, ash, wood fragments and other similar granular materials. Historic fill shall not include boulders, ledge, consolidated rock, asphalt, concrete, railroad timbers, rail, cobblestones or any other abandoned building materials.

G. Hazardous Waste:

M. Hazardous waste as defined 310 CMR 40.0006; or
N. Hazardous waste as defined in 40 CFR 261.3.
O. A waste, or combination of wastes, that, because of its quantity, concentration, or physical, chemical, or infectious characteristics may:

l·φ Cause or significantly contribute to an increase in mortality or cause or significantly contribute to an increase in a serious irreversible or incapacitating reversible illness; or

Oφ Pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

Iφ Peat: A substance of vegetable origin, consisting of roots and fibers, moss, etc., in various stages of decomposition, and found, as a kind of turf or bog. Peat shall be considered natural soil when it is encountered in small amounts (layers 1-foot (304.8 mm) or less in thickness) and when it is impractical to separate the peat from the natural soil or urban fill strata. Otherwise, peat shall be considered a distinctive stratum.

Lφ Liquid Waste: materials generated onsite due to work performed and are waste or excess including but not limited to collected groundwater, collected stormwater, non-aqueous phase liquids, Contractor-supplied fuels and fluids, and drummed liquids.

Wφ Solid Waste (Waste): materials generated on site due to work performed and are waste or excess, including but not limited to asphalt, brick and concrete (ABC) waste, demolition waste, decontamination waste, dredging spoils (dewatered), metal waste, plaster/drywall, plastic waste, rock, rubber waste, sediment, tar waste, trash, vegetation debris, wood waste.

Yφ Soil Classification Categories: Unless specifically stated otherwise, terms used in this specification are as defined in the Massachusetts Contingency Plan (MCP), 310 CMR 40.0006. The following definitions and soil classifications apply to these specifications:

Mφ (Class A-1) Background: Any soil or fill material which meets the regulatory definition of "background" as defined in 310 CMR 40.0006 may be reused as common fill/ordinary borrow provided it also meets the physical requirements as specified herein and as specified in Section 02200. For record keeping purposes soil/fill that meet the definition of background, shall be transported under a Material Shipping Record (MSR).

Class A-1 soil may also be re-used off-site without restriction provided it is re-used in an area where soil concentrations are equal to or greater than the Class A-1 soil being re-used (MCP “Similar Soils” provision). The Contractor is responsible for determining the background levels at the point of excavation. It is also the Contractor’s responsibility to identify one or more disposal facilities/locations with background levels appropriate to receive the material to be disposed or reused. It is the Contractor’s responsibility to determine these background levels in advance so as to comply with 310 CMR 40.0032(3)(b) and so as not to delay or adversely affect construction operations.

Hφ (Class A-2) Impacted: Any soil or fill material which contains oil or hazardous materials (OHM) at concentrations greater than background levels but less than release notification thresholds established by 310 CMR 40.0300 and 40.1600. Impacted soil may be reused in the area of excavation or as fill provided it is reused in an area of equal or greater contamination and meets the physical requirements as specified herein and as specified in Section 02200. Class A-2 soils requiring off-site transportation and disposal/reuse shall be transported using a Material Shipping Record (MSR).

Oφ (Class B) Contaminated: Any soil or fill material which contains oil or hazardous materials at concentrations equal to or greater than a release notification threshold established by 310 CMR 40.0300 and 40.1600, except where the presence of the

material is consistent with the regulatory definition of "background" as defined in 310 CMR 40.0006.

Any soils which contain either petroleum or chemical odor or visual indications of oil or hazardous materials shall be handled as potentially contaminated soils. Suitable soil which does not have any evidence of contamination may be reused within the area of excavation without first performing laboratory analyses. Soil/fill that may be contaminated shall be set aside by the Contractor for assessment by the Owner's environmental professional. Soil/fill that is staged and characterized can be reused within the area of excavation or elsewhere on site provided the material has been tested and has equal or less contamination than the point where it is to be reused and it is not reused beneath a permanent structure such as a building foundation. Any excavated soil/fill material not reused within the area of excavation must be characterized prior to non-project reuse. After analytical results are available, soil/fill shall be handled in accordance with the type and degree of contamination (if any) present in the soil/fill.

Class B soil that cannot be reused on site shall be reused off-site, recycled, or disposed as a solid waste at an appropriately permitted facility unless it also meets the regulatory definition of hazardous waste as defined in 40 CFR Part 261 or contains detectable asbestos. Subcategories of Class B soil are defined as follows:

- Class B-1: Soil and Fill that meet all applicable criteria (i.e., COMM 97-001 and/or facility-specific permit requirements) for off-site reuse as daily cover, intermediate cover, or pre-cap contouring material at in-state unlined landfills. Note: per COMM 97-001, sediments may not be re-used as Class B-1.
- Class B-2: Soil and Fill that meet all applicable criteria (i.e., COMM 97-001 and/or facility-specific permit requirements) for off-site reuse as daily cover, intermediate cover, or pre-cap contouring material at in-state lined landfills.
- Class B-3: Soil and Fill that meet all applicable criteria for instate recycling at an asphalt batching plant and/or the specific licensing requirements for the proposed in-state recycling facility.
- Class B-4: Soil and Fill that contain concentrations of contaminants that exceed in-state, lined, and unlined landfill reuse criteria as well as in-state recycling acceptance criteria, but meet the criteria for regional thermal treatment facilities or out-of-state recycling facilities, and are not classified as a Resource Conservation and Recovery Act (RCRA) Hazardous Waste.
- Class B-5: Soil and Fill that contain concentrations of contaminants that require removal to regional disposal facilities and are not classified as RCRA Hazardous Waste.
- Class B-6: Soil and fill which does not meet one of the designations above due to excessive foreign materials and/or debris that are not classified as a hazardous waste.

- (Class C) Hazardous Waste: A waste, or combination of wastes, that, because of its quantity, concentration, or physical, chemical, or infectious characteristics may cause or significantly contribute to an increase in mortality or cause or significantly contribute to an increase in a serious irreversible or incapacitating reversible illness; or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed. Also included within the definition of hazardous waste is hazardous waste as defined 310 CMR 40.0006 and 40.CFR 261.3. Hazardous waste as defined in 40 CFR 261.3 is a solid waste that exhibits any of the characteristics of hazardous waste in excess of regulation levels presented in 40 CFR 261, subpart C

and/or that is listed in 40 CFR 261, subpart D; that is a mixture of solid and hazardous waste; or that is derived from a listed waste. Subcategories of Class C soils shall be as follows:

- Class C-1: Soils classified as hazardous waste that can be readily treated on-site to eliminate the toxicity characteristic (e.g., for lead).
- Class C-2: Material determined to contain "listed" or "characteristic" hazardous waste constituents which cannot be readily treated on-site. This material must be transported to an out-of-state approved RCRA Subtitle C hazardous waste disposal or treatment facility under a Uniform Hazardous Waste Manifest.

- Special Waste: Any waste that is determined not to be a hazardous waste pursuant to 310 CMR 30.000 and that exists in such quantity or in such chemical or physical state, or any combination thereof, so that particular management controls are required to prevent an adverse impact from the collection, transport, transfer, storage, processing, treatment or disposal of the waste. Asbestos and PCB-contaminated soils/fill are examples of special waste categories. Refer to Section 02076.
- Soil (Natural Soils): Soil, otherwise known as natural soil, is defined for the purposes of the Contract as unconsolidated sand, gravel, silt and clay, and the organic material which has become part of the unconsolidated soil matrix. For this section only, soil may include broken and fragmented rock.
- Unauthorized Over Excavation: Consists of removal of materials beyond indicated elevations and width limits indicated in the Contract Documents without direction of the Engineer. Over-excavation material handling, transportation and disposal, backfilling and compaction shall be at the Contractor's expense. Over-excavations shall be backfilled and compacted as specified for excavations of the same class, unless otherwise directed by the Engineer.
- Unauthorized Excavation: Consists of removal of materials beyond indicated sub-grade elevations or Contract-defined limits as shown in the Contract documents without specific direction of the Engineer. Unauthorized excavation, handling material, transportation and disposal, backfilling and compaction shall be at the Contractor's expense. Unauthorized excavations shall be backfilled and compacted as specified for excavations of the same class, unless otherwise directed by the Engineer.
- Unknown Materials: Any material, that is not readily identifiable as nonhazardous waste, and which has not been previously characterized or encountered during site investigation activities. The Unknown Material classification is to be used in the event that an unexpected, unusual material is encountered for which special handling procedures shall be required in order to handle the material safely. Such wastes include but are not limited to:
  - Unlabelled drums or containers containing material which is not readily identifiable as a non-hazardous substance.
  - Any material, which varies significantly from material previously observed on site and which cannot be readily identified as a nonhazardous.
  - Waste material of unusual color or odor or material with indications of hazardous levels (e.g. exceeding OSHA permissible exposure limits) of contaminants as evidenced on an organic vapor monitor or other similar instrument.

  The Owner reserves the right to apply generator knowledge to classify and profile the material as a previously encountered waste or as a known waste. In the event that a material is encountered which the Contractor is uncertain as to its nature, the Owner or their representative shall assess the material with the Contractor and inform the Contractor as to the nature of the material (known or unknown).

м¢р WORK INCLUDED

!¢ Managing excavated soil, wastes, asphalt, brick and concrete (ABC), and fill material. For Asbestos-containing Material or Asbestos Cement Pipe, also see Section 02076.

.¢ Characterization of soil, fill, and unknown material for disposal/ off-site reuse purposes; field screening and soil management/segregation; temporary storage/staging; and characterization (as may be necessary for unknown materials and/or for compliance with receiving facility requirements); and disposal and/or off-site reuse of excavated soil and fill material.

All laboratory chemical analyses conducted shall utilize currently accepted U.S. EPA and applicable state agency analytical protocols and procedures.

/¢ Management of contaminated groundwater: If groundwater potentially impacted by oil and hazardous material (OHM), based on visual or olfactory evidence, is encountered in the course of the work, construction dewatering and discharge permits and groundwater treatment may be necessary depending upon the discharge method(s) and/or location(s) utilized by the Contractor. The Owner and Engineer shall be notified by the Contactor if groundwater potentially impacted by OHM is identified. REFER TO SECTION 02140 DEWATERING.

5¢ All work at the site must be performed in accordance with all applicable federal, state, and local regulations, permits and licenses, including, but not limited to:

м¢ The applicable parts of the Code of Federal Regulation (CFR) Title 40: Protection of Environment, pertaining to the Comprehensive Environmental Response and Liability Act (CERCLA) and the Superfund Amendments and Reauthorization Act (SARA), RCRA, and the National Emission Standards for Hazardous Air Pollutants (NESHAPS) as regulated by the U.S. Environmental Protection Agency (U.S. EPA);

н¢ State regulations specified in the Massachusetts Contingency Plan (MCP) (310 CMR 40.0000), and Massachusetts General Law 21E - Massachusetts Oil and Hazardous Materials Release Prevention and Response Act, and applicable Massachusetts Department of Environmental Protection (MassDEP) guidelines and policies;

о¢ MassDEP Technical Update. Background Levels of Polycyclic Aromatic Hydrocarbons and Metals in Soil (2002);

п¢ Department of Transportation (DOT) regulations 49 CFR, and state transportation licenses and permits;

р¢ OSHA regulations (including, but not limited to, 29 CFR 1910.1000, 29 CFR 1926, and CFR 1910.120), 40-hour Occupational Safety and Health Administration (OSHA) training (plus 8-hour refresher training) and all other applicable state and federal regulations regarding health and safety requirements;

с¢ NIOSH/OSHA/USCG/EPA: “Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities” October 1985, DHHS (NIOSH). Publ. No. 85-115;

т¢ Department of Transportation training;

у¢ U.S. Army Corps of Engineers 404 permit;

ф¢ General Contractor's license;

мл¢ National Pollutant Discharge Elimination System (NPDES) Notice of Intent (NOI) to discharge and associated general permits;

мм¢ Massachusetts Water Resources Authority pretreatment and construction dewatering requirements and permits;

мн¢ Excavation and/or grading permits;

мо¢ Special use permits;

мп¢ Special waste haulers certificate;

мр¢ Massachusetts Wetlands Protection Act and associated Order of Conditions;

MC♦ City of Waltham wetland regulations and bylaws; and The Contractor's Soil and Waste Management Plan (SWMP) and Health and Safety Plan to protect the workers and the public.

9♦ Implementation of the submitted HASP and other applicable includes establishing work zones (e.g., support zone, contamination reduction zone, exclusion zone), preparing a decontamination pad(s) and staging area(s), performing the appropriate environmental monitoring, training and medical monitoring of personnel, coordinating waste disposal and waste characterization as needed, etc.

C♦ The Contractor shall characterize all excavated and stockpiled soil and fill material prior to off-site reuse or disposal. Characterization requirements may vary depending on the source/location of the excavated soil/fill, the site selected to receive soil suitable for off- site reuse, or the disposal facility permits and policies. The Contractor is responsible for final waste characterization and shall determine if any additional waste characterization is required at no additional cost to the Owner.

D♦ The Contractor shall develop, implement, maintain, supervise, and be responsible for all soil management practices during the course of this contract. An OSHA Competent Person, with demonstrated experience in clean and contaminated soil and hazardous waste handling, shall be present during all excavation, backfilling, field screening, segregating, handling, and characterization of all soils excavated in the course of completing this contract to ensure that soil is managed in accordance with applicable laws, regulations, and this Section.

Soil management activities shall include and be conducted as specified herein:

M♦ Providing and constructing a secure soil staging area sized to adequately segregate soils in accordance with the conditions specified without impeding construction-related activities. The Contractor is to use existing information and obtain additional information as may be needed to minimize the need for a staging area. If a staging area is required to characterize unknown or excess material for any reason, the Contractor is responsible for locating, selecting, preparing and securing the area.

H♦ If the soil storage area consists of an unimproved or otherwise pervious surface, the Contractor shall install a lining of 6-mil (or greater) polyethylene, to protect the soil from the potential of intermixing with existing subsurface soils.

O♦ Stockpiles shall be no greater than 250 cubic yards in volume. If space constraints, etc. make it infeasible to maintain separate stockpiles of soils to 350 cubic yards, the Waste Management Plan shall include a map with the locations of the composite samples for each stockpile shall be provided to the Resident Engineer prior to the submittal of the samples to the off-site analytical laboratory. This will allow any portion of the stockpile, which came back as contaminated soil to be properly segregated and managed separately

П♦ Stockpiles shall be established and maintained as per EPA requirements under the Construction General Permit Section 2.1.2.4. Requirements include the following.

I·♦ Locate the piles outside of any natural buffers and physically separated from other stormwater controls;

Ō♦ Protect from contact with stormwater (including run-on) using a temporary perimeter sediment barrier;

Ŏ♦ For all soils, provide cover or appropriate temporary stabilization to minimize sediment discharge and to contain and securely protect from wind; nevertheless, the Contractor shall provide cover for any stockpiles containing contaminated soils (>RCS-1 or containing asbestos containing material – see Item 1.5.G.5);

Ř Do not hose down or sweep soil or sediment accumulated on pavement or other impervious surfaces into any stormwater conveyance (unless connected to a sediment basin, sediment trap, or similarly effective control), storm drain inlet, or surface water; and

Ŝ Unless infeasible, contain and securely protect from wind.

p Excavated soil/fill that is contaminated or hazardous, or may be suspected to be contaminated or containing hazardous materials shall be stockpiled and covered prior to characterization and off-site reuse or disposal. Since individual disposal facilities will have different permit conditions and specific pre-characterization data requirements the Contractor is responsible for final soil characterization prior to transport and disposal. The Contractor is hereby made aware that for the purposes of disposal, final soil characterization is the responsibility of the Contractor and costs for securing a staging area and conducting waste characterization shall be incorporated into the Contractor's bid price for construction. Contractor's operations shall meet all stockpiling requirements established in the MCP (310 CMR 40.0036)

c Prior to off-site soil disposal, excavated materials removed adjacent to asbestos pipe removal as per Contract Documents for asbestos pipe removal that cannot be re- used on site shall be tested to ensure no asbestos is present in the soil. This shall include at a minimum, visual screening of all soil for suspect asbestos or debris and one asbestos soil test for every 250 cubic yards of material and a minimum of one test per project, or whatever is required by the receiving facility (even if greater than once every 250 cubic yards). Samples shall be collected and analyzed by California Air Resources Board (CARB) Method 435 titled Determination of Asbestos Content of Serpentine Aggregate by Polarized Light Microscopy (PLM). Any material which exceeds 1% asbestos content must be disposed of at a licensed asbestos disposal facility in accordance with the Soil Management Plan (S/WMP) and applicable regulatory requirements.

т During construction activities, excavated soil/fill waste shall be field-screened by the Contractor and either loaded directly for off-site disposal (provided the excavated material is consistent with previously conducted investigations) or stockpiled in a soil/fill waste staging area located by the Contractor and approved by the Owner and Engineer. Stockpiles of Class A, B, and C soils shall be minimized to reduce the amount of waste material stored onsite. Stockpiled materials that are to be disposed of shall remain onsite for only as long as it would reasonably take to characterize (if not done in advance), load and transport offsite to an approved disposal facility. Stockpiles of Class B soil must be removed within 120 days of being generated per the MCP (310 CMR 40.0031). Stockpiles of Class C soil must be removed within 90 days of being generated per RCRA and the MCP. Soils that are to be re-used as fill material shall be stockpiled and maintained as specified herein.

y Soil suspected of having the characteristics of a hazardous waste or of containing a listed hazardous waste shall not be removed from the excavation except at the direction of the Engineer.

ф Soil/fill waste shall not be staged within 100 feet (30.5 meters) of a reservoir, wetland or Area of Critical Environmental Concern or in a 100-year floodplain. Soil/fill waste shall not be staged in the work area over night. Contaminated material requiring additional waste characterization due to waste disposal facility requirements or in order to assess unknown materials, shall be staged securely pending analytical sampling and characterization by the Contractor.

мл The Contractor shall reuse excavated soil at the point of origin to the maximum degree possible. Soil/fill which cannot be reused immediately at the point of origin shall either have been pre-characterized for off-site reuse or disposal by the Contractor and directly loaded for off-site transport (provided the excavated soil/fill is consistent in visual, olfactory and field screening characteristics with subsurface investigation conducted prior to construction pursuant to the MCP) or it shall be staged at a location determined and secured by the Contractor pending analytical characterization.

мм Excavating unknown, previously uncharacterized material which may be classified as RCRA hazardous waste and disposing of it at an approved facility.

мн Excavating soil, fill and waste containing potential asbestos-containing material (e.g., transite board) shall conform to Section 02076.

мо Removing characterized on-site materials for off-site re-use or disposal.

мп Placing and grading of certified clean fill (including fill from on-site which is determined to be suitable for re-use). The Contractor is to maximize the in-project reuse of on-site materials by using soil suitable for such reuse prior to importing material on site.

мр Demobilizing the site, including, but not limited to, removing and disposing of excess or waste soils, rock, solid waste, demolition waste, construction-related equipment and materials used for personnel and equipment decontamination and related waste such as personal protective equipment (PPE), decontamination water/solids, temporary covers, and wash-water storage tanks; disconnection of temporary utilities; and final clean-up to pre-construction conditions.

мс In the event that a previously uncharacterized, unknown material is encountered the Contractor shall manage the material separately and will temporarily stage the material pending characterization as specified herein.

I All Investigation Derived Wastes are the property and responsibility of the Contractor and are to be disposed of by the Contractor under a Uniform Hazardous Waste Manifest and/or by a Bill of Lading, as appropriate. All samples and laboratory by-products will be returned to the Contractor for disposal. The parties understand and agree that any consultant or sub-consultant (at any tier) is not, and has no responsibility as, a generator, treater, storer, transporter, or disposer of hazardous or toxic substances found or identified at the project site, and that the Contractor agrees to assume responsibility for and indemnify and hold any consultant or sub-consultant (at any tier) harmless from the foregoing.

L The Contractor is responsible for being aware of potential hazards at the site and reviewing all existing information which provides evidence of contamination within the limit of the work.

мс EXISTING CONDITIONS

! Refer to the documents referenced as part of this Section. The Contractor is obligated to review existing environmental assessment reports and manage the soil and groundwater in accordance with applicable state and federal regulations.

мт SUBMITTALS

! The Contractor shall prepare a Soil and Waste Management Plan (S/WMP) that generally describes the work to be performed under 02080 Part 3 (Execution). The Soil Management plan shall include, but not be limited to detailing the submittal and implementation of the following:

м Soil and Waste Management Plan;

2. Site-Specific Health and Safety Plan;
3. Dust, Vapor and Odor Control Plan;
4. Air Monitoring Plan;
5. Dewatering Plan;
6. Stormwater Handling Plan;
7. Equipment and Personnel Decontamination Plan
8. Quality Control Plan;
9. Spill and Discharge Control Plan
10. Asbestos Work Plan, and
11. Template URAM.
12. The Soil and Waste Management Plan (S/WMP) shall be submitted at least three weeks prior to the beginning of any intrusive work at the site. All other required plans shall be submitted to the Owner or Engineer and/or their representative for review and approval at least two weeks prior to beginning any intrusive work at the site. Plans shall be consolidated provided the requirements of each plan are fully incorporated therein.

B. Soil and Waste Management Plan (S/WMP): The S/WMP shall outline measures for soil and fill sampling, field screening, laboratory chemical analysis, and disposal/ off-site reuse. The S/WMP shall be prepared by a Massachusetts Licensed Site Professional (LSP). The S/WMP shall be implemented prior to the commencement of any excavation activities. At a minimum, this plan shall address the following:

1. Methods, procedures, and equipment used for excavating, handling, characterizing, segregating, reusing/backfilling, loading, and transportation of contaminated soil/solid waste materials encountered during excavation operations;
2. A list of all transporters and waste facilities, complete with license numbers, permit numbers, contact person, and address and telephone number that the Contractor utilizes for waste disposal. In addition, a copy of a memorandum of understanding between the Contractor and each disposal facility shall be attached to the Soil and Waste Management Plan. The memorandum of understanding shall detail that the disposal facility agrees to accept a specified quantity of waste as characterized in the contract specifications and detail what if any restrictions may apply. The Contractor shall provide copies of the permits held by each disposal facility which the Contractor plans to use to dispose of non-hazardous solid waste, hazardous waste, PCB- impacted waste and asbestos-containing waste;
3. A summary of the history of compliance actions for each disposal/recycling facility proposed to be used by the Contractor. The compliance history shall include a comprehensive list of any state or federal citations, notices of non-compliance, consent decrees or violations relative to the management of waste (including remediation waste) at the facility. The Owner reserves the right to reject any facility on the basis of poor compliance history;
4. Procedures for securing the staging area, controlling dust and soil/solid waste migration, air monitoring procedures, and methods of preventing damage to uncontaminated areas via contaminant migration and for decontaminating vehicles and personnel exiting the staging area;
5. The means and methods for decontaminating all equipment and personnel, including provisions for installing an equipment decontamination pad if required or specified;
6. Methods and procedures for identifying stockpiled material (e.g., labeling, marking containers) and procedures for identification and tracking;

т. Methods, procedures, and equipment used for obtaining the necessary information needed to satisfy the off-site reuse/disposal facility requirements specified herein and/or by the facility;

у. Methods, procedures, and equipment proposed for assessing and handling Unknown Materials. The S/WMP shall indicate which laboratory(ies) the Contractor shall utilize for chemical analysis soil, groundwater and unknown materials.

і. An Unknown Materials information sheet shall be developed as part of the Contractor's S/WMP, upon which the Contractor shall record information such as container type, size, and condition; and, any identifying characteristics of the unknown material. The format of the information sheet shall be as accepted by the Owner and/or its representatives;

ō. The Contractor's plan for notifying the Owner and Engineer in the event that an unknown material as defined in this specification is encountered. The plan shall include the phone numbers and names of the Owner's representative(s) that the Contractor would contact in such an event.

ф. Provisions for separation of incompatible materials and segregation of different class of soil;

мл. Procedures for consolidating (i.e., bulking) compatible materials for disposal;

мм. Procedures for dewatering as well as handling, characterization, storing, treating and disposing of groundwater due to dewatering. Refer to Section 02140;

мн. Procedures for diverting and handling site stormwater. This would include handling, treatment and discharge of stormwater;

мо. Provisions, procedures and equipment used for control of dust, vapor and odor; including measures to control objectionable dust, vapors, and odors originating from the site (Section 3.7). This shall describe procedures to minimize the creation of dust, and the control of objectionable vapors and odors originating from the site;

мп. Provisions, procedures and equipment used to monitor air at the site (Section 3.6). This shall include site specific monitoring for potential hazards in the air; including the proposed instrument(s) to be used, the expected hazards (e.g., dust, VOCs), the monitoring frequency, the monitoring locations, and the reporting procedures.

/. Soil Management/Tracking Documentation:

м. Prior to off-site disposal or reuse, the Contractor shall provide to the Engineer a letter from the disposal facility indicating that the facility has reviewed the available data relative to the soil/solid waste to be delivered and agrees that the soil/solid waste meets their acceptance criteria. The letter shall be signed by a duly authorized representative of the receiving facility.

н. Within the time constraints established in state and/or Federal laws and regulations, the Contractor shall submit to appropriate authority(ies) and the Owner, as applicable, Uniform Hazardous Waste Manifests, Material Shipping Records, and/or Bills of Lading for all soils and associated fill, rock, ABC and waste disposed or reused of off-site utilizing such documents. Copies of all manifests, Bills of Lading, and all other documents used to track and/or permit off-site transportation of soils shall be submitted to the Owner and Engineer within ten (10) days of shipment. All manifests and Bills of Lading shall be signed by the transporter and receiving/disposal facility. The Contractor is responsible for preparation of all manifests, Bills of Lading, Material Shipping Records, and all other related documents completely and accurately prior to submitting them to the Owner and/or its representative for generator and LSP signatures. The Contractor shall be responsible for paying for any and all fines associated with inaccurate, incorrect, or improperly completed

manifests, Bills of Lading and all other related documents, including fines resulting from late or untimely submittals.

D. Stormwater Handling Plan: The Stormwater handling plan shall provide provisions to ensure compliance with Section 3.10, other portions of the Contract Documents, and all applicable local, state and federal permits.

E. Quality Control Plan: The Contractor shall prepare a Quality Control plan for the development, implementation, and maintenance of a quality control system to ensure that the specified quality is achieved for all materials and work performed.

F. Spill and Discharge Control Plan (SDCP): The SDCP shall provide contingency measures and reporting responsibilities for potential uncontrolled spills and discharges of contaminated and/or hazardous materials, including, but not limited to: fuels, oils, contaminated groundwater, granular solid waste, leachate, decontamination water, sewage, and other on-site waste materials. In addition to the above listed items, the SDCP shall specifically contain: procedures for containing dry and liquid spills; absorbent material available on site; storage of spilled materials; governmental reporting (i.e., notification) procedures; decontamination procedures; discharges of sanitary or combined sewers into storm drains either by flow handling/bypassing or accidental or unintentional discharge; and procedures for protecting wetlands and surrounding public and private property.

The Spill and Discharge Control Plan shall indicate the location and quantity of the materials to be staged on site and the basis for the quantities (i.e. indicate the vessel which will be on site containing the greatest volume of oil or hazardous materials). No fuel or oil tanks or drums may be temporarily staged on site unless they are stored within a secondary containment system. Fuel deliveries shall be performed in a designated area which has either secondary spill containment or an impervious surface with absorbent berms located around the point of fuel delivery. The Spill and Discharge Plan shall indicate the location of the fueling area and the nature of secondary containment which the Contractor intends on utilizing.

1. Notification Procedures: The Contractor shall prepare in advance of work activities a notification list, complete with phone numbers, addresses, and contact names for all parties to be notified in the event of a spill. This list shall be posted on-site at all times and shall include:
    a. Owner’s designated representatives;
    b. Owner;
    c. Fire Department;
    d. Engineer; and
    e. Massachusetts Department of Environmental Protection (as required per 310 CMR 40.0000). The Owner shall be notified immediately of an uncontrolled spill or discharge. If human health or the environment are potentially threatened, the Contractor shall take immediate action to abate the conditions and notify emergency personnel.
2. Spill Incident Report(s): In the event of an uncontrolled spill or discharge, a written report detailing each uncontrolled spill or discharge shall include, at a minimum, the cause and resolution of incident, outside agencies involved, and date of occurrence. The report shall be submitted to the Owner within 48 hours of the incident. The Contractor shall document all spills on the as-built Drawings and submit the Drawings to the Owner at project completion. The Contractor shall be responsible for remediating any spills or releases of oil or hazardous materials as a result of the Contractor’s activities. The site shall be remediated to pre-release conditions at no additional cost to the Owner.

PART 2 - PRODUCTS

H$M DUST CONTROL

!$ Dust suppression may be achieved by applying controlled amounts of water or dust suppression chemicals to the project site, and through covering of soil stockpiles, etc. Dust suppression shall be carried out in accordance with the approved SWMP.

H$H SPILL CONTROL

!$ At a minimum, the Contractor shall maintain on-site absorbent pads, booms and absorbent materials in sufficient quantity to address a release of fuel oil, hydraulic oil or other OHM that the Contractor intends to use or store on site, including fuel oil and hydraulic oil that is used within earth moving equipment. The quantity of spill containment materials maintained on site shall be sufficient to respond to a catastrophic release from the vessel containing the greatest quantity of oil or hazardous material on-site.

PART 3 - EXECUTION

O$M GENERAL

!$ All work in this section will be performed in accordance with the Contractor's Work Plan, S/WMP and Site-Specific HASP that have been approved by the Owner and Engineer.

.$ The primary concern of the Contractor in the excavating, handling, sampling, bulking, and on-site storage of soil/solid waste and/or drummed material (if encountered) will be to protect the health and safety of the site workers, the public, and the environment.

/$ The Contractor shall keep a copy of the Health and Safety Plan (HASP) on site during all operations and shall conduct daily health and safety meetings. Failure to keep a copy of the HASP on-site, or any other breach of the Contractor's Plan, may be cause for stopping work at the cost of the Contractor. Delays caused by the Contractor's failure to comply with the health and safety regulations or any health and safety plan shall not entitle the Contractor to recover any additional costs or time lost. The Contractor shall not be allowed to resume activities until corrective measures are accepted by the Engineer and/or their representative and implemented.

5$ Medical surveillance records, OSHA 40-hour training forms, accident forms, and all other documentation requirements of the Contractor's safety and health program for personnel working on the site (who are subject to exposure to potentially contaminated soil) shall be up-to-date and kept on file at the site. The Contractor shall provide documentation of employee status upon request of the Engineer and/or their representative.

O$H SOIL/SOLIDS FILL WASTE MANAGEMENT

!$ Soil and fill material that is managed under a Utility-Related Abatement Measure (URAM) Plan pursuant to the MCP, and which is staged off-site may be re-used within fourteen (14) calendar days of excavation. Any material which is suitable for re-use as ordinary borrow, based on analytical results and could have been placed on site, but was not, due to Contractor delay (i.e. analytical results were not available within 10 days following excavation) will be disposed in accordance with the applicable regulations by the Contractor at no cost to the Owner.

.$ Soil and fill material that is managed under a Utility-Related Abatement Measure (URAM) Plan pursuant to the MCP, which is staged off-site and which is determined at the staging area to be characteristically hazardous may be treated (stabilized) within the “Area of Contamination” only and must be reused with 14 days or disposed of within ninety (90)

calendar days of excavation. No treatment may occur at the staging area. Pursuant to the MCP and RCRA, hazardous Remediation Waste (e.g., Class C soils) shall be removed from the site within 90 days. All other Remediation Waste (e.g., Class B soils) shall be removed within 120 days unless exceptions identified at 310 CMR 40.0031(7) apply.

/. Class B and C excavated soils shall be completely covered with a minimum 10-mil thick layer of plastic tarp. Soils exhibiting evidence of potential contamination including but not limited to odors and/or staining shall be covered prior to characterization and off-site reuse or disposal. Stockpiled soils determined to be Class B or C, as described herein, shall be securely covered at the close of each day and continuously when not being added to or otherwise being handled by the Contractor. Stockpiles shall also be covered at times as directed by the Engineer. All stockpiling activities shall meet the MCP requirements for management of Remediation Waste (310 CMR 40.0036).

O.O SOIL/FILL WASTE CHARACTERIZATION

Soil and fill material shall be classified based on the criteria established in the accepted SWMP.

!. Initial Characterization of Soil/Fill Waste Material: A summary of existing conditions and investigation findings performed by the Engineer during design, including a summary of analytical results, shall be available to the Contractor.

.. The Contractor shall review all the existing conditions information supplied by others. The Contractor shall use the information and shall either perform independent sampling and characterization of soil/fill waste strata to be encountered during construction in advance of excavation such that excavated soil can be segregated and directly transported to an appropriate facility or the contractor shall make the necessary arrangements to secure a staging area(s) suitable for storing soil stockpiles pending analyses, at no additional cost to the Owner.

/. Soil shall be preliminarily segregated based on the Soil Classification Categories detailed in Sub-section 1.4, except as indicated below.

M. Potential Asbestos Containing Material (PACM). If soil/fill waste suspected of containing asbestos is encountered during excavation, the Contractor shall immediately contact the Engineer to discuss the nature and extent of the PACM and to assess potential hazards and appropriate handling procedures. Prior to handling and removing the PACM, MassDEP shall be contacted for approval. Discovery and management of PACM shall be documented in the S/WMP. Evidence of PACM includes but is not limited to the presence of suspect asbestos-containing building debris such as cementitious (transite) piping, vinyl floor tiling, roofing paper or paper-like insulation materials or any other suspect asbestos containing material observed in the soil/fill waste. Following MassDEP approval, such soil/fill waste shall be segregated and stockpiled pending confirmatory analysis to determine appropriate disposal requirements.

H. Unknown Material. If unknown material is encountered during excavation, the Contractor shall immediately contact the Owner and Owner's representative to discuss the nature and extent of the unknown material and to assess potential hazards and appropriate handling procedures. Prior to handling and removing the unknown material from the excavation area, the Contractor and Owner and/or its representatives, shall visually assess the material and its potential hazards. Drums shall be assessed to determine whether they are leaking, bulging (evidence of reactive waste), crushed, or empty. Crushed, empty, and/or skeletal parts of drums shall be handled as solid waste, as specified. The Contractor shall record any identification or markings on the drummed material(s). Discovery and management of unknown materials shall be documented as required in the S/WMP.

5. Final Waste Characterization: Final waste characterization shall be the responsibility of the Contractor. The Contractor shall be responsible for determining the characterization requirements of each disposal facility in advance to facilitate timely disposal and to adequately estimate the disposal costs. The Contractor shall perform additional segregation based on disposal requirements. Disposal or off-site reuse of the material shall depend on sampling and characterization analytical results. At the request of the Engineer or Owner, the Contractor shall provide a split sample. The Contractor shall perform or observe all sampling and shall provide notice in advance to the Engineer so that the Engineer may observe the sampling procedure.

M. Stockpiles within the staging area shall be sampled and characterized within a timely manner so as not to impede construction activities or preclude the reuse of soil/fill on site. If soil/fill cannot be reused on site due to the Contractor's delay in sampling material, the Contractor shall dispose of the soil/fill at no additional cost to the Owner including the additional cost of imported fill material used in its place to meet project requirements.

STAGING AREAS

!. The Contractor's staging area shall be large enough to store equipment, materials and all stockpiled soils. The contractor shall protect the staging area from contamination due to excavating, handling, storing and disposing of hazardous materials.

.. Stockpiles of soils that are known or suspected to be hazardous within the soil staging areas shall be placed on a 20-mil HDPE liner/filter fabric and bermed to minimize the potential for contamination release. Each soil category shall be staged in separate areas with barriers to keep different soil types from mixing. Waste characterized as RCRA hazardous waste will not be stored on site for a period greater than ninety (90) days. All other waste must be disposed of off-site within 120 days of excavation unless otherwise approved by the Owner. At the end of each working day, contaminated soils will be covered with 10-mil polyethylene to minimize the potential for release of contaminants. All stockpiling activities shall meet the MCP requirements for management of Remediation Waste (310 CMR 40.0036).

/. Covers on stockpiles of soils that are known or suspected to be hazardous shall be secured with tires, ropes, anchors or equivalent material. The cover system shall be capable of resisting actual wind gusts at the site, with a minimum wind capacity of 40 miles per hour. The stockpile covers shall be installed and secured at the end of each working day and at all times when earthwork is not taking place on site. Stockpile covers shall be immediately re-covered should wind forces expose any of the excavated materials. Failure to adequately protect the stockpiles may result in non-payment.

5. Stockpiles are to be segregated based on visual, olfactory, and field screening results. Similar material may be stockpiled together. Each stockpile must be clearly separated from adjacent stockpiles. A temporary construction fence with visual screen shall be maintained around the perimeter of the stockpile area at all times.

9. Stockpiles will be clearly designated by a sign post or marker which can be cross-referenced with samples collected from the pile for characterization purposes. The signs/markers are not to be moved, except by authorized personnel and not until the soil is ready to be either reused on site or loaded for off-site disposal.

C. Unknown, potentially hazardous soils/debris and drummed materials encountered during the project shall be located in a separate bermed location. The Contractor's Soil and Waste Management Plan shall provide construction details of the dimensions and protective measures proposed for the staging area(s). The construction details and protective measures are subject to the approval of the Owner and/or its representatives. The

Contractor shall select the area to facilitate handling of the material and to minimize interference with other ongoing construction activities. The Owner or Engineer must agree with the location prior to construction. In the event that excavation is conducted near storm water drainage basins or inlet manholes, the Contractor must protect the drainage structures with filter fabric or provide similar protection to prevent sediment loading and migration of contaminated soils and sediments.

o♦p EQUIPMENT AND PERSONNEL DECONTAMINATION

!♦ Equipment and personnel decontamination facilities shall be provided by the Contractor when hazardous materials are expected to the encountered and handled onsite. Equipment and personnel decontamination area(s), conforming with the Contractor's HASP and these Specifications, will be constructed in such a manner to protect existing site surfaces, materials, and structures from contamination. The equipment decontamination area(s) will be sized adequately to provide for the decontamination of the largest piece of equipment to be decontaminated. Filter fabric will be placed over an impermeable liner to protect the liner from rips, punctures, or tears from traffic and heavy equipment.

.♦ The Contractor shall establish a site-specific decontamination protocol and decontamination areas for personnel and equipment utilized at the subject site. Personnel and equipment decontamination shall be conducted in compliance with the HASP.

/♦ The decontamination protocol shall include (i) the means, methods, and materials for the proposed decontamination procedures; (ii) the procedures employed to contain and store the wash or rinse liquids/sludges; (iii) procedures used to sample, analyze, and characterize the contaminated wash or rinse liquids/sludges; (iv) procedures to contain or clean contaminated equipment and PPE; and (v) the procedures for handling and disposing of solid wastes generated from site decontamination activities. All sample analysis or sample compositing shall be completed by a certified laboratory. The Contractor shall be responsible for the cost of this analytical work. The Contractor shall submit a copy of the analytical results and laboratory certifications to the Owner for review prior to proceeding with disposal. The Contractor shall be responsible to properly manifest and dispose of all residual wastes generated from on-site activities in conformance with federal, state, and local environmental and transportation regulations. The Contractor shall be responsible for the manifests and procedures to be used to package and dispose of contaminated solid wastes, wash, or rinse liquids at an EPA or state-approved treatment or disposal facility. The Contractor shall be responsible for any releases from site or decontamination activities due to its work, and will remediate any release for which the Contractor is responsible to pre-existing conditions at the Contractor’s expense.

5♦ Provisions for collecting decontamination water will be incorporated into the maintenance of the decontamination pad and will include placing an impermeable liner over a sloped surface such that water is directed, if necessary, into an area for subsequent pumping to 55-gallon drums or other appropriate tankage. Following completion of the work, the wash water shall be characterized by the Contractor and disposed off-site, in accordance with federal, state, and local regulations.

o♦c ENVIRONMENTAL FIELD MONITORING / DUST CONTROL

!♦ Refer to related Section 01562 – Dust Control.

.♦ Air monitoring shall occur when excavating or handling soils that are known or suspected to be hazardous or contain hazardous materials pursuant to the MCP. The Contractor shall keep accurate documentation of all air monitoring, which will be made available to the Engineer or Owner upon request.

M Air monitoring shall include headspace analyses in a jar or plastic bag performed using a portable photoionization detector or other appropriate instrument for the anticipated conditions. The Contractor shall be responsible for properly calibrating the instrument each day and recording the calibration in a daily log which shall include the following information:

- I Name of device or instrument calibrated.
- O Date of calibration.
- Ŏ Results of calibration.
- Ř Name of person performing the calibration.
- Ŝ Identification of the calibration gas.

H The Contractor is responsible for providing fully charged instrument(s) at the start of each work day.

O When applicable, field screening samples shall be taken from numerous locations within the excavation. Samples shall be taken from any area that appears to be visibly contaminated or where an odor is noted.

/ If there are indications of contamination, the frequency of air monitoring will be determined by an Industrial Hygienist or competent environmental health professional. The Contractor's Site Health and Safety Officer and Superintendent will be responsible for assuring that monitoring is conducted in an appropriate manner, and that work practices, engineering controls and/or Personal Protective Equipment are proper for the conditions.

5 The air monitoring program is to be designed to protect public health and the environment from the potential generation of dust and contaminant release during work. At a minimum, the air monitoring shall include daily monitoring and documentation of one upwind, and two downwind conditions during periods of activity on the site and when there is a potential for dust being generated on the site. The air monitoring information including air monitoring in the vicinity of all site activities shall also be utilized for establishing levels of personal protection measures in the Contractor's Site Specific Health and Safety Plan. The Contractor shall submit his/her air quality monitoring program for review and approval prior to commencement of site activities.

9 Air monitoring shall be performed by the Contractor during all soil handling operations. In contaminated areas, detectors for organic contaminants and dust should be utilized to monitor on-site and off-site breathing zones and possible sources of potentially hazardous material (e.g. excavations, regrading, etc.). All personnel shall be made aware of the potential hazards and be informed of air monitoring information by the Contractor. Particular attention to air quality shall be made in the work area during earthwork activities to ensure that contaminants do not escape to the atmosphere and affect off-site population, on-site control, working conditions and personnel protection measures.

C Dust shall be controlled during excavation of soil/fill waste material to limit potential spread of contaminants and potential exposure of contaminants to workers and the public.

D During construction, real-time dust monitoring shall be conducted under windy and/or excessively dry working conditions or when directed by the Engineer. The monitoring shall consist of total dust testing using MIE, INC. MINIRAM PDM-3 DUST MONITORS, or like instruments. The total dust criteria at the site shall conform to the requirements of the HASP. Should fugitive dust quantities exceed 20 percent of the ambient level or action levels indicated within the HASP, the Contractor shall perform additional measures to reduce the total dust concentrations.

I Nuisance dust levels shall be reduced by pre-wetting the surface soils and by establishing and maintaining clean access roads. The Contractor's Dust, Vapor, and Odor Control Plan shall describe the procedures and materials to minimize dust. At a minimum, the Contractor shall provide clean water, free from salt, oil, and other deleterious materials.

L. Areas of exposed earth to be excavated shall be lightly sprayed with water before excavation if there is potential for nuisance dust generation. Additional water spray may be utilized only when any indication of excessive dust is observed. To the extent feasible, the Contractor shall minimize the use of water within the limits of excavation.

M. Unimproved access roads shall be sprayed with water on a regular basis to minimize the generation of dust.

Y. All containers temporarily storing waste material shall be covered at all times except as necessary to place waste material into the container. The Contractor shall monitor the covers daily to ensure the covers are in place and effectively eliminating the generation of dust and make appropriate notes in the site log.

3.3 VAPOR AND ODOR CONTROL

A. Unimproved access roads shall be sprayed with water on a regular basis to minimize the generation of dust. The Contractor shall provide the materials and labor to control objectionable vapors and odor in accordance with the Contractor's S/WMP. The Contractor shall limit the exposure area and shall cover the exposure area with synthetic reusable covers, lime, foam suppressants, or other methods to reduce off-site odors to acceptable levels. The Contractor shall not use soil suitable for on-site reuse as cover to control vapor and odors.

3.4 BULKING

A. Following characterization and compatibility testing of waste material, the Contractor shall place compatible materials into common containers to reduce transport and disposal costs, when practicable and with the approval of the Engineer. In addition, materials that are improperly contained shall be transferred into the appropriate containers. Drums and containers used during this project shall meet the appropriate DOT, OSHA, and U.S. EPA regulations for the materials contained. The Contractor shall describe the bulking procedures in the Soil and Waste Management Plan.

3.5 CONTAMINATED LIQUIDS

A. The Contractor shall collect and properly dispose of contaminated liquids and other liquids generated or encountered on site during construction. Contaminated liquid sources include decontamination water, and drummed liquids encountered during excavation. The Contractor shall be responsible for treating and disposing of contaminated groundwater as required by applicable regulations and SECTION 02140 DEWATERING.

3.6 STORMWATER CONTROL

A. The Contractor shall protect all work from erosion while onsite. The Contractor shall divert all stormwater from work areas that may contain oil or hazardous materials (OHM). Stormwater that may contact OHM, polychlorinated biphenyls (PCBs), lead, asbestos or other types of impacted soil shall be collected within the immediate area of the contact, treated (as determined by sampling and testing) and disposed of in accordance with all local, state and federal regulations. Stormwater that is collected, stored onsite and sampled shall be tested and characterized for determining proper transportation, disposal and/or discharge in accordance with SECTION 02140 DEWATERING.

3.7 BACKFILLING AND COMPACTION

A. Excavated areas shall be backfilled with appropriate backfill material (including excavated material suitable for reuse and, when necessary, imported off-site material). Imported

backfill used in excavated areas shall have been analyzed and certified as free of contaminants and as specified in SECTION 02200 - EARTHWORK.

3.12 CLEANUP

A. During the course of the work, the Contractor shall keep the Site and his operations clean and neat at all times. He shall dispose of all residue resulting from the site clearing operations; and at the conclusion for the day's Work, he shall remove and haul away any surplus materials, lumber, equipment, temporary structures, and any other refuse remaining from the site clearing operations and shall leave the entire site in a neat and orderly condition.

END OF SECTION

SECTION 02095

TRANSPORTATION AND DISPOSAL OF SOIL AND WASTE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Furnish all labor, materials, equipment, and incidentals required to transport waste material off site, and dispose, reuse or recycle excess soil (defined herein as including sediments) or waste materials at a licensed facility approved by the Owner.

B. All personnel involved in the transportation of waste from the site shall have the required Department of Transportation (DOT) and Occupational Safety and Health Administration (OSHA) training.

1.2 SUBMITTALS

A. Submit the following:

1. A list of all transporters, destination/receiving sites and waste facilities, complete with license numbers and permit numbers (as appropriate), contact person, and address and telephone number that the Contractor utilizes for soil management and waste disposal. The transporters shall have adequate financial insurance and liability insurance mechanisms to handle any accidents, and associated third-party compensation.
2. A summary of the history of compliance for each disposal/recycling facility proposed to be used by the Contractor. The compliance history shall include a comprehensive list of any state or federal citations, notices of non-compliance, consent decrees or violations relative to the management of waste (including remediation waste) at the facility. The Owner reserves the right to reject any facility on the basis of poor compliance history.
3. If hazardous wastes are to be transported, Contractor shall have or obtain a valid EPA identification number to transport hazardous materials and any other permits or licenses as required by federal, state, and local laws, regulations, ordinances, and procedures.
4. Where appropriate the Contractor shall submit waste manifests and bills of lading for all non-hazardous waste disposed off-site to the appropriate authority, agency, facility, or person within the time constraints specified by state and federal regulations. Originals of all waste manifests shall be provided to the Owner within five (5) days. The Contractor shall complete all waste manifests, bills of lading (BOL) and Material Shipping Records (MSR) completely and accurately prior to submitting them to the Owner. The Contractor shall be responsible for preparing draft Licensed Site Professional (LSP) opinion letters for each disposal facility and coordinating disposal documentation with all parties. The Contractor's LSP and the Owner shall the sign the LSP Opinion Letter, MassDEP BOL and MSR. The Contractor shall reimburse the Owner for any and all fines associated with inaccurate, incorrect, or improperly completed waste manifests, including fines resulting from late or untimely submittals.
5. The Contractor shall submit waste manifests and bills of lading for all hazardous waste disposed off-site to the appropriate authority, agency, facility, or person within the time constraints specified by state and federal regulations. Contractor shall provide the original copy of manifests signed by the hazardous waste transporter and the receiving facility to the Owner immediately.

C. Prior to transporting any soils or fill material to a disposal facility the Contractor shall submit a letter from the disposal facility indicating that the facility has reviewed the available data and the generator's profile of the material and the facility agrees that it meets the facility's acceptance criteria.

M.O DEFINITIONS

!. Asphalt, Brick and Concrete (ABC): Asphalt, Brick and Concrete material that is waste from construction or found in fill material during excavation. ABC material found in clean, reusable fill may be reused onsite to the greatest extent possible. All excess ABC generated during construction shall be disposed of offsite at an appropriate, licensed facility that will accept ABC waste.

.. Bill of Lading (BOL): A document signed by a waste transporter or the transporter's representative and issued to a waste generator that evidences the receipt of waste to a specified disposal facility or location.

/. Fill (Historic Fill): Fill, also known as urban, historic, or miscellaneous fill, is defined as a mixture of soil and other materials which have been located in the area through man-made processes primarily for the purpose of grading, backfilling or filling in low areas. Material commonly associated with historic fill includes, but are not limited to; coal, glass, brick, ash, wood fragments and other similar granular materials. Historic fill shall not include boulders, ledge, consolidated rock, asphalt, concrete, railroad timbers, rail, cobblestones or any other abandoned building materials which would preclude the disposal of the fill as landfill daily cover.

5. Generator: Party Per 40 CFR 260.10 Generator means any person, by site, whose act or process produces hazardous waste identified or listed in Part 261 or whose act first causes a hazardous waste to become subject to regulation.

9. Hazardous Waste:

M. Hazardous waste as defined 310 CMR 40.0006; or

H. Hazardous waste as defined in 40 CFR 261.3.

O. A waste, or combination of wastes, that, because of its quantity, concentration, or physical, chemical, or infectious characteristics may:

I. Cause or significantly contribute to an increase in mortality or cause or significantly contribute to an increase in a serious irreversible or incapacitating reversible illness; or

Ō. Pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

C. Liquid Waste: materials generated on the site due to work performed and are waste or excess including but not limited to: collected groundwater, collected stormwater, non- aqueous phase liquids, contractor-supplied fuels and fluids, and drummed liquids.

D. Solid Waste (Waste): materials generated on the site due to work performed and are waste or excess, including but not limited to: asphalt, brick and concrete (ABC) waste, demolition waste, decontamination waste, dredging spoils (dewatered), metal waste, plaster/drywall, plastic waste, rock, rubber waste, sediment, tar waste, trash, vegetation debris, and wood waste.

I. Soil Classification Categories: Unless specifically stated otherwise, terms used in this specification are as defined in the MCP, 310 CMR 40.0006. The following definitions and soil classifications apply to these specifications:

M. (Class A-1) Background: Any soil or fill material which meets the regulatory definition of "background" as defined in 310 CMR 40.0006 may be reused as common fill/ordinary borrow provided it also meets the physical requirements as specified

herein and as specified in Section 02200. For record keeping purposes soil/fill that meet the definition of background, shall be transported under a Material Shipping Record (MSR).

Background soil may also be re-used off-site without restriction provided it is reused in an area where background concentrations area equal to or greater than the site- specific background determined at the off-site reuse location. The Contractor is responsible for determining the background levels at the point of excavation. It is also the Contractor's responsibility to identify one or more disposal facilities/locations with background levels appropriate to receive the material to be disposed or reused. It is the Contractor's responsibility to determine these background levels in advance so as to comply with 310 CMR 40.0032(3)(b) and so as not to delay or adversely affect construction operations.

H◊ (Class A-2) Impacted: Any soil or fill material which contains oil or hazardous materials (OHM) at concentrations greater than background levels but less than release notification thresholds established by 310 CMR 40.0300 and 40.1600. Impacted soil may be reused in the area of excavation or as fill provided it is reused in an area of equal or greater contamination and meets the physical requirements as specified herein and as specified in Section 02200. Class A-2 soils requiring off-site transportation and disposal/reuse shall be transported using a Material Shipping Record (MSR).

O◊ (Class B) Contaminated: Any soil or fill material which contains oil or hazardous materials at concentrations equal to or greater than a release notification threshold established by 310 CMR 40.0300 and 40.1600, except where the presence of the material is consistent with the regulatory definition of "background" as defined in 310 CMR 40.0006.

Any soils which contain either petroleum or chemical odor or visual indications of oil or hazardous materials shall be handled as potentially contaminated soils. Soil which does not have any evidence of contamination can be reused within the area of excavation without first performing laboratory analyses. Soil/fill that may be contaminated should be set aside by the Contractor for assessment by the Owner's environmental professional. Soil/fill that is staged and characterized can be reused within the area of excavation or elsewhere on site provided the material has been tested and has equal or less contamination than the point where it is to be reused and it is not reused beneath a permanent structure such as a building foundation. Any excavated soil/fill material not reused within the area of excavation must be characterized prior to reuse. After analytical results are available, soil/fill shall be handled in accordance with the type and degree of contamination (if any) present in the soil/fill.

Class B soil that cannot be reused on site shall be reused off-site, recycled, or disposed as a solid waste at an appropriately permitted facility unless it also meets the regulatory definition of hazardous waste as defined in 40 CFR Part 261 or contains detectable asbestos. Subcategories of Class B soil are defined as follows:

I◊ Class B-1: Soil and Fill that meet all applicable criteria (i.e., COMM 97-001 and/or facility-specific permit requirements) for reuse as daily cover, intermediate cover, or pre-cap contouring material at in-state unlined landfills. Note: per COMM 97-001, sediments may not be re-used as Class B-1.

Ō◊ Class B-2: Soil and Fill that meet all applicable criteria (i.e., COMM 97-001 and/or facility-specific permit requirements) for reuse as daily cover, intermediate cover, or pre-cap contouring material at in-state lined landfills.

Ŏ¢ Class B-3: Soil and Fill that meet all applicable criteria for instate recycling at an asphalt batching plant and/or the specific licensing requirements for the proposed in-state recycling facility.

Ř¢ Class B-4: Soil and Fill that contain concentrations of contaminants that exceed in-state, lined, and unlined landfill reuse criteria as well as in-state recycling acceptance criteria, but meet the criteria for regional thermal treatment facilities or out-of-state recycling facilities, and are not classified as a Resource Conservation and Recovery Act (RCRA) Hazardous Waste.

Ŝ¢ Class B-5: Soil and Fill that contain concentrations of contaminants that require removal to regional disposal facilities and are not classified as RCRA Hazardous Waste.

Ŧ¢ Class B-6: Soil and fill which does not meet one of the designations above due to excessive foreign materials and/or debris that are not classified as a hazardous waste.

п¢ (Class C) Hazardous Waste: A waste, or combination of wastes, that, because of its quantity, concentration, or physical, chemical, or infectious characteristics may cause or significantly contribute to an increase in mortality or cause or significantly contribute to an increase in a serious irreversible or incapacitating reversible illness; or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed. Also included within the definition of hazardous waste is hazardous waste as defined 310 CMR 40.0006 and 40.CFR 261.3. Hazardous waste as defined in 40 CFR 261.3 is a solid waste that exhibits any of the characteristics of hazardous waste in excess of regulation levels presented in 40 CFR 261, Subpart C and/or that is listed in 40 CFR 261, Subpart D; that is a mixture of solid and hazardous waste; or that is derived from a listed waste. Subcategories of Class C soils shall be as follows:

I· Class C-1: Soils classified as hazardous waste that can be readily treated on-site to eliminate the toxicity characteristic (e.g., for lead). On site treatment of soils will not be permitted for this project.

ō¢ Class C-2: Material determined to contain "listed" or "characteristic" hazardous waste constituents which cannot be readily treated on-site. This material must be transported to an out-of-state approved RCRA Subtitle C hazardous waste disposal or treatment facility under a Uniform Hazardous Waste Manifest.

I. Material Shipping Records (MSR): See Bill of Lading (BOL).

W¢ Special Waste: Any waste that is determined not to be a hazardous waste pursuant to 310 CMR 30.000 and that exists in such quantity or in such chemical or physical state, or any combination thereof, so that particular management controls are required to prevent an adverse impact from the collection, transport, transfer, storage, processing, treatment or disposal of the waste. Asbestos and PCB-contaminated soils/fill are examples of special waste categories.

Y¢ Soil (Natural Soils): Soil, otherwise known as natural soil, is defined for the purposes of the Contract as unconsolidated sand, gravel, silt and clay, and the organic material which has become part of the unconsolidated soil matrix. For this section only, soil may include broken and fragmented rock.

[¢ Unauthorized Excavation: Consists of removal of materials beyond indicated sub-grade elevations or Contract-defined limits without specific direction of the Engineer. Unauthorized excavation, handling material, transportation and disposal, backfilling and compaction shall be at the Contractor's expense. Unauthorized excavations shall be

backfilled and compacted as specified for excavations of the same class, unless otherwise directed by the Engineer.

a. Waste Manifests: the hazardous waste shipping documentation required to ship all hazardous waste and subject to provisions in 49 CFR 172 Subpart C.

PART 2 - PRODUCTS

H.M GENERAL

!. Provide completed Bills of Lading, Material Shipping Records, manifests, certificates of disposal, weight slips and all other documentation relative to disposal, reuse, treatment or recycling of soil and waste material.

PART 3 - EXECUTION

O.M GENERAL

!. The Contractor shall reuse, recycle or dispose of all excess soil and wastes resulting from excavation activities in accordance with federal, state and local regulations and these specifications. Transport shall be by a permitted and licensed waste transporter. The Contractor shall be responsible for supplying the proper manifests to be approved and signed by a representative of the Owner.

.. Prior to disposal, the Contractor shall maintain segregated waste stockpiles in conformance with all applicable federal, state, and local waste disposal regulations and as specified in Section 02080.

/. The Contractor shall be responsible for preparing and keeping in proper order all waste manifests, BOLs, MSRs , and shall designate one person who shall be made available to sign all transportation documentation. The Contractor shall be responsible for obtaining the generator's signature and all other signatures required for the proper completion of the manifests. The Contractor shall allow a minimum of five working days from the date of the submittal for any documents requiring the signature of the Owner and the Contractor's LSP. The manifests shall document the handling of the waste from the time it is generated until the time it is properly disposed.

5. The Contractor shall be responsible for obtaining all federal, state, and local permits and variances to allow transport of materials and wastes on public roadways.

9. The Contractor shall be responsible to inform the Owner if hazardous waste disposal will not be performed within 90 days of hazardous waste characterization. This notification shall take place a minimum of 30 days prior to the 90-day deadline. No hazardous waste stockpiled at the site shall remain on site more than 90 days after it is characterized. In accordance with 310 CMR 40.0031, all other Remediation Waste shall not remain on site more than 120 days from initial date of generation. The Contractor shall be responsible to inform the Owner if Remediation Waste disposal will not be performed within 120 days of characterization. This notification shall take place a minimum of 30 days prior to the 120- day deadline.

C. The Contractor shall obtain certificates of disposal for all disposed wastes.

D. Transportation of wastes shall be in compliance with any relevant federal, state and local requirements, and such as to assure that waste material is not released during transit.

O.H SOLID WASTES

!. Transporters of solid wastes that include, but are not limited to, contaminated soil/fill (including oil-contaminated soil/fill), construction and demolition debris, non-hazardous laboratory wastes, bottles, tires, metal parts, tree stumps, brush, and grass cuttings will

utilize trucks or dumpsters specifically designed to ensure that material, dust, or liquid is not released in transit. No truck shall be allowed to exit the site until all free liquids are drained from soil/fill being transported off-site. Moisture content of the soil/waste shall be reduced by the Contractor, to or below the maximum acceptance limits required by the disposal facility. Material shall be covered at all times. The vehicle in which the waste is transported shall be driven directly to the intended destination without any stops or detours in between, except those necessary in response to road conditions, vehicle service needs, or emergencies. Discharge or release of material during transport shall be immediately reported to the Owner. Transporters shall clean up any discharge that occurs in transit, at the Contractor's expense.

.◊ The disposal site shall be permitted by the state in which the facility is located to receive and dispose of solid waste, and shall be approved for use by the Owner. The Contractor shall provide copies of the disposal facility's operating permit. No materials shall leave the site unless a disposal facility willing to accept all of the material being transported has agreed in writing to accept the type and quantity of waste.

/◊ Manifesting of solid waste shall be required and shall include at a minimum: vehicle identification; date of loading and disposal; tonnage, as measured at the disposal site; and signature of the Owner and/or its representative, transporter, and disposal facility's representative. Transportation of the wastes shall be accompanied by the appropriate manifests such as a MassDEP Bill of Lading, as required in the Code of Massachusetts Regulations (CMR) 310 CMR 40.0030, a Material Shipping Record or by a Uniform Hazardous Waste Manifest. The original shall be returned to the Owner, and/or their representative, within ten (10) working days of disposal.

5◊ All solid waste shall be disposed in accordance with all applicable federal, state and local laws and regulations, as well as all other state laws through which the waste material is being transported.

9◊ Transport of soils in which asbestos containing materials have come to be located shall be transported and disposed of in accordance with Section 02080 – SOIL AND WASTE MANAGEMENT and all applicable local, state and federal laws and regulations.

o◊o HAZARDOUS WASTES

!◊ Transporters of hazardous wastes shall be in conformance with Code of Federal Regulations (CFR) 40 CFR, Part 171, all other federal laws and regulations and 310 CMR 30.400, and all other state laws through whose boundaries the waste material is being transported. The transporter shall provide copies of its EPA identification number, Massachusetts transporter's license, and proof of driver training in transporting hazardous waste.

.◊ The disposal site shall be in conformance with 40 CFR, Part 264 and relevant laws of the state in which the facility is located. The Contractor shall provide copies of the disposal facility's EPA and state treatment and disposal permit.

/◊ Manifesting of hazardous wastes shall be in conformance with 40 CFR, Part 264, Subpart E, 310 CMR 30.310 and 310 CMR 30.405.

5◊ Actual quantities which are subject to unit rates shall be tabulated by the Contractor and verified by the Engineer on a daily basis. The Contractor shall not be reimbursed for unit rate work performed without the prior approval of quantities by the Engineer.

o◊п DUST CONTROL

!◊ Dust control measures shall be implemented during loading and transport of waste material from the site in accordance with the contractor's Dust Control Plan, as specified in Section 02080 – SOIL AND WASTE MANAGEMENT.

END OF SECTION

SECTION 02100

SITE PREPARATION

PART I- GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

A. This section includes the following:

1. Provide labor, material, tools and equipment to prepare site as indicated and specified.

B. Related sections include the following:

1. Section 02200: Earthwork

PART 2- PRODUCTS

2.1 WOOD CHIPS

A. Chip from cleared wood.

B. Provide additional wood chips as directed by Engineer.

C. Do not permit use of elm wood and elm bark as wood chips.

PART 3- EXECUTION

3.1 EXISTING TREES AND VEGETATION

A. Avoid cutting or injuring trees and vegetation outside easement line and Outside areas to be cleared as indicated, without Engineer’s permission Protect existing trees from damage.

B. Accept responsibility for damages outside these lines.

C. Remove trees within permanent and temporary easement as designated by Engineer.

3.2 EXISTING STRUCTURES AND PROPERTY

A. Remove existing signs, posts, catchbasin frames and grates, manhole frames and covers, and granite curbing within construction path unless directed otherwise.

B. Store at a site designated by Owner, items in reusable condition as determined by Engineer.

C. For work in loamed areas, strip loam to one side to avoid mixing with excavation materials. Do not take loam from site.

3.3 CLEARING

A. Cut or remove trees, brush, and other vegetable matter such as snags, bark and refuse, from areas to be cleared. Clear ground to width of permanent easement unless otherwise directed.

B. Cut trees, stumps, and stubs to be cleared, except where clearing done by machinery, as close to ground surface as practicable, but no more than 6 in. above ground surface for small trees and 12 in. for larger trees.

C. Bury elm bark, at least 1 ft. deep, or burn in incinerators off site with anti- pollution controls and fire prevention controls, to prevent spread of Dutch Elm disease as required by applicable laws.

3.4 CLEARING IN WOODED AREAS

A. Chip and stockpile wood cleared at location directed by Owner. Do NOT PERMIT use of elm wood and elm bark as wood chips.

B. Chip and spread wood cleared at locations and cover as indicated. Do NOT PERMIT use of elm wood and elm bark as wood chips.

C. Supply and spread wood chips.

3.5 GRUBBING, STRJPPING, DISPOSAL

A. Remove stumps and roots larger than 3 in. in diameter to a depth of 12 in., and roots larger than 1/2 in. in diameter to a depth of 6 in. Measure depths to cut from existing ground surface or proposed finished grade, whichever is lower.

B. Strip stumps, roots, foreign matter, topsoil, loam and unsuitable earth from ground surface. Utilize topsoil and loam insofar as possible for finished surfacing. Do not take loam from site.

C. Promptly dispose off site material from clearing and grubbing not reused or stockpiled. In doing so, observe all applicable laws, ordinances, rules and regulations. Do not consider work completed until final cleaning, unless otherwise directed.

3.6 CONTRACT CLOSEOUT

A. Provide in accordance with Section 01710.

END OF SECTION 02100

SECTION 02101

SITE INVESTIGATION

PART 1 GENERAL

1.1 SITE CONDITIONS

A. The Contractor acknowledges that he has satisfied himself as to the nature and location of the work, the general and local conditions, particularly those bearing upon transportation, disposal, handling, and storage of materials, availability of labor, water, electric power, roads and uncertainties of weather, groundwater table or similar physical conditions at the site, the conformation of subsurface materials to be encountered, the character of equipment and facilities needed prior to and during the prosecution of the work and all other matters which can in any way affect the work or the cost thereof under this Contract. Any failure by the Contractor to acquaint himself with all available information concerning these conditions will not relieve him from responsibility for estimating properly the difficulty or cost of successfully performing the work.

1.2 SUBSURFACE DATA

A. The Contractor acknowledges that he assumes all risk contingent upon the nature of the subsurface conditions, to be actually encountered by him in performing the work covered by the Contract, even though such actual conditions may result in the Contractor performing more or less work than he originally anticipated.

PART 2 PRODUCTS (NOT USED)

PART 3- EXECUTION (NOT USED)

END OF SECTION 02101

SECTION 02112

REMOVAL OF UNDERGROUND NONFRIABLE ASBESTOS CEMENT

PIPE PART 1 - GENERAL

1.1 GENERAL:

A. Definitions -

"Friable" -material can be crushed, pulverized, or reduced to powder, when dry, by hand pressure.

"Non-friable" -material that cannot be crushed or pulverized under hand pressure.

B. This section specifies requirements for the removal of nonfriable (pipe that has been below the groundwater level or is in otherwise saturated soils will generally be nonfriable because it has been saturated/wet) asbestos-cement pipe during trenching and excavation operations associated with the installation of new water or sewer pipes, where existing AC pipes may be encountered.

C. All asbestos cement pipe which is removed during construction is the responsibility of the Contractor, for removal, transportation and proper disposal.

1.2 RELATED WORK:

A. Section 01601 CONTROL OF MATERIALS

B. Section 02200, EARTHWORK

1.3 SUBMITTALS:

A. The Contractor shall submit to the Engineer the following listed items at least 14 days before work is to proceed. No asbestos pipe removal work activities shall commence until the Engineer reviews these items, unless otherwise waived.

Submittal No. 1

Plan of Action and Standard Operating Procedure: Submit a detailed plan of the procedures proposed for use in complying with all applicable regulations and the requirements of this specification.

Submittal No. 2

Name, location, and copies of applicable licenses for primary and secondary

landfill for disposal of asbestos-containing or asbestos-contaminated waste.

Submittal No. 3

Within 30 days of receipt of asbestos waste at the approved landfill, the Contractor shall submit to the Engineer the original copy of the "Waste Shipment Record" acknowledging disposal of all associated waste material from the Contract showing delivery date, quantity, and appropriate signature of Contractor, transporter, and landfill's authorized representative.

1.4 GENERAL APPLICABILITY OF CODES, REGULATIONS AND STANDARDS:

A. All applicable federal, state and municipal codes, regulations, and standards have the same force and effect (and are made a part of the contract documents by reference) as if copied directly into the contract documents, or as if published copies are bound herewith. All regulations by governing agencies in their most recent version are applicable. Provisions contained in this specification that are more stringent than applicable codes, regulations and standards shall govern for this project.

PART 2 - PRODUCTS

2.1 MATERIALS, TOOLS, AND EQUIPMENT:

A. Wetting Materials: For wetting before disturbance of asbestos-containing materials use either amended water or a removal encapsulant. The material must be odorless, non- flammable, non-toxic, non-irritating, and non-carcinogenic. It shall be applied as a mist using a low-pressure sprayer recommended by the manufacturer.

1. Amended Water: Provide water to which a surfactant has been added. Use a mixture of surfactant and water which results in wetting of the asbestos containing material and retardation of fiber release during disturbance of the material equal to or greater than that provided by the use of one ounce of a surfactant consisting of 50% polyoxyethylene ester and 50% polyoxyethylene ether mixed with five gallons of water.

2. Removal Encapsulant: Provide a penetrating type encapsulant designed specifically for removal of asbestos containing material. Use a material which results in wetting of the asbestos-containing material and retardation of fiber release during disturbance of the material equal to or greater than that provided by water amended with one ounce of a surfactant consisting of 50% polyoxyethylene ester and 50% polyoxyethylene ether mixed with five gallons of water.

C. Encapsulant: A material that surrounds or embeds asbestos fibers in an adhesive

matrix, to prevent release of fibers.

1. Bridging Encapsulant: An encapsulant that forms a discrete layer on the surface of an in situ asbestos matrix.

2. Penetrating Encapsulant: An encapsulant that is absorbed by the in situ asbestos matrix without leaving a discrete surface layer.

3. Removal Encapsulant: A penetrating encapsulant specifically designed for removal of asbestos-containing materials rather than for in situ encapsulation.

D. Polyethylene Sheet: Provide flame resistant polyethylene film that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-resistant Textiles and Films. Provide largest size possible to minimize seams, 6.0 mils thick as required, frosted or black as indicated.

E. Duct Tape: Provide duct tape in 2" or 3" widths as indicated, with an adhesive, which is formulated to aggressively stick to sheet polyethylene, is waterproof, and will adhere to other materials.

F. Spray Cement: Provide spray adhesive in aerosol cans that is specifically formulated to stick tenaciously to sheet polyethylene.

G. Waste Containers: Provide 6 mil thick leak-tight polyethylene bags labeled as follows:

DANGER

CONTAINS ASBESTOS FIBERS · AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD

If the waste material contains sharp edges or may otherwise puncture polyethylene bags, provide properly labeled drums or other closed containers for storage, transportation, and disposal.

H. Warning Signs And Labels: Shall comply with 29 CFR 1926.59(k), and all other federal, state, or local codes and regulations.

I. Brushes: All brushes shall have nylon bristles. Wire brushes are excluded from use due to their potential to shred asbestos fibers into small fibers. Wire brushes may be used on pipe joint applications upon prior written notice to the Engineer.

PART 3 -EXECUTION

3.1 GENERAL

A. Nonfriable asbestos cement pipe shall be handled, transported, and disposed of in a way that prevents it from becoming friable and releasing asbestos fibers. AC pipe cannot be shattered, crumbled, pulverized, sanded, chipped, or ground.

B. Nonfriable AC pipe may not be used as fill; it shall be disposed of at a landfill that is state- approved to accept asbestos waste. Landfills may require special packaging and labeling in order to accept the AC pipe.

C. AC pipe shall not be removed from the excavation if it is not necessary to disturb it during the installation of the new pipeline.

D. AC pipe shall never be handled unless it is wet. Dry pipe shall be wet down with a suitable wetting material prior to handling it.

3.1 AC PIPE REMOVAL DURING EXCAVATION:

A. This section is provided for removal of AC pipe in excavation areas.

B. Removal Of Non-Friable Asbestos Materials:

1. Carefully excavate, by hand, a sufficient area around the pipe to perform the work. Any asbestos debris that is present or generated by these activities will be promptly wetted and placed into 6-mil asbestos waste bags before continuing with the work.

2. Once excavation is complete, place one layer of 6-mil polyethylene sheeting on sidewalls and bottom of trench under the AC pipe to be removed.

3. Thoroughly encapsulate AC pipe with an acceptable penetrating encapsulant per manufacturer guidelines.

4. Remove AC pipe as follows:

Cut sections of pipe will be removed from the trench and immediately wrapped and sealed in two layers of 6-mil asbestos waste bags. Packaged waste will then be placed into acceptable waste transportation vehicle.

Whenever possible, the Contractor will limit cutting of asbestos cement materials and dismantle materials in intact sections. Removal should be up to Contractor's means and methods in accordance with applicable laws and regulations.

3.2 AC PIPE LEFT IN PLACE

A. Ends of AC pipe to be left in the excavation shall be encapsulated. AC pipe is not to be crushed and left in place. Any crushed pieces must be removed and properly disposed of.

3.3 AC PIPE DISPOSAL PROCEDURES

A. The Contractor shall package, label, and remove all AC pipe as specified below. Packaging shall be accomplished in a manner that minimizes waste volume, but insures waste containers shall not tear or break. Transportation and disposal of the containerized waste at an approved landfill shall be the responsibility of the Contractor.

B. Waste Labeling:

1. Warning labels, having waterproof print and permanent adhesive in compliance with OSHA, EPA and Department of Transportation requirements shall be affixed to or printed on the sides of all waste bags or transfer containers. Warning labels shall be conspicuous and legible.

2. In compliance with NESHAPS, 40 CFR, Part 61.150, all waste containers or bags shall be labeled with the following generator information:

a. Name of waste generator.

b. Location where waste was generated.

END OF SECTION

SECTION 02140

DEWATERING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

B. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section.

1.2 DESCRIPTION

A. Dewatering consists of the removal of surface water and groundwater as necessary to perform the construction required by the contract in accordance with the drawings and specifications. Furnish all labor, materials, equipment, and incidentals required to:

1. Design, furnish, operate, maintain, and remove temporary dewatering systems to control groundwater and surface water to maintain stable, undisturbed subgrades, and allow work to be performed under dry and stable conditions, and comply with all applicable permit and other regulatory requirements.

2. Work to be done as part of dewatering includes, but is not limited to:

a. Lower hydrostatic pressure.

b. Prevent surface water from entering the excavation during construction.

c. Implement erosion and sedimentation control measures.

d. Provide system to treat/settle all water removed from excavations, except water that is re-infiltrated into the ground on site in a manner that does not result in negative on- or off-site impacts.

e. Provide an Environmental Site Professional/Dewatering Specialist/Field Representative (hereinafter referred to as the Dewatering Professional) who will be responsible for dewatering, reinfiltration, treatment and discharge of dewatering flows as specified and in compliance with all applicable permits and regulations.

3. Clean, uncontaminated groundwater or accumulated surface runoff removed from excavations shall be reinfiltrated to the ground if feasible, by means of a temporary infiltration trench or basin. The temporary infiltration trench or basin must be: 1) open to the surface or “open-air”; and 2) wider than it is deep. Otherwise, the Contractor must obtain an Underground Injection Control (UIC) permit from the Massachusetts Department of Environmental Protection (MassDEP) Bureau of Resource Protection (BRP) in accordance with 310 CMR 27.00.

Surface flow that could lead to offsite discharge is not permitted. If reinfiltration is not feasible, treated water shall be directly or indirectly discharged to a surface water in accordance with a National Pollutant Discharge Elimination System (NPDES) permit issued by the U.S. Environmental Protection Agency (EPA). If neither

reinfiltration nor surface water discharge is feasible, treated water shall be discharged to the local sewer system in accordance with the appropriate permits and regulations or transported off-site to an approved facility. In no case shall dewatering flows be directly or indirectly released to surface waters or storm drains prior to settling and appropriate additional treatment. The Contractor is responsible for acquiring all the proper permitting required for the chosen method of discharge.

4. If work is expected to be conducted within soil or groundwater affected by oil or hazardous materials, or if the groundwater appears to be impacted, prior to any discharge, the groundwater or accumulated surface runoff shall be sampled and tested to meet the requirements of the NPDES Remediation General Permit (Appendix III), or other permit requirements if an alternative discharge/disposal method (e.g., discharge to sanitary sewer, off-site disposal) is selected by the Contractor. The Contractor is responsible for coordinating the selected method of permitting and discharge or disposal with the Owner's Licensed Site Professional (LSP) to meet the applicable requirements of the Massachusetts Contingency at 310 CMR 40.00. Laboratory analysis of groundwater to be treated and discharged may include, but not be limited to, the following parameters:

    a. RCRA 8 Metals, US EPA Methods 6010B and 6020;

    b. Volatile Organic Compound (VOC), US EPA Method 8260B;

    c. Semi Volatile Organic Compound (SVOC), US EPA Method 8270C;

    d. Pesticides, US EPA Method 8081

    e. Herbicides, US EPA Method 8151A

    f. Corrosivity/Toxicity, US EPA Method 9040B and 9045C;

    g. Reactivity, US EPA Method 7.3;

    h. pH and

    i. Ignitability, US EPA Method 1010

    Upon sampling, testing and characterization of the groundwater or accumulated surface runoff, proper treatment or disposal of the impacted ground water or accumulated surface runoff shall be determined. Treatment, discharge or disposal of impacted groundwater shall be in accordance with all applicable regulations and shall be approved by the Engineer and Owner prior to final discharge or disposal.

5. Related Sections:

    a. SECTION 02210: EARTH EXCAVATION, BACKFILL, FILL, AND GRADING

1.3 SUBMITTALS

A. Shop Drawing: Submit the following in accordance with SECTION 01300 –SUBMITTAL PROCEDURES:

1. Qualifications of the both the Contractor's dewatering specialist or firm (design) and the Dewatering Professional (all other responsibilities) shall be submitted for approval a minimum of four (4) weeks prior to execution of any dewatering. The submittal shall include, but not be limited to:

    a. Qualifications of firm's Registered Professional Engineer as specified in Section 1.4, B.

b. Qualifications of the Dewatering Professional who shall oversee the installation, operation and maintenance of the dewatering system.

2. Submit a Dewatering Plan including design calculations at least four (4) weeks prior to start of any dewatering operation. The submittal will be only for the information of the Owner and third parties for an overall understanding of the project relating to access, maintenance of existing facilities and proper utilization of the site. The Contractor shall remain responsible for the adequacy, regulatory compliance, and safety of the means, methods and sequencing of construction activities related to dewatering. The plan shall include the following items as a minimum:

   a. Dewatering Plan and details stamped and signed by a Massachusetts Registered Professional Engineer that conforms to the requirements of the dewatering permit(s), the Wetlands Protection Act Order of Conditions, and all other applicable regulations and permits including, but not limited to, requirements for equipment, monitoring, sampling and reporting.

   b. A list of equipment including, but not limited to, pumps, prime movers, and standby equipment.

   c. A description of the proposed method of dewatering; water reinfiltration; containment; treatment discharge; and disposal; and installation, maintenance, and system removal procedures.

   d. A description of erosion/sedimentation control measures and best management practices to eliminate or minimize impacts from potential pollutants.

3. Data for the required discharge reports, as applicable, shall be collected and maintained by the Contractor's Dewatering Professional. It shall consist of periodic sampling and analysis of system influents, midfluents and/or effluents and discharge quantities and other requirements of the relevant permits. The Contractor's Dewatering Professional shall also coordinate analysis of samples at an appropriately certified analytical laboratory and shall comply with all permit reporting requirements.

4. Contractor shall submit a modified Dewatering Plan **within 24 hours**, if open pumping from sumps and ditches results in boils, loss of fines, softening of the ground or other adverse impacts on or off-site.

1.4 QUALITY ASSURANCE

A. PROVIDE IN ACCORDANCE WITH SECTION 01400 AND AS SPECIFIED.

B. Employ the services of a Dewatering Professional and a Massachusetts Registered Professional Engineer having the following qualifications:

1. The Massachusetts Registered Professional Civil Engineer shall have completed the design of at least five (5) successful dewatering projects of equal size and complexity and with equal systems within the last five (5) years consisting of deep wells, well points, vacuum well points, and sump pumping for heavy Civil projects of similar size, type, and complexity in developed areas with trench box or steel/timber sheeting support of excavation systems.

2. The dewatering system installer's supervisor shall have a minimum of 5 years experience in installation of well points, deep wells, recharge systems, or equal systems.

3. The Dewatering Professional responsible for day to day operation of the system shall have the following minimum qualifications:

   a. Completion of at least 5 successful dewatering projects of equal size and complexity with equal systems within the last five (5) years consisting of system operation and troubleshooting, collection of readings, maintenance of logs and other required documents, collection of samples, coordination of analysis of samples, and compliance with reporting requirements during pumping for heavy Civil projects of similar size, type, and complexity in developed areas.

   b. Current certification from MassDEP to operate the proposed treatment system, as applicable.

C. If subgrade soils are disturbed or become unstable due to dewatering operation or an inadequate dewatering system, notify the Engineer, stabilize the subgrade, and modify system to perform as specified at no additional cost to the Owner.

D. If oil and/or other hazardous materials are encountered after dewatering begins, immediately notify the Engineer.

1.5 PROJECT/SITE CONDITIONS

A. Subsurface Investigations: Refer to Section 02010.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Provide and store auxiliary dewatering equipment, consisting of pumps and hoses on the site in the event of breakdown, at least one (1) pump for every five (5) used.

B. Provide dewatering equipment, including an appropriately sized settling tank, and maintain erosion/sedimentation control devices as indicated or specified and in accordance with the Dewatering Plan.

C. Provide temporary pipes, hoses, flumes, channels, crushed stone, geotextile fabric, sedimentation barriers, or any combination of the above for the transport of discharge water over-ground to the discharge location.

D. Provide sampling and analysis equipment to test for turbidity.

PART 3 - EXECUTION

3.1 GENERAL

A. Execution of any earth excavation, installation of earth retention systems, and dewatering shall not commence until the related submittals have been submitted, approved by the Owner and Engineer, and the Dewatering Professional is on site and has begun the duties specified herein.

B. Furnish, install, operate, and maintain dewatering, re-infiltration, treatment and discharge systems as indicated or specified and in accordance with the Dewatering Plan. Delays due to insufficient storage capacity, inadequate Contractor Dewatering Plan, or permitting delays

will be at no additional cost to the Owner. The Contractor is responsible to evaluate available data and determine the necessary dewatering system so as not to impede construction activities.

C. Carry out dewatering program in such a manner as to prevent undermining or disturbing foundations of existing structures or of work ongoing or previously completed.

D. Do not excavate below the seasonal high groundwater elevation until the dewatering system is operational.

E. Unless otherwise specified, continue dewatering uninterrupted until all structures, pipes, and appurtenances below the seasonal high groundwater level have been completed and sufficiently backfilled and/or anchored such that they will not be floated or otherwise damaged by an increase in groundwater elevation.

F. Discontinue open pumping from sumps and ditches, if such pumping is resulting in boils, loss of fines, softening of the ground, instability of the slopes or other adverse impacts on or off-site. Modify Dewatering Plan and submit to the Engineer at no additional cost to the Owner.

G. Where subgrade materials are disturbed or become unstable due to dewatering operations, remove and replace the materials at no additional cost to the Owner.

3.2 DEWATERING DISCHARGE

A. Groundwater or accumulated surface runoff to be infiltrated does need not be treated, unless known to be contaminated or noticeably impacted with oil or hazardous waste. Contractor shall provide infiltration as described in Section 1.2, A(3) that complies with relevant local, state and federal regulations.

B. The effluent (discharge) shall be tested for turbidity on a daily basis and shall not exceed 280 NTU, averaged over 5 consecutive days. Sufficient measures shall be employed to provide effective ways to remove turbidity, color and potential coliform organisms (from sewer work) prior to discharge

C. Transport pumped or drained water to discharge location in compliance with applicable permits and without interference to other work; damage to or contamination of pavement, other surfaces, or property; erosion; or siltation.

D. Provide separately controlled pumping lines.

E. Immediately notify the Engineer and Owner if groundwater is encountered that is suspected to be contaminated with substances other than those for which the treatment system has been designed. Do not pump water found to be contaminated with oil or other hazardous material to the discharge locations. Sampling, testing and characterization of the groundwater shall include (but not be limited to) criteria within part 1.2 of this specification section to determine the final disposal of the groundwater. Groundwater disposal shall follow all local, state and federal permits and regulations.

3.3 COMPLIANCE WITH DEWATERING AND RELATED PERMITS AND REGULATIONS

A. Discharging groundwater and allowing for natural infiltration may not be a viable option for controlling groundwater in the project area. Should dewatering activities be required where

the Contractor needs to discharge groundwater to a location other than the point of origin, then the Contractor shall store, treat and discharge the water in accordance with applicable permits and regulations. Periodic sampling, as may be required to demonstrate treatment effectiveness and compliance with pretreatment standards specified in any local, state, or federal discharge permit required shall be the responsibility of the Contractor and its Dewatering Professional. If on-site infiltration, discharge to the local sanitary sewer system or off-site disposal are not feasible options, the Contractor shall be responsible for seeking coverage under one of the following EPA NPDES permits: Construction General Permit (CGP) for projects disturbing >1 acre; Dewatering General Permit (DGP) for projects disturbing <1 acre; or Remediation General Permit (RGP) for any project with known groundwater contamination. The Contractor shall be prepared to comply with standard local permit conditions including periodic testing of the effluent and with standard NPDES permit conditions including periodic testing of the treatment system influent, midfluent and effluent. The Dewatering Plan shall include a description of procedures and information related to the collection of readings, maintenance of logs and other required documents. At a minimum, the Dewatering Plan shall describe compliance with relevant provisions of the applicable NPDES Permit or other discharge permit and the local Conservation Commission Order of Conditions. Copies of the applicable NPDES or other permit authorization to discharge shall be provided to the Owner prior to the start of dewatering activities.

B. The Contractor, through its Dewatering Professional:

1. Shall furnish all labor, equipment and materials necessary to obtain accurate representative samples of the groundwater and for analysis for the set of analytical parameters specified above and as required by local, state and federal permits and regulations.

2. Shall coordinate sampling activities with the Engineer. The Engineer reserves the right to sample treated and untreated dewatering flows at any time.

3. Shall take readings from the treatment system in accordance with the Dewatering Plan.

4. Shall collect an initial sample of untreated and treated groundwater at the beginning of dewatering activities within the construction area. Sampling and start-up shall be conducted in accordance with applicable permits.

5. Shall prepare and keep in proper order all records required by regulatory authorities and permits.

6. Shall maintain logs and other records in accordance with the Specifications, regulatory agency and permit requirements, and the Dewatering Plan.

7. Shall coordinate analysis of samples by an appropriately certified analytical laboratory in accordance with the Specifications, regulatory agency and permit requirements, and the Dewatering Plan, and ensure that laboratory detection limits meet permit requirements.

8. Shall comply with reporting requirements in a timely manner and in the format required by the relevant permit. Reporting in compliance with permit requirements includes, but is not limited to: notification to the appropriate regulatory agencies, Owner and Engineer prior to discharge; submittal of laboratory analytical reports for each sampling event; submittal of reports for each reporting period during which no discharge occurs; notification of non-compliant discharges; notification of termination of discharge; and response to permit-related questions posed by regulatory agencies or the Owner and Engineer.

a. If water will be discharged under a National Pollutant Discharge Elimination System (NPDES) permit, submit notifications and reports to both the Environmental Protection Agency (EPA) and the appropriate regional office of the Massachusetts Department of Environmental Protection (MassDEP) and the Engineer. Comply with pre-discharge notification, discharge reporting, notification of no discharge, and termination of discharge notification requirements; and respond to inquiries or correspondence from EPA or MassDEP regarding permit issues.

b. If water will be discharged under a local permit, submit notifications and reports as required in the permit.

c. Observe and record daily the elevation of the groundwater during the length of the dewatering operation and provide data to Engineer on daily basis. For monthly or less frequent reporting deadlines, provide the Engineer with copies of all reports fourteen (14) days prior to the reporting deadline, and submit reports to the appropriate agency(ies). Provide copies of other dewatering documents to the Engineer immediately.

9. Install and maintain erosion/sedimentation control devices at the point of discharge as indicated or specified and in accordance with the Dewatering Plan.

10. The Contractor shall obtain all federal, state, county, and local permits and variances to allow transport of materials on public roadways, should such transport be necessary.

11. The Contractor shall dispose of all wastes resulting from construction dewatering activities in accordance with local, federal and state regulations.

12. The Contractor is solely responsible for the implementation of the permit requirements, and is solely responsible for any punitive action resulting from any violation of the permit. The actual permit issued shall become part of this Contract by either addendum or by change order. If the actual permit is included by change order, no additional costs for implementing the permit will be considered by the Owner, when the actual permit is issued.

3.4 REMOVAL

A. Do not remove dewatering system without written approval from the Engineer.

B. Backfill and compact sumps or ditches with crushed stone wrapped with geotextile fabric in accordance with SECTION 02210.

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

END OF SECTION 02140

SECTION 02200

EARTHWORK

PART 1- GENERAL

1.1 SUMMARY

A. This Section includes excavations of normal depth in earth for trenches and structures; backfilling such excavations to the extent required; filling; rough grading;; constructing embankments; miscellaneous earth excavation; the removal, hauling and stockpiling of suitable excavated material for subsequent re-use in the work; all rehandling, hauling and placing of stockpiled materials for use in refilling, filling, backfilling, grading and such other operations; the removal and satisfactory disposal off site of unsuitable material; and appurtenant work, complete, in accordance with the Drawings and Specifications, and as directed.

RELATED SECTIONS

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

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Backfill Materials Source Verification: Submit 50 pound sample for each proposed source of backfill materials. Submit a grain size analysis and curve performed in accordance with ASTM D422 for each proposed source of backfill for review by the Engineer. The grain size analysis shall indicate that the backfill material conforms to the specified gradation requirements. Material obtained from the cuts on the site can be used for backfill provided that it meets the spec for Common Fill or Gravel Borrow contained herein.

C. Submit a moisture-density curve indicating the maximum dry density and optimum moisture content as determined by ASTM D1557 for each proposed source of compacted backfill for review of the Engineer.

A. Filter fabric: Submit the manufacturer's information and a one square foot representative sample of the filter fabric (Section 02273) to the Engineer for review.

E. Within one week of a field change, resubmit revised working drawings as necessary to reflect changes required by field conditions.

F. Submit reports from the geotechnical testing laboratory documenting all earthwork activity and field testing. The field reports shall include as a minimum the following:

1. A description of the day's activities.

2. The results of in-place density testing including in-place dry density, moisture content, percent compaction, elevation of test and a description of the soil.

3. A sketch indicating the extent of each day's work and the location of testing.

G. Submit the qualifications of the certified independent geotechnical testing laboratory performing soil testing and inspection services during earthwork operations. The geotechnical testing laboratory must demonstrate to the Engineer's satisfaction, based on evaluation of laboratory submitted criteria conforming to ASTM D3740, that it has the experience and capability to conduct required field and laboratory geotechnical testing. In addition, the laboratory shall be supervised by a Registered Professional Engineer.

1.4 EXCAVATION CLASSIFICATIONS

A. Earth Excavation or "Excavation" consists of removal of materials encountered to the subgrade elevations indicated and subsequent reuse or disposal of the materials removed. All excavation is classified as earth excavation unless it otherwise meets the classifications provided below for unauthorized excavation, additional excavation, or rock excavation.

B. Unauthorized Excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of the Engineer. Unauthorized excavation, as well as remedial work directed by the Engineer, shall be at Contractor's expense.

1. Under footings, foundations bases, concrete slabs, retaining walls or other structures, fill unauthorized excavations to the proper elevations with lean concrete. Elsewhere, backfill and compact unauthorized excavations as specified for excavations of the same class, otherwise directed by the Engineer.

C. Additional Excavation.

1. When excavation has reached required subgrade elevations, notify the Engineer who will review subgrade conditions..

2. If unsuitable bearing materials are encountered at required subgrade elevations, carry excavations deeper and replace excavated material as directed by the Engineer.

1.5 ROCKEXCAVATION

A. Rock excavation in trenches and pits includes removal and disposal of materials and obstructions encountered which cannot be excavated with a 1.0 cubic yard (heaped) capacity, 42-inch wide bucket on track-mounted power excavator equivalent to Caterpillar Model 215, rated at not less than 90 HP flywheel power and 30,000 lb. drawbar pull Trenches in excess of 10 foot 0-inches in width and pits in excess of 30 feet 0-inches in either length or width are classified as open excavation.

B. Rock excavation in open excavations includes removal and disposal of materials and obstructions encountered which cannot be dislodged and excavated with modem track-mounted heavy-duty excavation equipment without drilling, blasting or ripping. Rock excavation equipment is defined as Caterpillar Model No. 973 or No. 977K, or equivalent track-mounted loader, rated at not less than 170HP flywheel power and developing 40,000 lb. break-out force (measured in accordance with SAE J732C).

C. Determination of rock excavation classification will be made by the Engineer. Typical of materials classified of rock are boulders 1.0 cu. yd. or more in volume, solid rock, rock in ledges, and rock-hard cementitious aggregate deposits. Intermittent drilling, blasting or ripping performed to increase production and not necessary to permit excavation of material encountered will be classified as earth excavation. Do not perform rock excavation work until material to be excavated has been cross-sectioned and classified by Engineer. If the area to be excavated is pre-blasted prior to the excavation of overburden soils, the Engineer shall be notified at least two days in advance to allow observation of the pre-blast drilling by the Engineer in order to classify the excavation. Visual observation of the completed excavation may be made by the Engineer to modify the excavation classifications. Removal of rock excavation prior to classification by the Engineer shall be considered as earth excavation unless accepted by the Engineer in writing. Such excavation will be paid on the basis of contract unit rates for this classification. If site rock or trench rock is encountered, the contractor must submit a plan for its removal to the Engineer for approval. Excess boulder and rocks must be removed from the site.

D. Rock payment lines are limited to the following:

1. Two feet outside of concrete work for which forms are required, except footings.

2. One foot outside the perimeter of footings.

3. Rock in pipe trenches shall be measured from its surface to 6-inches below the outside of the pipe and with a width of two (2) feet greater than the inside diameter of the pipe but not less than 3 feet minimum trench width. Any rock excavated to a depth or width greater than the above shall be removed and backfilled with ordinary borrow at the Contractor's expense.

1.6 EXCAVATION

A. The Contractor shall perform all excavations of every description and of whatever substances encountered, in a manner as required to allow for placing of temporary earth support, forms, installation of pipe and other work, and to permit access to the Engineer for the purpose of observing the work Excavations shall be to such widths as will give suitable space for the required work. Bottoms of trenches and excavations shall be protected from frost and shall be firm, dry and in an acceptable condition to receive the work; work shall not be placed on frozen surfaces nor shall work be placed on wet or unstable surfaces.

B. All excavations made in open cut will be controlled by the conditions existing at the various locations and shall always be confined to the limits as designated by the Engineer. In no case shall earth be excavated or disturbed by machinery so near to the finished subgrade for structures and pipelines as to result in the disturbance of the earth below the subgrade. The final excavation to subgrade should be accomplished with a smooth faced bucket or by hand if directed by the Engineer.

1.7 GROUNDWATERCONTROL

A. The Contractor shall provide, at his own expense, adequate pumping and drainage facilities to maintain the excavated area(s) sufficiently dry from groundwater and/or surface runoff so as not to adversely affect construction procedures nor cause excessive disturbance of underlying natural ground. The drainage of all water resulting from pumping shall be managed so as not to cause damage to adjacent down-gradient property or resource areas.

B. Any damage resulting from the failure of the dewatering operations of the Contractor, and any damage resulting from the failure of the Contractor to maintain all the areas of work in a suitable dry condition, shall be repaired by the Contractor, as directed by the Engineer, at no additional expense to the Owner. The Contractor's pumping and dewatering operations shall be carried out in such a manner as to prevent damage to the Contract work and so that no loss of ground will result from these operations. Precautions shall be taken to protect new work from flooding during storms or from other causes. Pumping shall be continuous where directed by the Engineer to protect the work and/or to maintain satisfactory progress.

C. All pipelines or structures not stable against uplift during construction or prior to completion shall be thoroughly braced or otherwise protected. Water from the trenches, excavations and drainage operations shall be disposed of in such a manner as to avoid public nuisance, injury to public health or the environment, damage to public or private property, or resource areas, or damage to the work completed or in progress.

D. The Contractor shall control the grading in the areas surrounding all excavations so that the surface of the ground will be properly sloped to prevent water from running into the excavated area. Where required, temporary ditches shall be provided for drainage. Upon completion of the work and when directed, all areas shall be restored by the Contractor in a satisfactory manner and as directed.

PART 2- PRODUCTS

2.1 BACKFILL MATERIALS

A. Ordinary Borrow: Ordinary Borrow (MHD M1.01.0) shall be soil containing no stone greater than 2/3 loose lift thickness. The materials shall be free of trash, ice, snow, tree stumps, roots and other organic and deleterious materials. Ordinary Borrow shall not contain more than 30 percent by weight of soil material passing the number 200 sieve. It shall be of such a nature and character that it can be compacted to the specified densities in a reasonable length of time. Topsoil and subsoil shall not be considered Ordinary Borrow. Ordinary Borrow shall be used for general subgrade fill areas.

B. Structural Fill: Structural Fill shall be used beneath foundations and slabs and as backfill of foundations and other load bearing structures. Structural Fill shall consist of inert material that is hard, durable stone and coarse sand, free from loam and clay, surface coatings and deleterious materials. The gradation shall meet the following requirements:

SIEVE DESIGNATION	NOMINAL PERCENT PASSING BY WEIGHT
6 inch	100
3 inch	70-100
¾ inch	40-95
No. 4	30-90
No. 10	25-80
No. 40	10-50
No. 200	0-12

C. Processed Gravel for Subbase: Processed gravel for subbase shall be used where specified as sidewalk and pavement subbase material and shall consist of inert material that is hard, durable stone and coarse sand free from frost, frozen lumps, loam and clay, surface coatings, and deleterious materials.

Gradation requirements for Processed gravel for subbase shall be as designated by MHD M1.03.1 and shall conform to the following:

SIEVE DESIGNATION	NOMINAL PERCENT PASSING BY WEIGHT
3 inch	100
1 ½"	70-100
1/4"	50-85
No. 4	30-60
No. 200	0-10

D. ¾" Crushed Stone: ¾" Crushed stone should be used where specified as bedding under pipes and structures, as a working mat, as a filter around perforated drain pipe or as backfill behind retaining walls. Crushed stone shall consist of durable crushed rock or durable crushed gravel stone, free from ice and snow, sand, clay, loam, or other deleterious or organic material. The crushed stone gradation requirement shall be as designated by MHD M2.01.4 and shall be uniformly blended and shall conform to the following requirements.

SIEVE DESIGNATION	NOMINAL PERCENT PASSING BY WEIGHT
1 inch	100
¾-inch	70-100
1/2-inch	10-50
3/8-inch	0-20
No. 4	0-5

E. 1 1/2" Crushed Stone: 1 1/2" Crushed stone should be used where specified as bedding under pipes and structures, as a working mat, as a filter around perforated drain pipe or as backfill behind retaining walls. Crushed stone shall consist of durable crushed rock or durable crushed gravel stone, free from ice and snow, sand, clay, loam, or other deleterious or organic material. The crushed stone gradation requirement shall be as designated by MHD M2.01.1 and shall be unifom1ly blended and shall conform to the following requirements.

SIEVE DESIGNATION	NOMINAL PERCENT PASSING BY WEIGHT
2 inch	100
1 ½ inch	95-100
1 inch	35-70
3/4-inch	0-25

F. Dense Graded Crushed Stone for Subbase: Dense graded crushed stone for subbase should be used where specified as pavement and sidewalk sub-base material, only if a deficit of reclaimed material occurs. Dense graded crushed stone shall consist of durable crushed rock or durable crushed gravel stone combined with fine aggregates of natural sand or stone screenings uniformly premixed with a predetermined quantity of water. The composite material shall be free from ice and snow, clay, loam, or other deleterious or organic material. The dense graded crushed stone for subbase gradation requirement shall be as designated by MHD M2.0 I.7 and shall be uniformly blended and shall conform to the following requirements.

SIEVE DESIGNATION	NOMINAL PERCENT PASSING BY WEIGHT
2 inch	100
1 ½ inch	70-00
3/4-inch	50-85
No. 4	30-55
No. 50	8-24
No. 200	3-10

G. Gravel borrow: Gravel borrow shall consist of inert material that is hard, durable stone and coarse sand free from frost, frozen lumps, loam and clay, surface coatings, and deleterious materials.

Graduation requirements for gravel shall be determined by AASHTO-T11 and T27 and shall conform to the following:

SIEVE DESIGNATION	NOMINAL PERCENT PASSING BY WEIGHT
1/2 inch	50-85
No. 4	40-75
No. 50	8-28
No. 200	0-10

Maximum size of stone in gravel shall be as follows:

6 inches largest dimension Type a

3 inches largest dimension Type b

2 inches largest dimension Type c

H. Bank-run gravel: Bank run gravel shall be obtained from approved natural deposits and unprocessed except for the removal of deleterious materials and stones larger than the maximum size permitted.

Bank-run gravel shall be unfrozen and substantially free from vegetation, roots, loan1 and other organic 1natter, clay, snow, frozen particles and other fine or harmful substances.

Bank-run gravel: Inorganic granular material meeting the following gradation:

SIEVE DESIGNATION	NOMINAL PERCENT PASSING BY_WEIGHT
6 inch	100
2 inch	80-100
No. 4	20-65
No. 200	00-12

PART 3 EXECUTION

3.1 FILLING AND BACKFILLING

A. Verify locations and elevations of existing utilities. Maintain and protect utilities which are to remain.

B. Verify that survey bench marks, horizontal control points, and intended elevations for the work are as shown on the Drawings. Protect survey control points and existing structures.

C. Sequence the work such that work associated with lower elevations and utilities are completed before placing higher elevations and utilities.

D. Stockpiles shall be neatly trimmed and graded to provide drainage from surfaces and to prevent depressions where water may become impounded. Stockpiles shall be protected and shall not be disturbed. Unsuitable soils shall be segregated and legally disposed by the contractor at no additional cost to the Owner.

E. Subgrade Preparation: After the subgrade has been shaped to line, grade, and cross-section, it shall be thoroughly compacted. This operation shall include any required reshaping and wetting to obtain proper compaction. All soft or otherwise unsuitable material shall be removed and replaced with suitable material from excavation or borrow. The resulting area, and all other low sections, holes, or depressions shall be brought to the required grade with accepted material and the entire subgrade shaped to line, grade and cross-section and thoroughly compacted.

F. Backfill Material Selection: Unless otherwise specified or directed, material used for filling and backfilling shall meet the requirements specified under Backfill Materials (Part 2). In general, the material used for backfilling utility trench excavations shall be material removed from the excavations provided that the reuse of these materials result in the required trench con1paction and meets the requirements specified for common fill. All backfill placed beneath concrete slabs shall be structural fill unless otherwise specified. In areas where the bottom of the excavation is in fine sand and silt, and is below the groundwater table, the first lift of backfill shall be 12-inches of compacted sand and gravel (Gravel Borrow) to provide a working mat and drainage layer.

Place backfill to a maximum loose lift thickness of 12 inches. Maintain backfill material with a uniform moisture content, with no visible wet or dry streaking, between plus 2 percent and minus 3 percent of optimum moisture content. The final filled soil mass shall be as unifom1 as possible in lift thickness, moisture content, and effort required to compact soil mass.

G. Trench Backfill:

1. The trenches shall be backfilled as soon as practicable with suitable material. All trench backfilling shall be done with special care, in the following manner and as directed by the Engineer.

2. Backfill material for pipe bedding shall be deposited in the trench, uniformly on both sides of the pipe, for the entire width of the trench to the springline of the pipe. The selected backfill material shall be placed by hand shovels, in layers not more than 12-inches thick in loose depth, and each layer shall be thoroughly and evenly compacted by tamping on each side of the pipe to provide uniform support around the pipe, free from voids.

3. The balance of backfill shall be spread in layers not exceeding 12-inches in loose depth. Each layer shall be thoroughly compacted by mechanical methods and shall contain no rock, stones or boulders larger than 4-inches in their greatest dimension.

4. All trench backfilling shall be done with special care and must be carefully placed so as not to disturb the work at any time; if necessary, a timber grillage or other suitable method shall be used to break the fall of material. The moisture content of the backfill material• shall be such that proper compaction will be obtained. Puddling of backfill with water will not be permitted. Backfill within

areas to receive topsoil or pavement construction shall be made to grades required to establish the proper subgrade for the placement of topsoil or pavement base courses.

5. In backfilling trenches, each layer of backfill material shall be n1oistened and compacted to a density at least equal to that of the surrounding undisturbed earth, and in such a manner as to permit the rolling and compaction of the filled trench or excavation with the adjoining earth to provide the required bearing value, so that paving or foundation construction of the excavated and disturbed areas, where required, can proceed immediately after backfilling is completed.

6. Any trenches or excavations improperly backfilled or where settlement occurs shall be reopened, to the depth required for proper compaction, then refilled and compacted with the surface restored to the required grade and condition, at no additional expense to the Owner.

7. During filling and backfilling operations, pipelines will be checked by the Engineer to determine whether any displacement of the pipe has occurred. If the observation of the pipelines shows poor alignment, displaced pipe or any other defects they shall be remedied in a manner satisfactory to the Engineer at no additional cost to the Owner.

H. Backfilling Against Structures:

1. Backfilling against masonry or concrete shall not be done until permitted by the Engineer. The Contractor shall not place backfill against or on structures until they have attained sufficient strength to support the loads (including construction loads) to which they will be subjected, without distortion, cracking or other damage. As soon as practicable after the structures are structurally adequate and other necessary work has been satisfactorily completed, special leakage tests of the structures shall be made by the Contractor, as required by the Engineer. After the satisfactory completion of leakage tests and the satisfactory completion of any other required work in connection with the structures, the backfilling around the structures shall proceed using suitable and approved excavation material. The best of the backfill material shall be used for backfilling within 2 feet of the structure. Just prior to placing backfill, the areas shall be cleaned of all excess construction material and debris and the bottom of excavations shall be in a thoroughly compacted condition.

2. Symmetrical backfill loading shall be maintained. Special care shall be taken to prevent any wedging action or eccentric loading upon or against the structures. During backfilling operations, care shall be exercised that the equipment used will not overload the structures in passing over and compacting these fills. Except as otherwise specified or directed, backfill shall be placed in layers not more than 12-inches in loose depth and each layer of backfill shall be compacted thoroughly and evenly using approved types of mechanical equipment. Each pass of the equipment shall cover the entire area of each layer of backfill.

3. In compacting and other operations, the Contractor shall conduct his operations in a manner to prevent damage to structures due to passage of heavy equipment over, or adjacent to, structures, and any damage thereto shall be made good by the Contractor at no additional expense to the Owner.

I. After backfilling trenches and excavations, the Contractor shall maintain the surfaces of backfill areas in good condition so as to present a sn1ooth surface at all times level with adjacent surfaces. Any subsequent settling over backfilled areas shall be repaired by the Contractor immediately, in a manner satisfactory to the Engineer, and such maintenance shall be provided by the Contractor for the life of this Contract, at no additional expense to the Owner.

J. The finished subgrade of the fills and filled excavations upon which topsoil is to be placed, or pavements are to be constructed, or footings or slabs are to be constructed shall not be disturbed by traffic of other operations and shall be maintained in a satisfactory condition until the finished courses are placed. The storage or stockpiling of n1aterials on finished subgrade will not be permitted.

K. Uniformly smooth grading of all areas to be graded, as indicated and as directed, including excavated and filled sections, embankments and adjacent transition areas, and all areas disturbed as a result of the Contractor's operations, shall be accomplished. The finished surfaces shall be reasonably smooth, compacted and free from surface irregularities.

3.2 COMPACTION

A. Compaction Requirements: The degree of compaction is expressed as a percentage of the maximum dry density at optimum moisture content as determined by ASTM Test D1557, Method C. The compaction requirements are as follows:

AREA	ASTM DENSITY DEGREE OF COMPACTION
Below Footings & Slabs	95%
Pavement sub-base and access roads	95%
Root zone areas	85%-88%
Trench Backfill -below pavements -below general landscaped Areas -below structures and walls	 95% 92% 95%
Other Areas	92%

B. Moisture Control:

1. Fill that is too wet for proper compaction shall be disced, harrowed, or otherwise dried to a proper moisture content to allow compaction to the required density. If fill cannot be dried within 24 hours of placement, it shall be removed and replaced with drier fill.

2. Fill that is too dry for proper compaction shall receive water uniformly applied over the surface of the loose layer. Sufficient water shall be added to allow compaction to the required density.

C. Unfavorable Conditions:

1. In no case shall fill be placed over material that is frozen. No fill material shall be placed, spread or rolled during unfavorable weather conditions. When work is interrupted by heavy rains, fill operations shall not be resumed until the moisture content and the density of the previously placed fill are as specified.

2. In freezing weather, a layer of fill shal1 not be left in an uncompacted state at the close of the day's operations. Prior to terminating work for the day, the final layer of compacted fill shall be rolled with a smooth wheeled roller to eliminate ridges of soil left by compaction equipment.

D. Compaction Control:

1. In-place density tests shall be made in accordance with ASTM D1556, D2922 or D2167 as the work progresses, to determine the degree of compaction being attained by the Contractor. Any corrective work required as a result of such tests, such as additional compaction, or a decrease in the thickness of layers, shall be performed by the Contractor at no additional expense to the Owner. Testing shall be made at the Contractor's expense by the geotechnical testing laboratory.

2. The Engineer's duties do not include supervision or direction of the actual work by the Contractor, his employees or agents. Neither the presence of the Engineer nor any observation and testing performed by him shall excuse the Contractor from defects discovered in his work at that time or subsequent to the testing.

3. In-place density tests shall be performed as a minimum according to the following frequency:

   a. One test per lift under spread footings, or slabs.
   b. One test per lift for every 100' length of strip footings or wall foundations.
   c. A minimum of every 50 cubic yards of backfill in trenches or around structures, or beneath pavement
   d. One test every 500 cubic yards of material placed for general fill areas

4. Minimum laboratory testing requirements for granular fill and backfill materials are as follows:

Type of Test	Frequency	Testing Method
Grain Size Analysis (to the No. 200 Sieve)	1 test/1500 cy	ASTM D-422
Proctor Compaction Test	One test/source	ASTM D-1557

a. The results of the initial tests shall be submitted to the Engineer for review at least 15 days prior to beginning of construction. The testing results shall indicate that the material meets the specified requirements.

b. All other tests shall be performed during construction at the specified intervals or in the opinion of the Engineer, if the gradation of the materials changes. The samples obtained for testing shall be the newly placed backfill soils. The results shall be submitted to the Engineer for review prior to placement of overlay backfill material The testing results shall indicate that the material meets the specific requirements.

c. The rerun of the initial tests due to change of gradation of the backfill soils shall be performed by the Contractor at no additional expense to the Owner.

E. Placement:

1. Where the subgrade surface has an inclination of less than 4:1 (H:V), fill shall be placed in horizontal layers. Fill shall not be placed following the natural contours of the ground. Fill shall be placed starting in the lowest areas working up to finish grades in horizontal layers in the manner specified herein. Each layer of fill should be benched into the existing slope in order to avoid the formation of a shear plane.

2. When placing materials on slopes, the material can be compacted following the natural contours provided the materials are compacted to the requirements given in Paragraph 3.03.A of these specifications. Care should be exercised to avoid the formation of a smooth surface between layers of compacted soil. This may require that the Contractor scarify the top 2 to 3 inches of previously compacted material to permit shear transfer with the subsequent layer.

3.2 FINAL QUALITY CONTROL REPORT

A. The Contractor shall submit a final quality control report presenting all of the results of the materials testing. The Contractor is responsible for compiling all of the quality control testing data into a formal report. The report shall be submitted within 15 days after the completion of all earthwork operations. The report shall include all test results including laboratory compaction, field density, grain size analysis, and plans showing field density testing locations. The report shall be prepared and sealed by a Professional Engineer registered in the Commonwealth of Massachusetts.

3.4 FINE GRADING

A. Before surface or subbase is spread, the subgrade shall be shaped to a true surface conforming to the Drawings. All depressions and high spots shall be filled with suitable n1aterial or removed and such areas again compacted until the surface is smooth and properly compacted. A tolerance of ½ inch above or below the finished subgrade will be allowed provided that this ½ inch above or below grade is not maintained for a distance

longer than 50 feet and that the required crown is maintained in the subgrade. Any portion which is not accessible to a roller shall be thoroughly compacted by other mechanical methods.

END OF SECTION 02200

SECTION 02212

ROCK EXCAVATION

PART 1 -GENERAL

1.1 SUMMARY

A. Rock excavation may be required where boulders, monolithic concrete, reinforced concrete or stone structures measuring in excess of two cubic yards solid in volume or larger are encountered or solid ledge which, in the opinion of the Engineer, requires drilling and blasting, wedging, sledging, barring, or hydraulically fracturing for removal, is encountered.

B. The following do not constitute rock excavation: hardpan; soft or disintegrated rock; concrete which can be removed with a pick; previously blasted rock or broken stone less than the above mentioned two cubic yards; stone walls; rocks or sections of blasted ledge that may fall into or be jarred loose from the sides of the trench beyond the maximum limits of excavation approved by the Engineer.

C. The blasting shall be accomplished by an experienced technician and the Contractor or Sub-Contractor shall be conducted in accordance with 527 CMR 13.00. The Contractor will procure the proper blasting permit from the City of Waltham Fire Department and shall acknowledge all the contents and laws of the State Fire Marshall in handling, using, storing and transporting explosives and caps. Blasting shall be conducted with all possible care so as to avoid injury to persons and property. The rock shall be well covered with suitable mats or heavy logs chained together or other such effective appliances; Sufficient warning shall be given to all persons in the vicinity of the work before blasting. Extreme care shall be taken to avoid injury to water mains and services, gas pipes, sewers, drain ducts, cables and other structures.

D. In addition to adhering to all the laws and ordinances relating to the handling and storage of explosives, the Contractor shall also conform to any further regulations deems necessary by the Fire Department Chief and the Engineer and be aware of any inspection fees as required by the fire department.

1.2 SCOPE OF WORK

A. Furnish all labor, materials, equipment, and incidentals required to excavate and dispose of rock boulders as shown on the Drawings and as specified herein.

B. Blasting permits are the responsibility of the Contractor. All applications and fees shall be provided by the Contractor. When permits have been obtained, blasting may be used to fracture rock and boulders for excavation. If blasting is performed, provide the services of a qualified blasting technician, licensed in Massachusetts.

C. All arrangements for inspections required by the Waltham Fire Department shall be made by the Contractor.

1.3 RELATED WORK

A. Earth excavation and backfilling are included in Section 02221.

B. Environmental Protection is included in Section 01110.

1.4 SUBMITIALS

A. Submit three copies of blasting permits required by local agencies and authorities. Original permits shall be prominently displayed on the Work site prior to initiating blasting operations. Submittals shall be for information only. Contractor shall remain responsible for means, methods, and techniques, as well as all safety considerations.

B. All blasting shall be in accordance with 527 CMR 13.00.

C. The cost for all photographs and/or pre-blast videotapes shall be included in the bid price.

D. The cost for inspection, shall be paid directly to the Waltham Fire Department. All fees for inspection shall be included in the blasting cost.

1.5 DELIVERY, STORAGE, AND HANDLING

A. The delivery, storage, and handling of explosives shall be performed only by qualified persons licensed in Massachusetts, and shall be in full conformance with all laws, regulations, ordinances, and practices. Extreme care shall be taken to avoid injury or damage to persons or property.

1.6 DEFINITIONS

A. Rock: Any large mass of stone, bedrock, or ledgerock.

B. Boulder: Rock fragments not exceeding two cubic yards in volume.

C. Rock Excavation: The removal of solid rock or rock fragments greater than two cubic yards in volume which cannot be removed by conventional mechanical excavation equipment or without continuous, systematic drilling blasting.

D. Boulder Excavation: The Removal of boulders not exceeding two cubic yards in volume which can be excavated without by conventional mechanical excavation equipment or without continuous, systematic drilling and blasting.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Gravel fill shall be as specified in Section 02230.

PART 3 -EXECUTION

3.1 PREPARATION FOR BLASTING

A. A pre-blast survey shall be conducted for all structures within the influence range of blasting operations, or within 250-ft of the blast area, whichever is greater. The pre- blast survey shall consist of a close visual inspection, fully supported by photographs or video recordings, performed by, or under the supervision of, a licensed professional engineer or geologist experienced in such surveys. The Contractor's insurance underwriter shall be present during such surveys.

B. Any damage noted after completion of blasting operations which cannot be determined from the pre-blast survey to be a pre-existing condition shall be presumed to have been caused by blasting operations. Such damage shall be repaired promptly and completely to the property owner's satisfaction to restore the condition of the property to that existing prior to blasting.

C. Pre-blast survey records shall be maintained for a period of not less than three years following final completion and acceptance of the Work.

3.2 BLASTING PLANS

A. Prior to initiating blasting operations, a blasting plan shall be prepared as required by the Waltham Fire Department. The plan may include sketches to show blast locations; proximity to, and methods for protection of, existing structures and utilities; drill hole patterns, amount of charges, firing sequence and times; calculations of ground velocities, energy ration, acceleration and displacement; and any other pertinent information required. Field monitoring methods and techniques shall also be addressed.

B. If required by local or state regulations, blasting plans shall be reviewed by the appropriate agency or authority and revised as required to n1eet with their approval.

3.3 BLASTING

A. Blasting operations shall be performed under the direct supervision of a qualified blasting technicians licensed in Massachusetts. Blasting operations shall be in full compliance with applicable state and local laws, regulations, ordinances and practices.

B. Blast locations shall be heavily matted to contain potential flying debris.

3.4 BOULDER EXCAVATION

A. Boulders and rock fragments up to two cubic yards in volume may be reduced in size by rock excavation methods to simplify its removal.

3.5 TRENCH PROCEDURE

A. Excavate rock in pipe trenches, before laying pipe, to no less than 6 in. from pipe. Backfill trench, before pipe is laid, to correct subgrade. Use thoroughly compacted, suitable material or, when so specified or indicated on drawings, same material as required for bedding pipe. Furnish and place at no additional compensation.

B. Fill excess excavation below elevation of the top of bedding, cradle, or envelope when in pipe trenches with material of same type and placed and compacted in same manner as specified for bedding, cradle, or envelope.

C. At option of Contractor, fill excess excavation in rock beneath foundations with Class A or Class B concrete.

D. Drill and blast a single line of holes in vertical face of rock at end of trench, when shattering rock at ends of pipe or elsewhere as indicated. Provide minimum depth drillholes of 4 ft. and maximum spacing of 18 in. centers. Use sufficient explosive to shatter rock for future excavation. Complete shattering before any pipe or fitting is placed within 50 ft. of rock to be shattered.

E. Remove shattered rock. If rock below normal depth is shattered due to drilling or blasting operations of Contractor and Engineer considers such shattered rock to be unfit for foundations, remove it and backfill excavation with concrete as required, except that in pipe trenches, use screened gravel for backfill. Do such removal and backfilling at no additional compensation.

F. Remove dirt and loose rock, as directed, from designated areas and clean surface of rock thoroughly, using steam to melt snow and ice, if necessary. Remove water in depressions, so that whole surface of designated area can be inspected to determine whether seams or other defects exist.

G. Rough surfaces of rock foundations sufficiently to bond well with masonry and embankments to be built thereon and, if required, cut to rough benches or steps.

H. Remove from the rock surface to remain all vegetation, dirt, sand, clay, boulders, scale, excessively cracked rock, loose fragments, ice, snow, and other objectionable substances. Use picking, barring, wedging, streams of water under sufficient pressure, stiff brushes, hammers, steam jets, and other effective means to accomplish this cleaning, and remove free water left on the surface or rock. Perform all of above before any masonry embankment is built on or against rock.

I. Remove piles of boulders or loose rock encountered within limits of earth embankments to a suitable place of disposal.

J. Use excavated rock in backfilling trenches subject to following limitations:

1. Do not use pieces of rock larger than permitted by Engineer.

2. Do not allow rock quantities used in backfill in any location to result in formation

of voids.

3. Do not place rock backfill within 16 in. of surface of finish grade.

K. Backfill with material obtained from outside sources at no additional compensation, when material suitable for backfilling is not available in sufficient quantity from other excavations.

3.6 DISPOSAL OF ROCK AND BOULDERS

A. Fragmented rock with dimensions not exceeding 6-in. in any direction may be mixed with common fill (providing compaction requirements will not be compromised) and used as common fill in accordance with Section 02221.

B. Fragmented rock up to 12-in in length in any direction may be used as riprap or slope stabilization, provided that such materials meet the requirements for riprap and slope stabilization specified in Section 02221.

C. Rock and boulders may be crushed and screened for reuse in the Work, provided that the resultant materials meet the requirements for gravel, crushed stone, or structural fill as specified in Section 02221.

D. Unused rock and boulders shall be removed and disposed of off-site.

END OF SECTION 02212

SECTION 02221

TRENCHING, BACKFILLING AND COMPACTION

PART 1 GENERAL

1.1 SCOPE OF WORK

A. Furnish all labor, materials, equipment and incidentals necessary to perform all trenching for pipelines and appurtenances, including drainage, filling, backfilling, disposal of surplus material and restoration of trench surfaces and easements.

B. Excavation shall extend to the width and depth shown on the Drawings and or as specified and shall provide suitable room for installing pipe, structures and appurtenances.

C. The Contractor shall furnish and place all sheeting, bracing and supports and shall remove from the excavation all materials which the Engineer may deem unsuitable for backfilling. The bottom of the excavation shall be firm, dry and in all respects, acceptable to receive the work. Work shall not be placed on frozen ground nor shall work be placed on wet unstable ground. If conditions warrant, the Contractor may be ordered to deposit gravel for pipe bedding, or gravel refill for excavation below grade, directly on the bottom of the trench immediately after excavation has reached the proper depth and before the bottom of the trench has become softened or disturbed by any cause whatever. The length of open trench shall be related closely to the rate of pipe laying. All excavation shall be made in open trenches.

D. All excavation, trenching, and related sheeting, bracing, etc. shall comply with the requirements of OSHA excavation safety standards (29 CFR Part 1926.650 Subpart P) and State requirements. Where conflict between OSHA and State regulations exists, the more stringent requirements shall apply.

E. Wherever the requirement for 92 percent compaction is referred to herein it shall mean "at least 92 percent of maximum density as determined by ASTM D1557, Method C". Backfilling operations shall be such that material is compacted in 6 inch lifts, including the trench around the barrel of the pipe. Care shall be taken as to not place excessive pressure on the new pipe, such as using heavy rubber tire equipment as a compaction method directly over the new pipe.

F. Contractor will hand dig around existing utilities.

G. Excavation shall be protected each day by either backfilling or steel plates as required.

H. Abandoned pipes and structures are to be completely removed or sealed.

1.2 RELATED WORK

A. Granular fill materials is included in Section 02200.

C. Dewatering and Drainage is included in Section 02140.

D. Pavement repair and resurfacing is included in Section 02576.

1.3 DEFINITIONS

A. Percentage of compaction is defined as the ratio of the field dry density, as determined by ASTM Dl556 or ASTM D2922 to the maximum dry density determined by ASTM D1557 Method C, multiplied by 100.

B. Proof Roll: Compaction with a minimum of 4 passes of a vibratory steel drum or rubber tire roller. Vibratory plate compactors shall be used in small areas where vibratory steel drum or rubber tire roller cannot be used.

C. Acceptable Material: Material which does not contain organic silt or organic clay, peat, vegetation, wood or roots, stones or rock fragments over 6-inch [15 cm] in diameter, porous biodegradable matter, loose or soft fill, excavated pavement, construction debris, or refuse. Stones or rock fragments shall not exceed 40 percent by weight of the backfill material.

D. Unacceptable Materials: Materials that do not comply with the requirements for the acceptable material or which cannot be compacted to the specified or indicated density.

1.4 SUBMITTALS

A. Shop Drawings: Submit the following in accordance with Section 01300 - SUBMITTAL PROCEDURES:

1. Qualifications of the Contractor's Independent Testing Laboratory as specified in Paragraph 1.5 I, two (2) weeks prior to the execution of any earth excavation, backfilling, filling, or compaction process.

2. Submit an excavation, backfilling, and filling plan at least one week prior to start of any earth moving activities. The review will be only for the information of the Owner and third parties for an overall understanding of the project relating to access, maintenance of existing facilities and proper utilization of the site. The Contractor shall remain responsible for the adequacy and safety of the means, methods and sequencing of construction. The plan shall include, but not be limited to the following items:

a. Detailed sequence of work.

b. General description of construction methods.

c. Numbers, types, and sizes of equipment proposed to perform excavation and compaction.

d. Details of dust control measures.

e. Proposed locations of stockpiled excavation and/or backfill materials.

f. Proposed surplus excavated material off-site disposal areas and required permits.

g. Details of erosion and sedimentation control measures which will prevent erosion and sedimentation during the earth moving activities.

3. The following material submittals shall be submitted to the Engineer prior to backfilling and filling:

a. Gravel Borrow as specified in Section 02230.

b. Bank-run Gravel as specified in Section 02230.

c. Crushed Stone as specified in Section 02230.

d. Other Acceptable Materials: Laboratory testing results of gradation and moisture-density relationship. Submittal shall include specific location of the source and the date when sample was taken.

4. During Construction, submit written confirmation of fill lift thickness, in- place soil moisture content, and percentage of compaction to the Engineer before placing the next lift or constructing foundations.

5. Controlled Density Fill Mix Design:

a. Prior to beginning the work the Contractor shall submit for review, flowable fill mix designs which shall show the proportions and gradations of all materials for each class and type of flowable fill specified

1.5 QUALITY ASSURANCE

A. Provide in accordance with Section 01400 and as specified.

B. Dewatering and Groundwater Control: Provide and maintain as specified in Section 02140.

C. Excavations shall be performed in the dry, and kept free from standing water, snow and ice during construction. Bedding and backfill material shall not be placed in water. Water shall not be allowed to rise upon or flow over the bedding and backfill material

D. The Contractor shall be solely responsible for making all excavations in a safe manner. All excavation, trenching, and related sheeting, bracing, etc. shall con1ply with the requirements of OSHA excavation safety standards (29 CFR Part 1926 Subpart P) and State requirements. Where conflict between OSHA and State regulations exists, the more stringent requirements shall apply.

E. Do not excavate, construct embankments, or fill until all the required submittals have been reviewed by the Engineer.

F. Formulate excavation, backfilling, and filling schedule and procedures to eliminate possibility of undermining or disturbing foundations of partially and completed structures, pipelines and embankments or existing structures and pipelines.

G. Employ an independent testing laboratory to perform particle size and gradation analyses in accordance with ASTM D422, and to determine compactibility in accordance with ASTM D1557 for all the proposed backfill and fill materials, and monitoring field compaction operations. The independent testing laboratory shall have the following qualifications:

1. Be accredited by the American Associates of State Highway and Transportation Officials (AASHTO) Accreditation Program.

2. Have three (3) years experience in sampling, testing and analysis of soil and aggregates, and monitoring field compaction operations.

3. Able to provide three (3) references from previous work.

H. Field Testing and Inspections:

1. By (Owners testing laboratory or Contractor's independent testing laboratory, acceptable to the Engineer, at Contractor's expense) as specified.

2. Location of tests mutually acceptable to testing laboratory and the Engineer or as directed by the Engineer.

3. In the event compacted material does not meet specified in-place density, recompact material and retest this area until specified results are obtained at no additional cost to the Owner.

4. Testing laboratory to perform inspection at least once daily to confirm lift thickness and compaction effort for entire fill area.

I. Methods of Field Testing:

1. In-Place Density: ASTM D1556, ASTM D2167, or ASTM D2922.

2. In-Place Moisture Content: ASTM D3017, ASTM D4944, or ASTM D4959.

J. Material Testing Frequency: The following testing frequencies are minimum required for all structural and non-structural fill, grading and embankment

1. Field In-Place Density and Moisture Content - Screened gravel and crushed stone shall be compacted as specified and indicated. For other backfill and fill materials, minimum test frequency shall be as follows, and no less than one test per lift:

   a. Trenches under structures foundation preparation or roadways subbase: Every 100 lin. ft. [30 m.] per lift.

   b. Trenches in areas without structures or roadways: Every 250 lin. ft. [60 m.] per alternate lift.

   c. Paved Roadways: Every 100 lin. ft. [30 m.] per lift.

   d. Paved Areas: 2,000 sq. ft. [185 sq. m.] per lift.

   e. Under Structure: 1,000 sq. ft. [100 sq. m.] per lift.

   f. Around Structures: 1,500 sq. ft. [150 sq. m.] per lift.

   g. Embankment Fills: 5,000 sq. ft. [465 sq. m.] per lift.

2. Moisture Density - One per source, except for screened gravel and crushed stone. Repeat the moisture density test for every 1,000 cubic yard of material use, and whenever visual inspection indicates a change in material gradation as determined by the Engineer.

3. Gradation Analysis – A minimum of one per source and for each moisture density test and whenever visual inspection indicates a change in material gradation.

4. Liquid Limit, Plastic Limit and Plasticity Index - Minimum of one test per 500 cubic yard [382cubic meter] of soil for use as fill material and whenever classification of material is in doubt as determined by the Engineer.

K. Construction Tolerances

1. Construct finished surfaces to plus or minus 1 inch [2.5 cm] of the elevations

2. Grade cut and fill areas to plus or minus 0.20 foot [6.0 cm] of the grades indicated.

3. Complete embankment edges to plus or minus 6 inches [15 cm] of the slope lines indicated.

4. Provide the Engineer with adequate survey information to verify compliance with above tolerances.

L. Cut pavement with a saw or pneumatic tools to prevent damage to remaining pavement without extra compensation. Where pavement is removed in large pieces, dispose of pieces before proceeding with excavation.

M. Pipes, drains, and other utilities may exist in certain locations not indicated on drawings. No attempt has been made to show all services. Completeness or accuracy of information given is not guaranteed.

N. Carefully support and protect from damage, existing pipes, poles, wires, fences, curbings, property line markers, and other structures, which the Engineer determines must be preserved in place without being temporarily or permanently relocated. Should such items be damaged, restore without compensation therefor, to at least as good condition as that in which they were found immediately before the work was begun.

O. Whenever certain existing structures, as described below, are encountered, and the Engineer so directs, change the location, remove and later restore, or replace such structures, or assist the Owner in doing so. Such work to be paid for under applicable items of work, otherwise as Extra Work.

P. In removing existing pipes or other structures, include for payment only those new materials which are necessary to replace those unavoidably damaged as determined by the Engineer.

Q. The preceding two paragraphs apply to pipes, wires, and other structures which meet the following: (a) are not indicated on the drawings or otherwise provided for, (b) encroach upon or are encountered near and substantially parallel to the edge of the excavation, and (c) in the opinion of the Engineer, will impede progress to such an extent that satisfactory construction cannot proceed until they have been changed in location, removed (to be later restored), or replaced.

R. Restore existing property or structures as promptly as practicable.

S. If material is unacceptable for foundation support (in the opinion of the Engineer) is found at or below the grade to which excavation would normally be carried in

accordance with the drawings and/or specifications, remove such material to the required width and depth as directed by the Engineer and replace it with gravel borrow, crushed stone, or concrete.

T. Do not remove excavation materials from the site of the work or dispose of except as directed or permitted by the Engineer.

U. Provide suitable and safe bridges and other crossings where required for accommodation of travel, and to provide access to private property during construction, and remove said structures thereafter.

PART 2 PRODUCTS

2.1 GENERAL

A. Use only acceptable materials from excavations or borrows, as determined by the Engineer.

B. Provide 3,000 psi [20 MPa] concrete, bank-run gravel, gravel borrow, and crushed stone.

C. Provide Fine Aggregate conforming to ASTM C33.

D. Provide erosion/sedimentation control devices as indicated, including geotextile fabric in accordance with Section 01110.

E. Provide geotextile fabric and silt fence as indicated, .

F. Provide erosion/sedimentation control devices as indicated, including geotextile fabric in accordance with Section 01110.

PART3 EXECUTION

3.1 TRENCH EXCAVATION

A. Pavement shall be cut with a saw, or wheel along straight lines before excavating.

B. Trenches shall be excavated to sufficient depths and to sufficient widths for installing new pipe/components where required, placing and removing of decking, sheeting and bracing, and for pumping and drainage facilities. The bottom of the excavations shall be firm and dry and in all respects acceptable to the Engineer. Trench width shall be a practical minimum, as needed for proper execution for the work.

C. Trench excavation shall include material of every description and of whatever substance encountered, except rock and boulders. Trench excavation shall also include removal of existing reinforced concrete subbase, if encountered.

D. The Contractor shall strip and stockpile excavated trench materials. Any bushes that are removed shall be protected and replanted in the same location. Removed curbing shall be stockpiled in a safe manner. Where grassed areas are disturbed by stockpiled materials, the Contractor shall rake out the area and loam and re-seed at his expense.

E. Stockpiling of materials shall be included in the pay items for excavating and no Allowances shall be made for any stripping and stockpiling requirements.

F. While excavating and backfilling is in progress, traffic shall be maintained, and all utilities and other property protected as provided in the General Conditions and General Requirements.

G. Trenches shall be excavated to the depth indicated on the Drawings and in widths sufficient for laying the pipe, bracing and for pumping and drainage facilities. The

bottom of the excavations shall be firm and dry and in all respects acceptable to the• Engineer. Trench width shall be practical minimum.

H. Excavation and dewatering shall be accomplished by methods which preserve the undisturbed state of subgrade soils. The trench may be excavated by machinery to, or just below the designated subgrade, provided that material remaining in the bottom of the trench is no more than slightly disturbed. Subgrade soils which become soft, loose, "quick", or otherwise unsatisfactory as a result of inadequate excavation, dewatering or other construction methods shall be removed and replaced by gravel borrow as required by the Engineer at the Contractor's expense.

I. Clay and organic silt soils are particularly susceptible to disturbance due to construction operations. When excavation is to end in such soils, the Contractor shall use a smooth-edge bucket to excavate the last one foot of depth.

J. Where pipe is to be laid in crushed stone, the trench may be excavated by machinery to the normal depth of the pipe plus the depth of the stone, provided that the material remaining in the bottom of the trench is no more than slightly disturbed.

K. Where pipe is to be laid directly on the trench bottom. final excavation at the bottom of the trench shall be performed manually, providing a flat-bottom true to grade upon undisturbed material. Bell holes shall be made as required.

L. Excavate trenches to depths so as to permit pipe to be laid at elevations, slopes, or depths of cover indicated on drawings, and at uniform slopes between indicated elevations. .

M. Make pipe trenches as narrow as practicable and do not widen by scraping or loosening materials from the sides. Make every effort to maintain sides of trenches firm and undisturbed until backfilling has been placed and compacted.

N. Excavate trenches with approximately vertical sides between springline of pipe and elevation 1 ft. [30 cm] above top of pipe.

3.2 DISPOSAL OF MATERIALS

A. Excavated material shall be stacked without excessive surcharge on the trench bank or obstructing free access to hydrants and gate valves. Inconvenience to traffic and abutters shall be avoided as much as possible. Excavated material shall be segregated for use in backfilling as specified below.

B. It is expressly understood that no excavated material shall be removed from the site of the work or disposed of by the Contractor except as directed by the Engineer. When removal of surplus materials has been approved by the Engineer, the Contractor shall dispose of such surplus material in approved areas designated by the Contractor.

C. Should conditions make it impracticable or unsafe to stack material adjacent to the trench, the material shall be hauled and stored at a location provided by the Contractor. When required, it shall be re-handled and used in backfilling the trench.

D. All cost of handling, storing and rehandling excavated materials shall be included in the respective unit bid in the Bid Form for the installation of new water main.

3.3 SHEETING AND BRACING

A. Furnish, put in place and maintain sheeting and bracing required by Federal, State or local safety requirements to support the sides of the excavation and prevent loss of ground which could endanger personnel, damage or delay the work or endanger adjacent structures. If the Engineer is of the opinion that at any point sufficient or proper supports have not been provided, he/she may order additional supports placed at the expense of the Contractor. Compliance with such order shall not relieve the Contractor from his/her responsibility for the sufficiency of such supports. Care shall be taken to prevent voids outside of the sheeting, but if voids are formed, they shall be immediately filled and rammed.

B. When moveable trench bracing such as trench boxes; manhole boxes, moveable sheeting, shoring or plates are used to support the sides of the trench, care shall be taken in placing and moving the boxes or supporting bracing to prevent movement of the pipe, or disturbance of the pipe bedding and the screened gravel backfill.

C. When installing pipe; trench boxes, moveable sheeting, shoring or plates shall not be allowed to extend below mid-diameter of the pipe. As trench boxes, moveable sheeting, shoring or plates are moved, screened gravel shall be placed to fill any voids created and the screened gravel and backfill shall be recompacted to provide uniform side support for the pipe.

D. All excavations within the right-of-way of streets shall be sheeted and braced. Sheeting and bracing shall be adequate to support decking and to meet the requirements of applicable general laws and regulations.

E. The Contractor will be permitted to use steel sheeting in lieu of wood sheeting for the entire job wherever the use of sheeting is necessary. The cost for use of sheeting will be included in the bid items for pipe and shall include full compensation for driving, bracing and later removal of sheeting.

F. All sheeting and bracing shall be carefully removed in such manner as not to endanger the construction of other structures, utilities, or property, whether public or private. All voids left after withdrawal of sheeting shall be immediately refilled with sand by ramming with tools especially adapted to that purpose, by watering or otherwise as directed.

G. The Contractor shall receive no payment, for sheeting, bracing, etc., during the progress of the work. The Contractor shall receive no payment for sheeting which has actually been left in the trench for the convenience of the Contractor.

H. Sheeting driven below mid-diameter of any pipe shall remain in place from the driven elevation to at least 1-ft above the top of the pipe.

3.4 TEST PITS

A. The Contractor may be required to excavate test pits for the purpose of locating underground utilities or structures as an aid in establishing the precise location of new work.

B. Test pits shall be backfilled as soon as the desired information has been obtained. The backfilled surface shall be maintained in a satisfactory condition for travel until resurfaced as specified.

3.5 EXCAVATION BELOW GRADE AND REFILL

A. Whatever the nature of unstable material encountered or the groundwater conditions, trench drainage shall be complete and effective.

B. If the Contractor excavates below grade through error or for his/her own convenience, or through failure to properly dewater the trench, or disturbs the subgrade before dewatering is sufficiently complete, he/she 1nay be directed by the Engineer to excavate below grade as set forth in the following paragraph, in case the work of excavating below grade and furnishing and placing the refill shall be performed at his/her own expense.

If the material at the level of trench bottom consists of fine sand, sand and silt or soft earth which may work into the screened gravel notwithstanding effective drainage, the subgrade material shall be removed to the extent directed and the excavation refilled with a 6-in layer of crushed stone as approved by the Engineer, to form a filter layer preserving the voids in the gravel bed of the pipe. The composition and gradation of gravel shall be approved by the Engineer prior to placement. Screened gravel shall then be placed in 6-in. layers thoroughly compacted up to the normal grade of the pipe. If directed by the Engineer, bank-run gravel shall be used for refill of excavation below grade.

D. Geotextile filter fabric may be substituted for filter layer if approved by the Engineer. Filter fabric shall be Mirafi 140N, Supac equivalent, or equal.

3.6 BACKFILLING

A. As soon as practicable after the pipe has been laid and jointed and inspected by the Engineer, backfilling shall begin and thereafter be prosecuted expeditiously. Bedding gravel, as specified for the type of pipe installed, shall be placed up to 1-ft over the pipe.

B. An impervious dam or bulkhead cutoff of clay or other impervious material shall be constructed in the trench as directed, to interrupt the unnatural flow of groundwater after construction is completed. The dam shall be effectively keyed into the trench bottom and sidewalls. Provide at least one clay or other impervious material dam in the pipe bedding between each manhole where directed or every 300 feet, whichever is less.

C. Where the pipes are laid in streets, the remainder of the trench up to a depth of 1-ft below the bottom of the specified permanent paving shall be backfilled with common fill material in layers not to exceed 1-ft and thoroughly compacted. The subbase layer for paving shall be of bank-run gravel thoroughly compacted in 6-in layers.

D. To prevent longitudinal movement of the pipe, dumping backfill material into the trench and then spreading will not be permitted until selected material or screened gravel has been placed and compacted to a level 1-ft over the pipe.

E. Backfill shall be brought up evenly on all sides. Each layer of backfill material shall be thoroughly compacted by rolling, tan1ping, or vibrating with 1nechanical compacting equipment or hand tamping, to 92 percent compaction. If rolling is employed, it shall be by use a suitable roller or tractor, being careful to compact the fill throughout the full width of the trench.

E. Backfilling and filling operations shall be suspended in areas where test are being Made until tests are completed and the testing laboratory has advised the Engineer That adequate densities are obtained.

E. Water jetting or puddling may be used unless the refill contains too great a proportion of clay or loam to permit satisfactory drying. Water jetting shall consist of using a suitable length of pipe at least 1-1/4 in in diameter fitted with quick acting valve and sufficient hose to connect to hydrant or pump having adequate pressure and capacity. The full depth of backfill shall be thoroughly inundated by thrusting the pipe into the fill at frequent intervals with the valve open until all slun1ping ceases. Where backfill is compacted by puddling, it shall be done by depositing in water. Water for jetting or puddling may be obtained from Owner hydrants wherever possible. Water may be furnished by the Owner from these hydrants if reasonable care is exercised in its use and when approved by the Water Department.

G. If water restrictions are in force, the Contractor shall obtain his/her own water elsewhere, or compact the backfill by other approved methods at no additional cost to this Contract.

H. Where other methods are not practicable, compaction shall be by use of hand or pneumatic ramming with tools weighing at least 20 lbs. The material being spread and compacted in layers not over 6-in thick. If necessary, sprinkling shall be employed in conjunction with rolling or ramming.

I. Backfill around structures shall be selected common fill material, may be compacted by puddling where approved by the Engineer. All backfill shall be compacted, especially under and over pipes connected to the structures.

J. Subject to the approval of the Engineer, fragments of ledge and boulders smaller than 6-in may be used in trench backfill providing that the quantity in the opinion of the Engineer, is not excessive. Rock fragments shall not be placed until the pipe has at least 2-ft of earth cover. Small stones and rocks shall be placed in thin layers alternating with earth to insure that all voids are completely filled. Fill shall not be dropped into the trench in a manner to endanger the pipe.

K. Bituminous paving shall not be placed in backfilling unless specifically permitted, in which case it shall be broken up as directed. Frozen material shall not be used under any circumstances.

L. All road surfaces shall be broomed and hose-cleaned immediately after backfilling. Dust control measures shall be employed at all times.

3.7 RESTORING TRENCH SURFACE

A. Where the trench occurs adjacent to paved streets, in shoulders, sidewalks, or in cross-country areas, the Contractor shall thoroughly consolidate the backfill and shall maintain the surface as the work progresses. If settlement takes place, he/she shall immediately deposit additional fill to restore the level of the ground.

B. In and adjacent to streets, the top 12-in layer of trench backfill shall consist of compacted bank-run gravel. Should the Contractor wish to use material excavated from the trench as gravel subbase for pavement replacement, the Contractor shall at his/her own expense have samples of the material tested by an independent testing laboratory at intervals not to exceed 500 feet, in order to establish its compliance with the specifications. Only material which has been tested by the Contractor and approved by the Engineer shall be allowed to be incorporated into the work.

C. The surface of any driveway or any other area which is disturbed by the trench excavation and which is not a part of the paved road shall be restored by the Contractor to a condition at least equal to that existing before work began.

3.8 PROTECTION

A. Curbing, fencing, sign posts, utility poles, mailboxes, etc. in the vicinity of the Contractor's operations shall be adequately protected, and if necessary removed and restored after backfilling. All items which are damaged during construction shall be replaced with material fully equal to that existing prior to construction. Where curbing or throatstones are to be removed and not replaced, the curb pieces shall be brought to the Waltham Department of Public Works yard and deposited near the curbing laydown area.

B. Enclose uncut tree trunks adjacent to work in wooden boxes of such height as may be necessary for protection from injury from piled material, equipment, operations, or otherwise due to work. Operate excavating machinery and cranes of suitable type with care to prevent injury to trees not to be cut and particularly to overhanging branches and limbs.

C. Cut all branches, limbs, and roots smoothly and neatly without splitting or crushing. Neatly trim, cut the injured portions and cover with an application of grafting wax or tree healing paint as directed.

D. Protect cultivated hedges, shrubs, and plants which might be injured by the Contractor's operations by suitable means or dig up and temporarily replant and maintain. After construction operations have been substantially completed, replant in original positions and care for until growth is reestablished. If cultivated hedges, shrubs, and plants are

injured to such a degree as to affect their growth or diminish in their beauty or usefulness, replace by items of equal kind and quality existing at the start of the work.

E. Do not use or operate tractors, bulldozers, or other power-operated equipment on paved surfaces when their treads or wheels which are so shaped as to cut or otherwise damage such surfaces.

F. Restore surfaces damaged by the Contractor's operations to a condition at least equal to that in which they were found immediately before work commenced. Use suitable Materials and methods for such restoration.

3.9 DUST CONTROL

A. Calcium Chloride shall be uniformly applied by hand methods or by approved spreading devices as directed by the Engineer. The Contractor shall have a nominal supply of Calcium Chloride on hand at all times.

END OF SECTION 02221

SECTION 02222

CLEARING AND GRUBBING

PART 1-GENERAL

1.1 SCOPE OF WORK

A. This work shall consist of clearing, grubbing, cutting, removal and disposal of all vegetation and debris from areas either within or outside of the right-of-way as shown on the drawings or as designated by the Engineer. The work shall also include the preservation from injury or defacement of all vegetation and objects designated by the Engineer to remain.

PART 2-PRODUCTS (NOT USED)

PART 3-EXECUTION

3.1 GENERAL

A. The burning of trees, brush, stumps, etc., will not be permitted. The Contractor shall provide other satisfactory methods of disposal without additional compensation.

B. The Contractor shall obtain written permission of the Engineer for use of storage areas within the right-of-way requiring clearing and grubbing or selective clearing and thinning. Any clearing for the Contractor's convenience shall be done at his own expense. All such areas shall be restored to a condition acceptable to the Engineer including necessary mulching, seeding, and planting without additional compensation.

C. The Engineer shall be provided with notarized copies of agreements between the Contractor and owners used as disposal or storage areas.

D. When fencing is installed outside normal clearing areas, every reasonable effort shall be made to preserve trees or shrubs whose removal is not essential to the installation of the fencing.

E. Acceptable material obtained on the project may be used to produce wood chip mulch. Material obtained from Elm trees shall not be accepted for use.

F. Wood chips produced from clearing and grubbing shall be stockpiled within the location and used where and as directed.

G. Except for materials used for making wood chip mulch, the Contractor shall make all arrangements and negotiations necessary for the satisfactory disposal of trees, shrubs, stumps, roots, dead wood and other litter, in areas outside the Right of Way

and in such manner that no condition or accumulation of material shall be permitted to disfigure or mar the finished landscape.

3.2 CLEARING AND GRUBBING

A. The stumps of all trees, brush and major roots shall be grubbed and removed in all excavation areas and under all embankments where the original ground level is within 3-1/2 feet of the subgrade or slope of embankments.

B. All trees, stumps, and brush shall be cut off within 6 inches of the ground in embankment areas where the original ground level is more than 3-1/2 feet below the subgrade or slope of embankments.

C. Trees and shrubs that are specifically designated by the Engineer not to be cut, removed, destroyed or trimmed shall be saved from harm and injury.

D. All damage done to trees by the Contractor's operation and all branches of trees extending within the roadway shall be trimmed and painted where cut as directed to provide a 20-foot minimum vertical clearance including selective trimming of such trees as directed.

3.3 SELECTIVE CLEARING AND THINNING

A. The work under this item shall consist of the removal of hazardous growth and dead, dying or diseased plant material; the removal of groups and individual plants which interfere with the growth of more desirable types of trees and the clearing away of lesser growth that may obscure outstanding trees, tree groups, or scenic views. Any part of tree trunks or base of plant material located on the Location Lines shall be considered within the limit of work.

B. Densely wooded areas shall be trimmed to provide space for healthy growth by eliminating thinner, weaker trees and the reduction of number of varieties.

C. The Contractor's attention is called to the requirements for work under this item. The desired appearance to be attained in certain areas of heavy growth may require three or more operations. First, the obvious dead, dying and diseased trees and undergrowth shall be cut and cleared out of the area. This work includes the removal of any previously fallen trees, branches, uprooted stumps and other debris as directed. Next, the area is to be thinned out, as directed, by removing the less desirable trees and brush which interfere with the growth of better plant material Finally, clear out lesser growth which may obscure outstanding trees, tree groups or scenic views.

D. Tree up-branching and shaping under this item will be restricted to trees which have limbs and branches restricting sight distance, extending over roadways, shoulders, turn outs, etc. Up-branching or trimming will be required to produce an 20-foot minimum vertical clearance over locations described hereinbefore, and the removal. of limbs and branches involved in this operation shall be accomplished as outlined

hereafter.

E. Quality of work must confom1 with accepted tree trimming practices.

F. All trimming and pruning shall conform to recognized tree surge1y practices, and particular note should be made that painting with an approved tree dressing or paint will be required on all cuts 2-inchcs or over in diameter.

G. The dressing or paint shall be applied no later than two days after the cuts are made.

H.. Recognized tree surgery practices include among many others, the fact that all limbs find branches which require removal and all shrubs regardless of age must be cut flush either to a union with the next larger sound limb or branch or flush to the trunk of the tree.

I. The cutting shall be performed by experienced woodsmen. Trained tree climbers are required for pruning of tall growth. Care shall be exercised by the Contractor to prevent injury to trees and shrubs designed to be preserved. Any injury to limbs, bark or roots of such plants shall be repaired by the Contractor, as directed, or the plants replaced without additional compensation for such repair or replacement.

J. Standing trees, undesirable brush and existing stumps to be removed shall be cut flush with the ground and a 2 inch tolerance permitted and the resulting stumps or stubble then brushed or sprayed with a chemical spray material.

K. Applications shall be by brush or spray so as to give complete coverage and wetting to the point of runoff.

L. This application shall be completed within two days after the cutting.

M. As the specified chemical herbicide is harmful to desirable roadside growth, the Contractor shall apply the chemical in such a manner that damage will not occur either from direct spray or from drift of the chemical on any desirable growth.

N. The Contractor shall use all necessary precautions to prevent injury to crops or damage to other desirable growth on private abutting property, as well as those within the Right-of-Way, and shall assume full responsibility of damage.

O. The Contractor may dispose of cut material by processing into a wood chip mulch and spreading uniformly throughout the cleared and thinned areas as directed by the Engineer.

3.4 DISPOSAL OF TREES

A. All trees to be cleared shall become the property of the Contractor, and the satisfactory disposal of the wood in such trees outside the right-of-way shall become his/her responsibility.

B. The trees, including cuttings and slash, shall be disposed of after cutting as soon a practicable and in a manner as not to detract from the appearance of the roadside.

C. If the existing ground in the area is disturbed by any of the work or equipment, the Contractor shall rough-grade and loam and seed if necessary the disturbed areas, if so directed, without additional compensation.

3.5 DISPOSAL OF STUMPS AND BRUSH

A. After removal, all stumps including the major root system shall be disposed by the Contractor at his/her own responsibility outside the layout where the material will not cause obstruction to streams and will not detract from the appearance of the roadside.

3.6 DISPOSAL OF DUTCH ELM DISEASED WOOD

A. Dutch Elm diseased wood shall be disposed of in accordance with the provisions of General Law, Chapter 87, Section 5 and Chapter 132, Sections 8 and 11, as amended; and in accordance with any additional local regulations.

B. Where the work includes the removal of elm trees or the limbs of elm trees, such trees or limbs thereof shall be disposed of immediately after cutting or removal and such a manner as to prevent the spread of Dutch Elm Disease. This shall be accomplished by covering them with earth to a depth of at least 6 inches in areas outside the right-of-way location where the Contractor has arranged for disposal.

C. Where the work includes the removal and disposal of stumps of elm trees, such stumps shall be completely disposed of immediately after cutting in the manner specified above.

END OF SECTION 02222

SECTION 02225

FLOWABLE FILL

PART 1 - GENERAL

DESCRIPTION

- Work Included: Provide and install flowable fill material in authorized excavation(s) as shown on the Drawings and/or as specified herein.
- Related Work Specified Elsewhere:
  - Earthwork, excavation, backfilling, compaction, piping, manholes, testing and pavement are specified in the appropriate sections of this Division.

QUALITY ASSURANCE

- Perform work in accordance with ACI 229, Controlled Low-Strength Materials, or as specified here-in.

SUBMITTALS

- Submit Mix designs for each mixture to be provided at least 15 days prior to production.

TESTING

- Flowability: Reference ASTM D 6103
  - A 3-inch diameter by 6-inch long open ended cylinder is placed vertically on a level surface and filled to the top with flowable fill. The cylinder is then lifted vertically to allow the material to flow out onto the level surface. The test is considered passing when the material spread is at least 7 inches in diameter and there is no noticeable segregation.

PART 2 - PRODUCTS

MATERIALS

- General: Materials shall meet the following requirements:
  - Portland Cement, Type I or II - ASTM C150.
  - Fly Ash (LOI limits do not apply) - ASTM C618.
  - Fine Aggregate/Mineral Filler – ASTM C 33, ASTM or non-ASTM sands or mineral fillers with 100% passing the 1/2" sieve may be considered which produce an acceptable flow and desired performance characteristic. Soils with fine clays will not be considered. All other than ASTM C 33 materials must receive prior approval from the Engineer.
  - Air Entraining Admixtures - As Per Manufacturer's Specifications.
  - Light Weight Cellular Admixture - As Per Manufacturer's Specifications.
  - Water – Potable or ASTM C 94.
  - Preformed Foam – Procedures for evaluation ASTM C 796 and ASTM C 869.
- Standard Flowable Fill:
  - Compressive strength at 28 days less than 1200 psi
- Excavatable Flowable Fill:
  - Compressive strength at 28 days between 100-200 psi.

2. Mix:
   a. Portland Cement: 50-100 lb/yd^3
   b. Fly Ash: up to 350 lb/yd^3, lime content not to exceed 10% by weight.
   c. Fine Aggregate/Mineral Filler: 2000-3000 lb/yd^3
   d. Water: 325-600 lb/yd^3, for Class F fly ash and cement-only mixtures up to 1000 lb/yd^3 may be acceptable.

5. Low Density Flowable Fill:
   M. The preformed foam shall produce stable air cells capable of resisting the chemical and physical forces imposed during mixing, placing and setting.
   H. Submit the foaming agent Manufacturer's recommended mixing procedures and approved mixing equipment to the Engineer.
   O. Methods of placement must not cause a change in density due to loss of air content beyond predictable ranges.

PART 3 - EXECUTION

OM INSTALLATION

!. Flowable fill shall be produced and delivered using standard concrete construction equipment and practices.
.. Placing flowable fill shall be by chute, pumping, or other method approved by the Engineer.
/. The flowable fill shall be discharged directly from the mixer truck into the space to be filled.
5. No flowable fill shall be placed on frozen ground.
9. At the time of placement the flowable fill shall have a temperature of at least 40 degrees F.
C. When flowable fill is placed in freezing temperatures, the material should be covered with blankets and protected from freezing until hardening.
D. The Contractor shall provide all necessary means to confine the material within a designated space.
I. Formed walls or other bulkheads shall be constructed to withstand hydrostatic pressure exerted by flowable fill where necessary and as determined by the Engineer.
L. The Contractor is responsible to ensure underground utilities, including but not limited to pipes, tanks, structures, cables, etc. are secured to prevent floating.
W. No compaction or vibration of the material is required.
Y. Where flowable fill is being used as pipe bedding it shall be placed in lifts to ensure lateral support of the pipe develops along the side of the pipe before continuing with the backfilling.
[. When paving over flowable fill in cold weather, any frozen material on the surface shall be scraped off and removed prior to paving.
a. The flowable fill shall be left undisturbed until the material obtains sufficient strength. Sufficient strength for paving is achieved when the flowable fill can support the weight of foot traffic without apparent deformation. Sufficient strength for supporting vehicular traffic is 2.5 tons per square foot as measured by a pocket penetrometer.
b. Trenches shall be covered and barricaded until hardening occurs.

END OF SECTION

SECTION 02273

GEOTEXTILE FABRIC

PART 1 -GENERAL

1.1 SUMMARY

A. This section includes the following:

1. Providing geotextile fabric in foundation preparation for separation of existing soil from screened gravel or crushed stone beneath structures.

2. Placing the geotextile fabric beneath the crushed stone or rip rap at tank overflow or storm drain outlets.

3. Providing geotextile fabric for silt fence as indicated or specified.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section, and.

1. Section 02200 - Earthwork

1.3 SUBMITTALS

A. Shop Drawings: Submit the following in accordance with Section 01300-SUBMITTALS:

1. At least two weeks prior to shipment, submit manufacturer's certificate of compliance and physical property data sheet indicating that requirements for materials and manufacture are in conformance as specified.

2. For informational purposes only, submit manufacturer's printed installation instructions.

1.4 QUALITY ASSURANCE

A. GENERAL

1. Producer of geotextile fabric to maintain competent laboratory at point manufacture to insure control in accordance with ASTM testing procedures. Laboratory to maintain records of quality control results.

2. Do not expose geotextile fabric, except the geotextile fabric for silt fence, to ultraviolet radiation (sunlight) for more than 14 days total in period of time following manufacture until geotextile fabric is installed and covered with fill or backfill material.

3. Take all precautions to protect geotextile fabric from damage resulting from any cause. Either repair or replace geotextile fabric to Engineer's satisfaction at no additional cost to the Owner.

1.5 DELIVERY, STORAGE AND HANDLING

A. Provide in accordance with manufacturer's recommendations.

B. Provide geotextile fabric in rolls wrapped with protective covering to protect geotextile fabric from mud, dirt, dust, and debris. Label each roll of geotextile fabric with number or symbol to identify production run.

C. Protect geotextile fabric from sunlight during transportation and storage. Do not leave geotextile fabric exposed to sunlight for more than two weeks during installation operations.

PART 2 -PRODUCTS

2.1 MANUFACTURERS

A. Provide the following nonwoven (4.5 ounce per square yard) geotextile fabric, Model# US 120NW as manufactured by US Fabrics or approved equal.

B. Provide the following woven geotextile fabric for silt fence:

1. Amoco 2122 as manufactured by Arnoco Fabrics and Fibers Co., Atlanta, GA.

2. Mirafi 1OOX as manufactured by Mirafi, Pendergrass, GA.

3. Geotex 91OSC as manufactured by Synthetic Industry, Chattanooga, TN.

4. Or acceptable equivalent product.

2.2 MATERIAL

A. Geotextile fabric shall conform to test requirements for minimum average roll value (weakest principle direction) for strength properties of any individual roll tested from manufacturing lot or lots of particular shipment in excess of minimum average value (weakest principle direction) as specified hereafter:

B. Physical Properties of Minimum Average Roll of the 4.5-ounce per square yard Nonwoven geotextile fabric shall be.

	Property	ASTM Test Method	Units	Value
1.	Tensile Strength	D4632	lbs.	120
2.	Elongation at Break	D4632	%	50
3.	Trapezoidal Tear Strength	D4533	lbs.	50
4.	Puncture Strength	D4833	lbs.	70
5.	Permittivity	D4491	Sec-1	1.5
6.	Apparent Opening Size	D4751	Sieve#	70
7.	Mullen Burst Strength	D3786	Psi	230
8.	UV Resistance %Retained	D4355	%	70
9.	Flow Rate	D4491	Gal/min/sf	120

C. Physical Properties of Minimum Average Roll of the woven geotextile fabric for silt fence shall be:

	Property	ASTM Test Method	Units	Value
1.	Grab Strength	D4632	lbs.	100
2.	Permittivity	D4491	sec- 1	0.10
3.	Apparent Opening Size	D4751	Sieve#	20-30
4.	Ultraviolet Stability	D4355	%	70

PART 3- EXECUTION

3.1 INSTALLATION

A. Install geotextile fabric in accordance with manufacturer's printed instructions.

B. Place geotextile fabric on the foundation subgrade prior to placing the screened gravel or crushed stone. Use low ground pressure equipment to spread soil over the filter fabric to protect against tearing.

C. Overlap geotextile fabric 18 inches minimum for unsewn lap joint.

D. Do not permit traffic or construction equipment to travel directly on geotextile fabric.

E. Place geotextile fabric in relatively smooth condition to prevent tearing or puncturing. Lay geotextile fabric loosely but without wrinkles or creases so that placement of the backfill materials will not stretch or tear geotextile fabric. Leave sufficient slack in geotextile fabric around irregularities to allow for readjustments.

F. Patch all tears in geotextile fabric by placing additional section of geotextile fabric over tear with a minimum of 3 feet overlay.

G. Extend the geotextile fabric and wrap around the screened gravel or crushed stone along the perimeter of foundations and slabs.

3.2 CONTRACT CLOSEOUT

A. Provide in accordance with Section 01700.

END OF SECTION 02273

SECTION 02510

HOT MIX ASPHALT PAVEMENT

PART 1 GENERAL

1.01 DESCRIPTION:

A. Furnish all labor, materials, equipment and incidentals required to install permanent hot mix asphalt pavement for roadways.

1.02 RELATED SECTIONS

A. Section 02200 – Earthwork

B. Section 02221 - Trenching, Backfilling, and Compaction

1.03 REFERENCES

A. Reference is made herein to the Commonwealth of Massachusetts, Department of Public Works, Standard Specifications for Highways and Bridges, 1988, (MHD Standard Specifications) and latest Supplemental Specifications and Standard Special Provisions.

1. All references to method of measurement, basis of payment, and payment items in the MHD Standard Specifications are hereby deleted.

2. References made to particular sections or paragraphs in the MHD

1.04 SUBMITTALS:

A. Job mix formula, including complete data on all materials, source, location, percentages, temperatures and all other pertinent data.

PART 2 PRODUCTS

2.01 MATERIALS TO BE FURNISHED BY CONTRACTOR

A. Hot mix asphalt paving material in accordance with MHD Standard M3.11.00 for Class I binder and top courses.

B. Tack coat shall consist of either emulsified asphalt, Grade MS-1 conforming to section M3.03.0, or cutback asphalt, Grade MC-70 or MC-250 conforming to Section M3.02.0 of the above referenced specifications.

C. Hot poured rubberized asphalt sealer shall conform to MassDOT Section M3.05.0

PART 3 EXECUTION

3.01 INSTALLATION:

A. Install hot mix asphalt pavement in accordance with MHD, Section 460.

B. Hot mix asphalt paving at railroad track crossings shall be placed in accordance with the rubber rail seal manufacturer's instructions.

C. Place binder course as soon as possible after the subgrade and track have been prepared.

D. Place and compact binder and top courses by steel-wheeled rollers of sufficient weight to thoroughly compact the hot mix asphalt.

E. All pavement thickness referred to herein is compacted thickness. Place sufficient mix to ensure that the specified thickness of pavement occurs as indicated on the Contract Drawings.

F. The contact surfaces of existing pavement, castings, and other structures shall be painted with a tack coat prior to placement of paving.

G. All hot mix asphalt pavement shall be placed to the grades and in accordance with the cross sections and details shown on the Contract Drawings.

H. Existing drainage patterns shall not be altered by the new pavement construction unless otherwise indicated on the Contract Drawings.

I. After binder course has been installed, place and compact top course.

J. At both ends of railroad crossings, taper pavement down to top of ties at a slope not to exceed 2 horizontally to 1 vertically.

K. Apply tack coat at a rate of 0.05 to 0.10 gallons per square yard over the bottom course.

L. Top joint between existing sawcut pavement and new pavement shall be sealed using hot poured rubberized asphalt sealer.

END OF SECTION

SECTION 02515

CONCRETE SIDEWALKS, WALKWAYS AND DRIVEWAY APRONS

PART 1-GENERAL

1.1 SUMMARY

A. Furnish all labor, materials, equipment and incidentals required and install concrete sidewalks, walkways and sidewalk aprons as specified herein.

B. Damaged concrete sidewalks, walkways and driveway aprons as a result of construction shall be replaced to the nearest existing undisturbed concrete panel on all sides of construction disturbance.

1.2 RELATEDWORK

A. Earthwork is included in Section 02200.

B. Cast-in-Place Concrete is included in Section 03300.

1.3 REFERENCE STANDARDS

A. Except as otherwise specified herein, the current Standard Specifications for Highways and Bridges, including all addenda, issued by the Commonwealth of Massachusetts, MassHighway (SSHB) shall apply to materials and workmanship required for the work of this Section.

B. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

PART 2 -PRODUCTS

2.1 MATERIALS

A. Concrete shall be as specified in Section 03300, but in no case less than 3,500 psi at 28 days.

B. Expansion joint shall be bituminous type, ½-in thick meeting AASHTO Spec. M-213-65.

.

C. Materials for gravel base course shall be as specified in Section 02200.

PART 3-EXECUTION

3.1 SIDEWALK, WALKWAY AND DRIVEWAY APRON INSTALLATION

A. The full sidewalk, walkway or driveway apron panel(s) disturbed during construction shall be replaced. The Contractor shall saw cut the edges of the existing concrete at the edge of the existing undisturbed panels. The existing panels shall be saw cut at an existing tooled joint or removed to an existing expansion joint.

B. The subgrade for sidewalks, driveways and driveway aprons shall be shaped parallel to the proposed surface of the sidewalks, walkways and driveway aprons and thoroughly compacted. All depressions occurring shall be filled and again compacted until the surface is smooth and hard.

C. After the subgrade has been prepared, a gravel base course shall be placed. After being thoroughly compacted, the base course shall be at least 4-in in thickness and parallel to the proposed surface of the sidewalk, walkway or driveway apron. Reuse existing gravel base in areas not disturbed for trenching and provide new gravel base in areas disturbed for trenching.

D. Forms:

1. Side and transverse forms shall be smooth, free from wrap, of sufficient strength to resist springing out of shape, of a depth to conform to the thickness of the sidewalk, walkway or driveway apron.

2. All mortar or dirt shall be completely removed from forms that have been previously used. The forms shall be well staked and thoroughly braced and set to the established lines with their upper edge conforming to the grade of the finished sidewalk, walkway or driveway apron. Walkways shall have sufficient pitch to provide for surface drainage, but not to exceed ¼-in per foot. Driveway aprons shall have sufficient pitch to provide for surface drainage and shall be finished to meet existing grades of the driveway and street.

E. Placing and Finishing Concrete:

1. Concrete sidewalks, walkways and driveway aprons shall be placed in slabs to dimensions to meet existing walkways and driveway aprons, except as otherwise ordered. The joints between new and existing concrete shall be separated by transverse, preformed expansion joint filler.

2. Preformed expansion joint filler shall be placed adjacent to structures.

3. Concrete shall be placed in such quantity that,. after being thoroughly consolidated in place, it shall be 4-in in depth for sidewalks and walkways and 6-in in depth for driveway aprons. Finishing operations shall be delayed until all bled water and water sheen has left the surface and concrete has started to stiffen. After water sheen has disappeared, edging operations shall be completed. After edging and jointing operations, the surface shall be

floated with an aluminum or magnesium float. Immediately following floating, the surface shall be steel troweled. If necessary, tooled joints and edges shall be rerun before and after troweling to maintain uniformity. Finish with broom at right angles to alignment of walk, then round all edges with ¼-in radius after brooming.

4. When completed, the sidewalks, walkways and driveway aprons shall be kept moist and protected from traffic and weather for at least 3 days.

END OF SECTION 02515

SECTION 02576

PAVEMENT REPAIR AND RESURFACING

PART 1 GENERAL

1.1 SCOPE OF WORK

A. Furnish all labor, materials, equipment and incidentals removed or disturbed by the Contractor's operations and as specified and required for this project.

B. New pavement shall consist of initial temporary layer required to remain for a specified settlement time followed by the installation of final pavement layer.

C. Streets, driveways, parking areas or sidewalk pavements damaged or disturbed by the Contractor's operations shall be repaired, replaced or restored in accordance with the requirements specified herein and as directed for the respective type of pavement replacement and in a manner satisfactory to the Owner.

1.2 RELATED WORK

A. Trimming edges of existing pavement for the purpose of excavating trenches shall be by either saw or wheel cutters.

B. Roadway line painting shall be restored to n1atch the conditions prior to construction.

1.3 REFERENCE STANDARDS

A. Except as otherwise specified herein; the current Standard Specifications for Highways and Bridges, including all addenda, issued by the Commonwealth of Massachusetts, Department of Public Works, shall apply to 1naterials and workmanship required for the work of this Section.

B. American Association of State Highways and Transportation Officials (AASHTO) AASHTO M144 - Standard Specification for Calcium Chloride.

C. Where reference is made to one of the above standards, the revision in effect at the tune of bid opening shall apply.

1.4 SUBMITTALS

A. Shop Drawings: Submit the following in accordance with Section 01300 – SUBMITTAL PROCEDURES.

1. Product Data: Submit complete data on materials to be used in construction, Including gradation tests for granular base.

2. Design Data: Submit design mix for bituminous base, binder and top course.

3. Material Certificates: Provide copies of materials certificates signed by material producer and Contractor, certifying that each material item complies with, or exceeds, specified requirements.

1.5 QUALITY ASSURANCE

A. Provide in accordance with Section 01400 and as specified.

B. Laboratory Testing Required:

l. The bituminous mixture shall be compacted to at least 95% of the density achieved on the laboratory testing of the design mix for the project. The density of the Bituminous Concrete Pavement will be determined by using either the following tests; Nuclear Density Gauge Method ASTM D2950 or the Bulk Specific Gravity Method AASHTO-T166.

C. Thickness: Test in-place asphalt concrete courses for compliance with requirements for thickness. Repair or remove and replace unacceptable paving as directed by Engineer. In-place compacted thickness will not be accepted if exceeding the following allowable variation from required thickness:

1. Binder Course 1-inch, plus no minus

2. Top (Wearing) Course: 1/2-inch, plus no minus

1.6 PROJECT SITE CONDITIONS

A. Environmental Requirements:

1. Do not place materials when underlying surface is muddy, frozen, or has frost, snow, or water thereon.

2. Do not place concrete when air temperature at time of placement, or anticipated temperature for following 24 hours, is lower than 40°F or higher than 90°F.

3. Apply prime and tack coats when ambient temperature is above 50°F and when temperature has not been below for 12 hours immediately prior to application.

4. Binder Course may be placed when air temperature is above 30°F and rising.

5. Grade Control: Establish and maintain required lines and elevations.

B. Existing Conditions:

1. Drawings show approximate locations of paving areas.

2. Drawings show approximate location of existing structures along pipeline route.

3. Location of subsurface borings and the logs are indicated on drawings.

1.7 GUARANTEE

A. All final pavement placed in City streets shall be warranted by the Contractor for a period of one year. During this period all areas which have settled or are unsatisfactory for traffic shall be removed and replaced at no cost to the City, including the cost of Traffic Police.

PART 2 PRODUCTS

2.1 MATERIALS

A. Calcium chloride shall conform to AASHTO M144, Type I or Type II.

B. Initial pavement (temporary paving) shall be Binder Course, conforming to the referenced specification, Section M3.11, Class I, Type I-1 bituminous concrete.

C. For locations not receiving a full width overlay, final trench pavement shall consist of Binder Course and Top Course, conforming to the referenced specification, Section M3.11, Class I, bituminous concrete.

PART 3 -EXECUTION

3.1 GENERAL

A. Paving shall consist of an initial layer of temporary paving followed by a second layer of permanent paving.

B. Within 4 days of backfilling in areas to be paved, the Contractor shall commence temporary paving, unless directed otherwise in writing by the Engineer. The Contractor shall not leave excavated areas over weekends unless through written approval of the Engineer.

After completion of the backfilling, final pavement shall not be placed over trenches until the temporary paving has been in place for at least 90 days, or a winter settlement period, unless otherwise directed in writing by the Engineer. Where it is used as backfill, final pavement may be installed once the CDF has cured.

D. Materials for pavement shall be mixed, delivered, placed and compacted in accordance with the referenced specification, Sections M3.11 and 460 and as specified herein.

E. Whenever the subbase becomes dry enough to cause dust problems, spread calcium chloride uniformly over the gravel surface in sufficient quantity to eliminate the dust.

F. No vehicular traffic or loads shall be permitted on the newly completed pavement until adequate stability has been attained and the material has cooled sufficiently to prevent distortion or loss of fines. If the climatic or other conditions warrant it, the period of time before opening to traffic may be extended at the discretion of the Engineer.

G. Pavement Construction Period. No pavement shall be constructed during the period from December 20 to March 15, without approval in writing from the engineer.

3.2 PREPARATION

A. Protection of existing Roadways:

1. Saw cut existing pavement to required width and depth to avoid damage to adjacent pavement, curbs, gutters, or other structures and as indicated on the drawings.

B. Sub-Surface Preparation:

1. Pavement Subbase:

a. The subbase to be placed under pavement shall be a minimum of 12-inches thick after compaction. Subbase shall be evenly spread and thoroughly compacted in accordance with the Contract Documents.

b. The subbase shall be spread in layers not more than 8 - inches thick except the last layer of gravel shall be 4-inches thick, compacted measure. All layers shall be compacted to not less than 95 percent of the maximum dry density of the material as determined by ASTM D1557 Method C at optimum moisture content.

c. Complete subbase preparation, including dynamic compaction, for full width before placing surfacing materials.

2. Subgrade:

a. Prepare subgrade in accordance with Section 0221.

b. Complete subgrade preparation, including dynamic compaction, for full width before placing surface materials. .

c. Stabilize subgrades in accordance with Section 02221 so that loaded construction vehicles do not cause rutting or displacement when depositing materials.

3.3 DESCRIPTION

A. In general, the following pavement repairs shall be made:

1. Wherever existing paved areas are disturbed a 2-inch temporary pavement layer is to be placed. When, and if, this material is disturbed during additional excavation work required for utility installation it shall be replaced. After a 90-day minimum period, or a winter settlement period, a permanent pavement wearing course shall be installed.

2. In roads and streets that are not scheduled to have full width overlay placed, following a 90-day minimum period, or a winter settlement period, the temporary

layer shall be removed, the pavement edges cutback 12-inches from existing, and a permanent pavement wearing course installed.

3. In roads and streets that are to receive a full width overlay, following a 90-day minimum period, or a winter settlement period, the full width 1-1/2 inch overlay of permanent pavement wearing course shall be placed over the existing pavement and the 2-inch temporary pavement layer.

4. Driveways shall be paved as described in 3.3A2, above.

5. Driveway aprons and waterways shall be paved as part of the work

6. Asphalt berms shall be replaced as part of the work.

7. The paving thicknesses specified above may be increased based on permit or field requirements. Payment for additional thickness shall be made at the unit price bid in the proposal

3.4 INSTALLATION

A. Initial pavement:

1. An initial layer of temporary pavement shall be placed wherever existing pavement has been removed or disturbed as soon as practical after backfilling is completed.

2. The pavement subbase shall be excavated, graded, and compacted to a depth of 2-inches below the existing pavement.

3. Hose clean with water all road surfaces adjacent to the area to be paved. No paving is to be placed until subsurface is dry.

4. The initial pavement layer shall be a hot mixed binder course placed and compacted to a thickness of 2-inches by steel-wheeled rollers of sufficient weight to thoroughly compact the bituminous concrete without damaging the existing pavement. The new pavement shall be rolled smooth and even with the existing pavement.

5. Initial pavement shall be maintained in a condition suitable for traffic until replaced or overlaid by final pavement. Defects shall be repaired within 24 hours of notification of such defects.

B. Final pavement: areas not receiving full width overlay

1. Remove initial pavement and subbase to 3-1/2-in. below existing pavement. Saw cut all edges back 12-inches from edge of original trench, keeping the final pavement edge neat and straight. Shape and compact subbase to 95 percent of maximum dry density as determined by ASTM 01557, Method C.

2. Trim loose edges of existing pavement. Broom and tack coat all edges with emulsified or cutback asphalt.

3. Place Binder Course and compact to 2-in. thickness by steel-wheeled roller.

4. Place Top Course and compact to 1-1/2-in. thickness, finish smooth, dense and flush with surface of existing pavement.

5. Match roadway edges to and existing driveways or berms as required.

C. Final pavement: areas receiving full width overlay

1. The permanent pavement wearing course shall be a hot mixed top course and placed to a compacted thickness of 1-1/4 inches: Leveling course material shall be placed in vertical depression in the existing pavement which are greater than 0.5 inches from the surrounding existing pavement level.

2. Prior to the application of the overlay course, the entire surface shall be cleared of dirt and debris using power sweepers, and then tack coated with cut-back asphalt emulsion.

3. All thicknesses are measured after rolling. The permanent surface course shall be evenly spread and rolled with a power roller having a minimum weight of 5-tons.

4. The overlay course shall be keyed to the existing pavement at ends of pavement repair sections, including driveways. Keys shall be cut to full pavement depth and be at minimum width of 8-inches.

D. Pavement Markings:

1. The Contractor shall replace all reflectorized pavement markings removed or covered-over in carrying out the work, and as directed by the Engineer, no sooner than 48 hours after completion of overlay pavement. Markings shall conform to the latest standards of the municipality or agency having jurisdiction over the roadway. The markings shall be thermoplastic markings, 4-inches wide, white or yellow, single or double lines as required for road markings, and 12-inches wide, white for crosswalk markings.

2. Markings shall conform to MHD: M7.01.03 - White Thermoplastic Reflectorized Pavement Markings and M7.01.04 - Yellow Thermoplastic Reflectorized Pavement Markings.

3. The Contractor shall provide temporary markings on the temporary pavements where existing markings are removed at no additional cost to the Owner.

E. Curb and Gutter Replacement:

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

2. Removal and replacement of curbing shall be done in accordance with Sections 501 and 580, as applicable of the MHD Specifications for Highways and Bridges.

3. Provide expansion joints at each intersection with existing curb sections.

4. Use expansion joints one inch wide. Fill with expansion joint material and cut to shape of curb section.

F. Sidewalk, Driveway, and Parking Area Replacement:

1. Gravel sidewalks:

a. Gravel sidewalks shall be restored to a condition at least equal to that existing immediately before the work was started.

2. Bituminous concrete sidewalks, driveways, and parking areas:

a. Construct in accordance with MHD Section 701, sidewalks, Wheelchair Ramps and Driveways.

b. The subgrade shall be shaped parallel to the proposed surface of the sidewalk or driveway and shall be thoroughly rolled and tamped. All depressions occurring shall be filled with suitable material and again rolled or tamped until the surface is smooth and hard in order for a gravel foundation to be placed upon it.

c. The sidewalk, driveway, or parking area shall be a minimum of 2-1/2 compacted inches thick, laid in two equal courses.

d. Sidewalk cross slopes cannot exceed 2 percent as required by the Americans with Disabilities Act (ADA). The Contractor shall merge new sidewalk slopes into existing sidewalk slopes as required by ADA.

3. Cement concrete sidewalks, and driveways

a. Construct in accordance with MHD Section 701, Sidewalks, Wheelchair Ramps and Driveways.

b. Use 6x6, W10xW10 welded wire reinforcement.

c. Concrete sidewalks shall be 4-inches thick and concrete driveways shall be 6-inches thick.

d. The subgrade for the walk or driveway shall be shaped to a true surface conforming to the proposed slope of the walk, thoroughly rolled at optimum moisture content, and tamped with a power roller weighing not less than one ton and not more than 5 tons. All depressions occurring shall be filled with suitable material and again rolled or tamped until the surface is smooth and hard.

e. After the subgrade has been prepared, a subbase of gravel at optimum moisture content shall be placed, thoroughly rolled by a power roller, and tamped. The gravel shall be a minimum of 8 inches in thickness.

f. The forms shall be smooth, free from warp, strong enough to resist springing out of shape, and deep enough to conform to the thickness of the proposed walk or driveway. All mortar or dirt shall be completely removed from forms that have been previously used. The forms shall be well staked thoroughly braced, and set to the established lines with their upper edge conforming to the grade of the finished walk or driveway.

g. The finished surface shall have sufficient pitch from the outside edge to provide for surface drainage. This pitch shall be ¼ of an inch per foot unless otherwise directed by the Engineer. Before the concrete is placed, he subbase for sidewalks shall be thoroughly dampened until it is moist throughout but without puddles of water.

4. Handicap ramps:

a. Handicap ramps will be installed where indicated on the drawings, in accordance with these contract documents.

b. Construct in accordance with MHD Section 701, Sidewalks, Wheelchair Ramps and Driveways.

c. The Contractor shall install curb cuts and accessible walkways in accordance with the requirements of the Americans with Disabilities Act and as required in 521 CMR (2/23/96 edition) Sections 21 and 22.

d. Handicap ramps are to be constructed of cen1ent concrete unless otherwise approved by the Engineer.

e. Existing granite curbing shall be removed, cut if required and reset to allow for the ramp construction. New curbing shall be installed to replace granite curbing damaged by the Contractor.

5. General:

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

G. Berms and Waterways

1. Bituminous curbing shall be replaced as required. Curbing shall be machine laid and conform to grade of roadway and adjacent curb areas.

2. Bituminous berms shall be replaced as required. Berms shall be machine laid and conform to the grade of the roadways. Berms shall be placed in accordance with MHD Specification 470.20.

3. Bituminous waterways which have been disturbed by construction operations shall be repaired or replaced. The waterways shall be repaired and constructed in accordance with the applicable requirements of Section 280 of the MHD Specifications. Waterways shall be placed in two 1-1/2-inch thick courses on a prepared gravel base. Material shall be compacted by tamping or rolling.

3.5 RAISING BOXES AND CASTINGS

A. Prior to placing permanent pavement, the Contractor shall raise all boxes, utility castings, as required, to proper grade.

B. Contractor shall coordinate with all utility companies to obtain their requirements on Castings.

C. Castings which need to be raised or adjusted to complete final top course full-width paving shall be done immediately prior to paving.

END OF SECTION 02576

SECTION 02577

PAVEMENT MARKINGS

PART 1 - GENERAL

M.M DESCRIPTION

!. Work Included:

M. This work shall consist of providing final reflective pavement lines and markings during paving operations to match existing conditions and/or as shown on the plans. It shall also consist of providing temporary pavement markings during construction.

M.H SUBMITTALS

!. Submit shop drawings in accordance with general conditions of the construction contract.

PART 2 - PRODUCTS

H.M MATERIALS -PAINT

!. Paint shall conform to Massachusetts Highway Department (MHD) specifications for Fast Drying White Water-borne Traffic Paint M7.01.23 and Fast Drying Yellow Water-borne Traffic Paint M7.01.24.

.. Glass spheres (beads) used to reflectorize paint shall conform to Massachusetts Highway Department (MHD) specifications Glass Beads M7.01.07.

PART 3 - EXECUTION

O.M GENERAL

!. Contractor is to replace all pavement markings disturbed by the construction.

.. Markings shall be applied only in seasonable weather and in accordance with good painting practices. The surface shall be dry and free from sand, grease, oil or other foreign substances prior to application. Paint and pavement marking material shall be heated to the Manufacturer's recommended temperature. Ambient air temperature shall be a minimum of 45°F and rising.

/. The paint shall be applied at the rate of between 300 and 350 linear feet per gallon for four (4) inch wide stripes and the glass spheres (beads) shall be applied by the drop-on method at the rate of six (6) pounds to each gallon of paint. Beads applied to reflectorized paint pavement arrows may require an increased application rate. The beads shall be distributed in even application over the entire paint surface.

5. The paint shall be done in a workmanlike manner, with lines well defined and without deviations. When repainting existing lines, the new line shall follow the exact pattern of the old lines and when new measurements are necessary, they shall be exact.

9. The Contractor shall provide all materials, equipment, labor, protective devices,

and warning signs necessary to the safe and efficient performance of the work and the safety of the traveling public.

- Contractor is to protect pavement markings from traffic until markings are sufficiently dry.

END OF SECTION 02577

SECTION 02609

REINFORCED CONCRETE DRAIN PIPE

PART 1 -GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

A. This section includes the following:

1. Providing and testing reinforced concrete pipe as indicated and specified.

B. Related sections include the following:

1. Section 02221 - Trenching, Backfilling and Compaction

2. Section 02430- Manholes

3. Section 02431 - Catchbasins

4. Section 03300- Cast-in-Place Concrete

1.3 SUBMITTALS

A. Shop Drawings: Submit the following in accordance with Section 01300 - SUBMITTAL PROCEDURES:

1. Shop drawings showing pipe dimensions, reinforcement, joint and other details for each type and class pipe.

2. If less than 100 units of given size and class, submit three certified copies of pipe tests on identical pipe units made by the same manufacturer within past year.

3. If more than 100 units of given size and class, submit:

a. Reinforcing steel mill or sample test reports for each shipment of steel.

b. Cement mill test reports for each shipment of cement.

c. Aggregate test reports before manufacturer of pipe and monthly thereafter during production.

d. Records of average daily temperature and nun1ber of days pipe units cured, when average daily temperature below 60 deg.F.

e. Concrete cylinder compression test results within three days after test.

f. Absorption test results.

g. Pipe load-bearing test results.

1.4 QUALITY ASSURANCE

A. Provide in accordance with Section 01400 and as specified.

B Provide pipe made by manufacturer of established good reputation in the industry and manufactured in a plant adapted to meet the design requirements of the pipe.

C. Accept on basis of tests of materials, absorption tests, plant load-bearing tests, pressure tests, and inspection of completed product.

D. Testing Agencies:

1. Engage an acceptable independent testing laboratory to perform or witness tests, other than mill tests on reinforcing steel and cement, and certify the results.

E. Allow Owner to engage independent testing laboratory at Owner's expense to perform additional inspection or tests of any or all pipe units at manufacturer's plant or elsewhere. Accept such additional inspections or tests as test results of record.

F. Conduct all tests in accordance with applicable ASTM Specifications.

1. Materials

a. Reinforcing Steel: Mill test reports or reports on samples taken from each shipment to pipe manufacturer.

b. Cement: Mill test reports for each shipment to pipe manufacturer. Cement for this project kept segregated from other cement.

c. Aggregates: Tests to demonstrate compliance with specified requirements. Initial tests prior to commencement of pipe manufacturer and additional tests at least monthly during production of pipe.

2. Concrete: Compression tests on standard cylinders for first pipe unit, then for every 100 cu. yd. of concrete used in pipe fabrication, or for each additional 200 units of pipe, whichever is lesser amount of concrete. Make 4 cylinders for each test and break them at 7, 14 and 28 days. Set aside one cylinder in case of unsatisfactory break.

3. Conduct pipe tests on units selected at random by Engineer.

a. Absorption: Before load test, take 3 cores from each unit.

Test by boiling. Average absorption: Maximum 8 percent of dry weight, no single test more than 9 percent.

b. Load-Bearing: Before delivery, conduct one test or one pipe unit of each size and class, and one additional test for each 200 units of each size and class, after taking cores for absorption test. Carry test to specified load to produce 0.01- in. crack; if no crack produced, pipe may be used. Plug cored holes with mortar as specified for repairs.

c. Pressure: Before delivery, test six units of each size and class. Join units in normal manner using joint to be furnished and bulkhead end units independently. Average internal hydrostatic pressure of 10 psi for 10 minutes minimum without visible leakage from joints or barrels. Perform test in presence of Engineer.

G. Inspection by Engineer:

1. At place of manufacture.

2. At site of work after delivery.

3. Reject pipe at any time if it fails to meet specified requirements, even If sample pipe accepted at plant.

4. Immediately remove rejected pipe from site.

1.5 DELIVERY, STORAGE AND HANDLING

A. Provide in accordance with Section 01610.

PART 2- PRODUCTS

2.1 PIPE FABRICATION

A. Interior: Smooth; no projections, indentations, offsets or irregularities.

B. Classes: As indicated.

C. Conform to ASTM C76, modified as follows:

1. Provide with proper concrete ends true to size; form on machined rings to ensure accurate joint.

2. Use Type II cement, no admixtures unless permitted by Engineer.

3. Cement content in concrete: At least 564 lbs. per cu. yd.

4. Aggregates: Fine and Coarse Aggregate per Sections 03300, 03346.

5. Reinforcement: Section 03200. Longitudinal reinforcement continuous. Minimum cover 3/4 in. allowed. Elliptical reinforcement not allowed.

6. Minimum laying length: 8-ft. except where otherwise indicated or permitted.

7. Curing: Saturated steam at temperature between 100 and 130 deg. F. for minimum 12 hours.

8. Shipping: Aged at least 450 day-degrees including steam curing period before shipping. Day-degrees defined as total nun1ber of days times the average daily air temperature at pipe surface. (Example: Five days at daily average temperature of 60 deg. F. equals 300 day- degrees.)

9. No lift holes.

10. Repairs

    a. Mortar: Minimum compressive strength 4,000 psi at 7 days, and 5,000 psi at 28 days, when tested in 3-in by 6-in. cylinders stored in standard manner.

    b. Only those allowed by ASTM C76.

11. Mark permanently on inside and outside of pipe:

    a. Date of manufacture

    b. Class

    c. Size

    d. Consecutive number

    e. Manufacturer's trade mark

2.2 FITTINGS AND SPECIALS

A. Reinforcement: As required for class of pipe to be used.

B. Details: As indicated and conforming to approved shop drawings.

C. Pipebells for chimneys or building connections:

l. Formed or built into pipe unit at plant.

2. Vitrified-clay bells with premolded gaskets: ASTM C700, extra strength, and ASTM C425.

2.3 JOINTS

A. Rubber Gasket Type: Gaskets in compression permitting longitudinal and angular movement.

B. Pipe 36 in. or less in diameter: 0-ring: ASTM C361 and as specified.

C. Pipe larger than 36 in. in diameter: 0-ring or ribbed-gasket: ASTM C443 and as specified.

D. Design:

1. No visible leakage, when tested average internal hydrostatic pressure of 10 psi.

2. Diameter of joint surfaces compressing the gasket: Not off more than 1/16 in. from true diameter, or as permitted by above ASTM Standard, whichever is less.

E. Composition and Texture of Gaskets:

1. Resistant to common ingredients of sewage, industrial wastes, and groundwater. Permanent under anticipated service conditions.

2. Fabricated by manufacturer regularly making rubber gaskets for pipe.

PART 3- EXECUTION

3.1 HANDLING

A. Handle into position in acceptable manner.

B. Furnish suitable devices for support when lifted.

3.2 INSTALLATION

A. Inspect before installation. Remove and replace defective units. Clear of debris and dirt.

B. Bedding:

1. Support on compacted screened gravel per Section 02223, or as indicated. Do not permanently support on saddles, blocking, or stones.

2. Provide bell holes for imparting bearing pressure to pipe barrel.

C. Alignment:

1. Install to line and grade indicated.

2. Maintain close joints with next adjoining unit. Match inverts. Do not drive down to grade by striking.

D. Jointing:

1. Clean and lubricate bell or groove before jointing per manufacturer's recommendation. Push into place. Force pipe units together by proper devices leaving minimum open recess inside and outside and achieving tightly sealed joints. Avoid force that could wedge apart or split bell or groove ends. Do not pull or cramp joints, except where permitted by Engineer.

2. Inspect proper position of joint gasket with feeler gage furnished by Contractor.

3. Remove and replace unfittable pipe units with suitable units and new gaskets.

4. Install gaskets and assemble joints in accordance with recommendations of manufacturers of joint material and pipe, subject to acceptance by Engineer. Provide watertight pipeline with flexible joints.

E. Backfill:

1. Compact gravel between pipe and sides of trenches to hold pipe in correct alignment Fill bell holes with screened gravel and compact as indicated.

2. Prevent floatation in trench.

F. Cleaning:

1. Use watertight plugs in open ends of pipe and branches when installation not in progress.

2. Do not use pipeline as conductor for trench drainage.

3. Prevent earth, water, and other material from entering pipeline.

4. Clean pipeline and manholes upon completion. Prevent soil, water, and debris from entering existing sewers.

3.3 CONTRACT CLOSEOUT

A. Provide in accordance with Section 01700.

END OF SECTION 02609

SECTION 02622

POLYVINYL CHLORIDE GRAVITY PIPE

PART 1 -GENERAL

PART 1- GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This section includes the following:

1. Providing and testing of pipe, pipe fittings and specials, jointing materials, and accessories, of various sizes, classes, joints and types, and appurtenant work, at the locations and to the lines and grades as indicated and/or as directed, complete in place, in accordance with the drawings and specifications.

2. The pipe specified under this section shall include all gravity flow sanitary sewers.

B. Related sections include the following:

1. Section 02210 - Earth Excavation, Backfill, Fill and Grading

2. Section 02601- Manholes

1.3 SUBMITTALS

A. Shop Drawings: Submit the following in accordance with Section 01300- SUBMITTAL PROCEDURES:

1. Submit shop drawings or descriptive literature, or both showing pipe dimensions, joints, joint gaskets, and other details for each size of pipe to be furnished for the project. All pipe furnished shall be manufactured only in accordance with the specifications and the drawings.

1.4 QUALITY ASSURANCE

A. Provide in accordance with Section 01400 and as specified.

1.5 DELIVERY, STORAGE AND HANDLING

A. Provide in accordance with Section 01610. PART 2 - PRODUCTS

2.1 PIPE FITTINGS AND SPECIALS

A. The polyvinyl chloride pipe and fittings, including those required for stubs, shall conform to ASTM Standard Specifications for Type PSM PVC Sewer Pipe and Fittings, Designation ASTM D3034, latest revision, for sizes 4"-15" and ASTM F679, latest revision, for sizes 18"-27" The pipe shall have a maximum pipe diameter to wall thickness ratio (SDR) of 35. The pipe shall be tested by the flat plate deflection method at a minimum of 45 psi at 5 percent deflection in accordance with ASTM D 2412. Standard laying lengths shall be either 13 feet or 20 feet.

B. Specials, if required, shall conform to the Specifications for straight pipe insofar as applicable and to the details indicated on the Drawings or bound into the back of the Specifications.

C. Insulation shall be manufactured by Thermal Pipe Systems, Braintree, Massachusetts, Atlas Insulation, Ayer, Massachusetts or Insulated Piping Systems Inc., Canton, Massachusetts, or equal Insulation shall be factory formed-in-place polyurethane foam insulation having nominal thickness of 3", with an in-place density of 2.5 pcf, and a "K" factor of 0.14 BTU/in./hr/deg./F/sq.ft. Straight joints between insulated pipe lengths, and the end section of non-insulated pipe shall be 20-guage corrugated aluminum performed to be fastened with stainless steel screws and bands. Jackets shall have expansion joints at 25-foot intervals. Sections of jacket shall have 2-inch minimum at all seams.

2.2 JOINTS

A. Joints for the polyvinyl chloride pipe shall be push-on bell and spigot joints using elastomeric ring gaskets. The gaskets shall be securely fixed into place in the bells so that they cannot be dislodged during joint assembly. The gaskets shall be of a composition and texture which is resistant to con1mon ingredients of sewage and industrial wastes, as well as petroleum products (oil, gasoline, etc.) and groundwater, and which will endure permanently under the conditions of the proposed use. The joints shall conform to ASTM Standard Specifications for Joints for Drain and Sewer Plastic pipes using Flexible Elastomeric Seals, Designation D3212.

2.3 INSPECTION, TESTS AND ACCEPTANCE

A. All pipe delivered to the job site shall be accompanied by test reports certifying that the pipe and fittings conform to the above-mentioned ASTM Specifications. In addition, the pipe shall be subject to thorough inspection and tests, the right being reserved for the Engineer to apply such tests as he deems necessary.

B. All tests shall be made in accordance with the methods prescribed by the above mentioned ASTM Specifications, and the acceptance or rejection shall be based on the test results.

C. The Contractor shall furnish all labor to assist the Engineer in inspecting the pipe. Pipe will be inspected upon delivery, and such as does not conform to the requirements of this contract shall be rejected and shall immediately be removed from the project site by the Contractor.

PART 3-EXECUTION

3.1 HANDLING PIPE

A. All pipe shall be stored at the site until installation in a manner which will keep the pipe at ambient outdoor temperatures. Temporary shading shall be provided as required to meet this requirement. Simply covering the pipe which allows temperature build-up when exposed to direct sunlight will not be permitted.

B. Care shall be taken to avoid damaging the pipe and fittings.

3.2 INSTALLATION

A; Each pipe unit shall be inspected before being installed. No single piece of pipe shall be laid unless it is generally straight. The centerline of the pipe shall not deviate from a straight line drawn between the centers of the openings at the ends of the pipe by more than 1/16-inch per foot of length. If a piece of pipe fails to meet this requirement for straightness, it shall be rejected and removed from the site. Any pipe unit or fitting discovered to be defective either before or after installation shall be removed and replaced with a sound unit.

B. No pipe or fitting shall be permanently supported on saddles, blocking, or stones. Crushed stone shall be as specified in Section 02435.

C. Suitable bell holes shall be provided, so that after placement, only the barrel of the pipe receives bearing pressure from the supporting material. Special care shall be taken to hold the trench width at the crown of the pipe to the maximum indicated on the Trench Detail included in the Details section of these specifications.

D. All pipe fittings shall be cleared of all debris, dirt, etc., before being Installed and shall be kept clean until accepted in the completed work.

E. Pipe and fittings shall be installed to the lines and grades indicated on the Drawings. Care shall be taken to ensure true alignments and gradients.

F. Before any joint is made, the previously installed unit shall be checked to assure that a close joint with the adjoining unit has been maintained that the inverts are matched and conform to the required grade. The pipe shall not be driven down to the required grade by striking it with a shovel handle, timber or other unyielding object.

G. All joint surfaces shall be cleaned. Immediately before jointing the pipe, the bell or groove shall be lubricated in accordance with the manufacturer 's recommendation. Each pipe unit shall then be carefully pushed into place without damage to pipe or gasket. Suitable devices shall be used to force the pipe units together so that they will fit with minimum open recess inside and outside and have tightly sealed joints. Care shall be taken not to use such force as to wedge apart and split the bell or groove ends.

H. Joints shall not be "pulled" or "cramped" unless permitted by the Engineer.

I. Where any two pipe units do not fit each other closely enough to enable them to be properly jointed, they shall be removed and replaced with suitable units and new gaskets.

J. Details of gasket installation and joint assembly shall follow the directions of the manufacturers of the joint materials and of the pipe, all subject to review by the Engineer. The resulting joints shall be watertight and flexible.

K. All premolded gasket joint polyvinyl chloride pipe of a particular manufacturer may be rejected if there are more than five unsatisfactory joint assembly operations or "bell breaks" in 100 consecutive joints, even though the pipe and joint conform to the appropriate ASTM Specifications as hereinbefore specified. If the pipe is unsatisfactory, as determined above, the Contractor shall, if required, remove all pipe of that manufacturer of the same shipment from the work and shall furnish pipe from another manufacturer which will conform to all of the requirements of these specifications.

L. Open ends of pipe and branches shall be closed with polyvinyl chloride stoppers secured in place in an acceptable manner.

M. After each pipe has been properly bedded, enough crushed stone shall be placed between the pipe and the sides of the trench, and thoroughly compacted, to hold the pipe in correct alignment. Bell holes, provided for jointing, shall be filled with crushed stone and compacted, and then crushed stone shall be placed compacted to complete the pipe bedding.

N. The Contractor shall take all precautions to prevent flotation of the pipe in the trench.

O. At all times pipe installation is not in progress, the open ends of the pipe shall be closed with temporary watertight plugs, or by other acceptable means.

P. If water is in the trench when work is to be resumed, the plug shall not be removed until suitable provisions have been made to prevent water, earth, or other substances from entering the pipe.

Q. Pipelines shall not be used as conductors for trench drainage during construction.

3.3 ALLOWABLE PIPE DEFLECTION

A. Pipe provided under this Specification shall be so installed as to not exceed a maximum deflection of 5.0 percent. Such deflection shall be computed by multiplying the amount of deflection (nominal diameter less minimum diameter when measured) by 100 and dividing by the nominal diameter of the pipe.

B. Upon completion of a section of pipe, including placement and compaction of backfill, the Contractor shall measure the amount of deflection by pulling a specially designed gage assembly through the completed section. The gage assembly shall be in accordance with the recommendations of the pipe manufacturer, and be reviewed by the Engineer. The section of pipe must be placed and backfilled for a minimum of 90 days before the deflection can be measured.

C. Should the installed pipe fail to meet this requirement, the Contractor shall do all work to correct the problem without additional compensation.

3.4 CLEANING

A. Care shall be taken to prevent earth, water and other materials from entering the pipeline. As soon as possible after the pipe and manholes are completed, the Contractor shall clean out the pipeline and manholes being careful to prevent soil, water and debris from entering any existing pipe.

3.5 TESTING OF PIPE

A. If the visual inspection of the completed pipe or any part thereof shows any pipe, manhole or joint which allows infiltration of water in a noticeable stream or jet, the defective work or material shall be replaced or repaired as directed.

B. After completing installation and backfill of pipe, the Contractor shall, at his expense, conduct a line acceptance test using low pressure air.

C. Equipment used shall meet the following minimum requirements.

D. Pneumatic plugs shall have a sealing length equal to or greater than the diameter of the pipe to be inspected.

E. Pneumatic plugs shall resist internal test pressures without requiring external bracing or blocking.

F. All air used shall pass through a single control panel.

G. Three individual hoses shall be used for the following connections.

1. From control panel to pneumatic plugs for inflation.

2. From control panel to sealed line for introducing the low pressure air.

3. From sealed line to control panel for continually monitoring the air pressure rise in the sealed line.

H. All pneumatic plugs shall be seal tested before being used in the actual test installation. One length of pipe shall be laid on the ground and sealed at both ends with the pneumatic plugs to be checked. Air shall be introduced into the plugs to 25 psig. The sealed pipe shall be pressurized to 5 psig. The plugs shall hold against this pressure without bracing and without movement of the plugs out of the pipe.

I. After a manhole to manhole reach of pipe has been backfilled and cleaned, and the pneumatic plugs are checked by the above procedure, the plugs shall be placed in the line at each manhole and inflated to 25 psig. Low pressure air shall be introduced into this sealed line until the internal air pressure reaches 4 psig greater than the average back pressure of any groundwater that may be over the pipe. At least two minutes shall be allowed for the air pressure to stabilize.

J. After the stabilization period (3.5 psig minimum pressure in the pipe), the air hose from the control panel to the air supply shall be disconnected. The portion of line being tested shall be te1med "Acceptable" if the time required in minutes for the pressure to decrease from 3.5 to 2.5 psig (greater than the average back pressure of any groundwater that may be over the pipe) is not less than the time shown for the given diameter in the following table.

Pipe Diameter	Specification Time for Length Shown (min:sec)			
Inches	100ft.	200ft.	300ft.	400ft.
6	5:40	5:40	5:40	5:42
8	7:34	7:34	7:36	10:08
10	9:26	9:26	11:52	15:49
12	11:20	11:24	17:05	22:47
15	14:10	17:48	26:42	35:36
18	17:00	25:38	38:27	51:16
21	19:50	34:54	52:21	69:48
24	22:47	45:34	68:22	91:10

K. In areas where groundwater is known to exist, the Contractor shall install a 1/2-inch diameter capped pipe nipple, approximately 10-inches long, through the manhole wall adjacent to one of the sewer lines entering the manhole. This shall be done at the time the line is installed. immediately prior to the performance of the Line Acceptance Test, the groundwater shall be determined by removing the pipe cap, blowing air through the pipe nipple into the ground so as to clear it, and then connecting a clear plastic tube to the nipple. The hose shall be held vertically and a measurement of the height in feet of water over the invert of the pipe shall be taken after the water has stopped rising in this plastic tube. The height in feet shall be divided by 2.3 to establish the pounds of pressure that will be added to all readings. (For example, if the height of water is ll-112 feet, then the added pressure will be 5 psig. This increases the 3.5 psig to 8.5 psig, and the 2.5 psig to 7.5 psig. The allowable drop of one pound and the timing remain the same). In no case shall the starting pressure exceed 9.0 psig.

3.6 TEST FAILURE

A. If the section of pipe fails to pass the leakage and pressure test, or if there is any visible leakage, the Contractor shall locate, uncover and repair or replace the defective pipe fitting or joint and retest all at his own expense. Pipe will be considered passing only when the leakage does not exceed the above standard. Passing the test does not absolve the Contractor from his responsibility if leaks develop later within the period of warranty.

3.7 CONTRACT CLOSEOUT

Provide in accordance with Section 01700.

END OF SECTION 02622

SECTION 02650

BURIED UTILITY MARKINGS

PART 1 - GENERAL

DESCRIPTION

1. Work Included:
2. This work shall consist of providing and installing utility line markings above all buried lines installed as part of this contract as indicated on the Drawings and replacing existing markings disturbed as part of this contract. Related Work Specified Elsewhere:

PART 2 - PRODUCTS

MATERIALS

1. Materials and color shall be in accordance with latest AASHTO specifications for pipe and utility marking.
2. Marking tape color shall be in accordance with latest American Public Works Association (APWA) Uniform Color Code and American National Standards Institute ANSI Standard Z535.1, Safety Color Code specifications for buried utility marking as noted in the Schedule below.
   - Schedule

Marker Color	**Buried Utility**
Blue	Potable Water &Associated lines
Green	Sanitary Sewers, Storm Drain and other Drain lines
Orange	Telecommunication, signal, alarm
Purple	Reclaimed, Recycled, Irrigation Water and Slurry Lines
Red	Electric Power lines cables conduits and lighting cables
Yellow	Gas, Oil, Steam, Petroleum or Gaseous Material Lines

   - Warning Information shall be in Black Letters with typical wording of:
     1. "CAUTION: BURIED (NAME OF UTILITY LINE) BELOW"
3. For ferrous pipe material use 0.004" minimum polyethylene film; 6" wide clearly marking type of buried utility.
5. For non-ferrous pipe material (e.g. Concrete, PVC, PE, etc.) use detection tape composite of polyethylene and metallic core 6" wide clearly marking type of buried utility.
9. Seton Identification Products, New Haven, CT, Utility Safeguard LLC or equal.

PART 3 - EXECUTION

INSTALLATION

1. Marking tape shall be installed over utility lines centerline and buried 24" below grade. Markings damaged during opening of trench shall be reinstalled with 2' overlap at broken sections.

END OF SECTION 02650

SECTION 02270

EROSION AND SEDIMENT CONTROL

PART 1 GENERAL

1.1 SUMMARY

A. This Section specifies equipment and materials for an erosion and sediment control program installation during the construction phase of the project. The erosion and sediment control provisions detailed on the Drawings and specified herein are the minimum requirements for an erosion control program. The Contractor shall provide additional erosion and sediment control materials and methods as required to affect the erosion and siltation control principles specified herein.

1.2 RELATED SECTIONS

A. Examine Contract Documents and Drawing Details for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:

1. Section 01110 Environmental Protection Procedures

1.3 SUBMITTALS

A. Proposed methods, materials to be employed, and schedule for effecting erosion and siltation control and preventing erosion damage shall be submitted for approval. Submittals shall include:

1. List of proposed materials including manufacturer's product data.

2. Erosion Controls shall be installed prior to construction. Schedule of erosion control program indicating specific dates from implementing programs in each major area of work, including Erosion Control installation and truck wheel wash station installation.

B. Samples

The following samples shall be submitted:

Sample	Size
Filter Fabric (Woven and Non-Woven)	12 X 12 in.

1 .4 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

1. Massachusetts Department of Public Works, and The Commonwealth of Massachusetts Department of Public Works; Construction Standards.

2. Massachusetts Department of Environmental Protection.

1.5 EROSION CONTROL PRINCIPLES

A. Erosion Control Principles

The following erosion control principles shall apply to the land grading and construction phases:

1. Stripping of vegetation, grading, or other soil disturbance shall be done in a manner which will minimize soil erosion.

2. Whenever feasible, natural vegetation shall be retained and protected.

3. Extent of area which is exposed and free of vegetation and duration of its exposure shall be kept within practical limits.

4. Temporary seeding, mulching, or other suitable stabilization measures shall be used to protect exposed critical areas during prolonged construction or other land disturbance. Prolonged exposure of unstabilized soil shall not exceed 60 days.

5. Drainage provisions shall accommodate increased runoff resulting from modifications of soil and surface conditions during and after development or disturbance. Such provisions shall be in addition to existing requirements.

6. Sediment shall be retained on-site.

7. Erosion control devices and truck wheel wash station shall be installed prior to start of clearing and grubbing operations and excavation work.

B. Erosion Protection

Cut and fill slopes and stockpiled materials shall be protected to prevent erosion. Slopes shall be protected with permanent erosion protection when erosion exposure period is expected to be greater than or equal to two months, and temporary erosion protection when erosion exposure is expected to be less than two months.

1. Permanent erosion protection shall be accomplished by seeding with grass and covering with an erosion protection material, as appropriate for prevailing conditions.

2. Temporary erosion protection shall be accomplished by covering with an erosion protection n1aterials, as appropriate for prevailing conditions.

3. Except where specified slope is indicated on Drawings, fill slopes shall be limited to a grade of 4:1 (horizontal: vertical) cut slopes shall be limited to a grade of 4:1.

PART 2 -PRODUCTS

2.1 HAY BALES

A. Hay bales for construction of erosion control devices shall be new, firm, bound salt marsh hay bound with biodegradable twine.

2.2 TEMPORARY SEED COVER

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

Quantity per 1000 sq. ft. Coverage	Material
27-1/2 lb.	Wood Fiber Mulch
4lb.	Seed
½ lb.	Annual Ryegrass
22lb.	10-6-4 Fertilizer
69 gal	Water

B. Hydroseeding Equipment

Hydroseeding equipment may be either portable or truck mounted, with dual agitation, a minimum working volume of 1000 gallons and a minimum spray range of 80 ft.

1. Hydroseeding equipment must be capable of uniformly applying the slurry mix including wood fiber mulch if required, at the specified rate, and at the required locations.

2. Hydromulching equipment, either trailer or truck mounted, must be capable of uniformly applying straw or hay mulch at a minimum mulching rate of 8 tons per hour, at a distance of not less than 80 ft.

2.3 FILTER BASKETS

A. Filter baskets shall be Metal-Era Inlet Baskets, manufactured by Metal-Era Inc., Wukesha, WI 53186, approved equal. Baskets shall be installed at all newly installed and existing catch basins and remain in place until vegetation on the site is stabilized. Filter basket shall include a nonwoven geotextile filter fabric material with a minimum Grab strength of 45 lb., Mullen Burst Strength of 60 psi minimum, a minimum permeability of 120 gpm/sq. ft., and an opening no greater than No. 20 U.S. Standard Sieve.

PART 3 EXECUTION

3.1 HYDROSEEDING

A. If required for long-term disturbance greater than 60 days, seed for temporary cover shall be spread by the hydroseeding method, utilizing power equipment commonly used for that purpose. Seed, fertilizer, mulch and water shall be mixed and applied to achieve application quantities specified. Material shall be applied in 2 equal applications, with the equipment during the second pass moving perpendicular to direction employed during the first pass. Hydroseeding shall not be done when it is raining or snowing, or when wind velocity exceeds 5 mph.

B. If the results of hydroseeding application are unsatisfactory, the mixture and/or application rate and methods shall be modified to achieve the required results.

C. After the grass has appeared, all areas and parts of areas which fail to show a uniform stand of grass, for any reason whatsoever, shall be reseeded and such areas and parts of areas seeded repeatedly until all areas are covered with a satisfactory growth of grass.

3.2 FILTER BASKETS

A. Filter baskets shall be installed at all newly installed and existing catch basins. Filter baskets shall be installed in accordance with manufacturer's recommendations. Maintain filter baskets as required and as follows. Baskets shall be inspected within 24 hours after each rainfall or daily during extended periods of precipitation. Repairs shall be made immediately, as necessary, to prevent particles from reaching the drainage system. Sediment deposits shall be removed after each storm event, or more often if the fabric becomes clogged. Clean clogged fabric and repair or replace damaged filter fabric as necessary.

3.3 MAINTENANCE AND REMOVAL OF EROSION CONTROL DEVICES

A. Wetland area, water courses, and drainage swales adjacent to construction activities shall be monitored continuously for evidence of silt intrusion and other adverse environmental impacts, which shall be corrected immediately upon discovery.

B. Culverts and drainage ditches shall be kept clean and clear of obstructions during construction period.

C. Erosion Control Devices

1. Sediment behind the erosion control device shall be checked twice each month and after heavy rain. Silt shall be re1noved if greater than 6 in. deep.

2. Condition of erosion control device shall be checked twice each month or more frequently as required. Damaged and/or deteriorated items shall be replaced. Erosion control devices shall be maintained in place and in effective condition.

3. Hay bales shall be inspected frequently and maintained or replaced as required to maintain both their effectiveness and essentially their original condition. Underside of bales shall be kept in close contact with the earth below at all times, as required to prevent water from washing beneath bales.

4. Sediment deposits shall be properly disposed of, in a location and manner which will not cause sediment nuisance elsewhere.

D. Removal of Erosion Control Devices

1. Erosion control devices shall be maintained until all disturbed earth has been paved or vegetated, at which time they shall be removed. After removal, areas disturbed by these devices shall be regraded and seeded.

2. Erosion protection material shall be kept securely anchored until acceptance of the entire Project.

END OF SECTION 02270

SECTION 02721

STORM DRAINAGE SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. Provide all labor, materials, equipment and supervision necessary to complete the work specified in this Section or shown on the Contract Drawings, or both, but not limited to the following:

1. Storm drain piping, fittings, accessories and bedding.

2. Catch basins and catch basin frames and grates.

3. Drain manholes and drain manhole frames and covers.

1.2 RELATED SECTIONS

A. Drawings and general provisions of the Contract, and:

1. Section 02200 Earthwork

2. Section 02140 Dewatering and Drainage

1.3 SUBMITTALS

A. Submit shop drawings and manufacturer's specifications and installation instructions for all pipe materials including flared end sections, precast concrete catch basins and drain manholes, manhole frames and covers and catch basin frames and grates. Include component construction, features, configuration, and dimensions.

B. Each shipment of pipe, catch basins and metal castings shall be accompanied with the manufacturers notarized certificate that the materials meet the specification requirements.

1.4 REFERENCES

1. ASTM C32-05 Sewer and Manhole Brick.

2. ASTM C62-08 Building Brick.

3. ASTM C76-08a Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.

4. ASTM C139-05 Concrete Masonry units for Construction of Catch Basins and Manholes.

5. ASTM C270-08a Mortar for Unit Masonry.

6. ASTM C443-05a Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.

7. ASTM C478-08 Precast Reinforced Concrete Manhole Sections.

PART 2 - PRODUCTS

2.1 PIPE MATERIALS

A. Reinforce Concrete Pipe: ASTM C76, Class III (unless otherwise specified on the project drawings), modified bell and spigot compression gasket joints complying with ASTMC443.

B. General: Ells, tees, reducing tees, wyes, couplings, increasers, crosses, transitions and end caps of same-type class of materials as piping unless otherwise indicated.

2.2 MANHOLES AND CATCH BASINS

A. The material to be used in the construction of storm drain manholes, catch basins, and drop inlets shall conform to MHD Standard Specifications, the Drawings, and these specifications. Design depths as indicated on the Contract Drawings.

B. Precast Concrete Manholes and Catch Basins: ASTM C478, eccentric cone, flat slab precast top; precast riser section and monolithic base section with integral floor.

C. Concrete Compressive Strength: 4000 psi minimum. Type II cement.

D. Reinforcing Steel: ASTM A185, 0.12 sq. in./linear ft. and 0.12 sq. in. (both ways) base bottom.

E. Joints sealed with rubber gaskets conforming to ASTM C443.

F. Steps: Forged 6061B, T6 aluminum or Copolymer Polypropylene Plastic with 1/2 inch Grade 50 steel reinforcement.

G. PVC Structures: ASTM DI784, ASTM D2122 and ASTM D2564.

H. Pipe Connectors: Provide a hydraulic cement, no shrink grout, which shall be made watertight with the RCP storm drainage pipe.

2.3 CAST IRON FRAME AND COVER

A. Frame and Cover: Cast iron construction, manufactured by LeBaron Foundry, Inc. (East Jordan Iron Works, Inc).

2.4 CAST IRON FRAME AND GRATE

A. Frame and Grate: Manufactured by E.L. LeBaron (East Jordan Iron Works, Inc.) model #LF-248-2 flange (single or double) or approved equal.

2.5 OIL AND FLOATING DEBRIS TRAP

A. Oil and Floating Debris Trap: Manufactured by Ground Water Rescue, Inc. model The Eliminator or approved equal.

2.6 MASONRY MATERIAL

A. Concrete Masonry Units: ASTM CI39.

B. Brick: ASTM C32Grade MS or ASTM C62) Grade SW.

C. Mortar: ASTM C270Type M.

2.7 PIPE BEDDING AND COVER MATERIALS

A. Bedding, Cover and Compaction Requirements: Fill Type as specified in Section 02200, and shown on the Details.

2.8 INFILTRATION BASIN

A. Infiltration basin shall be pre cast concrete type, a min of 6 feet in diameter and a min 6 ft. deep. Concrete strength shall be 4,000 psi @ 28 days. Cement shall be Portland Type II per ASTM Cl50-81. Steel reinforcement shall conform to ASTM A-615, Grade 60. Design loading per AASHO HS-10.

B. Infiltration basin shall comply with the standards of the City of Waltham.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that the trench cut and excavation base is ready to receive work and excavations, dimensions, and elevations are as indicated on Contract Drawings.

3.2 PREPARATION

A. Hand trim excavations to required elevations. Correct over excavation with processed

B. Remove large stones or other hard matter, which could damage piping, structures, or Impede consistent backfilling or compaction

3.3 BEDDING

A. Excavate for pipe trench or structure in accordance with Section 02200. Hand trim excavation for accurate placement of pipe and structures to elevations indicated on the Drawings.

B. Place bedding material at trench bottom, level materials in continuous layer not exceeding 12 inches compacted depth.

C. Maintain optimum moisture content of bedding material to attain required compaction density.

3.4 INSTALLATION- PIPE

A. Install pipe, fittings, and accessories in accordance with ASTM D2321 and manufacturer's instructions. Seal joints watertight.

B. Place pipe on minimum 12 inch deep bed in accordance with Section 02200.

C. Lay pipe to slope gradients noted on drawings with maximum variation from true slope of 1/8 inch in 10 feet.

D. Install processed gravel at sides to the midpoint of the pipe. Install Ordinary Borrow from the midpoint of the pipe to the elevations indicated on the Contract Drawings, compacted to 95 percent maximum density at optimum moisture content.

E. Refer to Section 02200 for trenching and backfilling requirements. Do not displace or damage pipe when compacting.

3.5 INSTALLATION- CATCH BASINS AND DRAIN MANHOLES

A. Form bottom of excavation clean and smooth to correct elevation.

B. Install and level precast concrete manhole base and sections per the Details of the Drawings including 12" depth of crushed stone with filter fabric.

C. Establish elevations and pipe inverts for inlets and outlets as indicated on the Drawings. D. Mount frame and cover or frame and grate level in grout, secured to top cone or flat top section to elevations indicated on the Drawings.

3.6 FIELD QUALITY CONTROL

A. Request inspection prior to and immediately after placing aggregate cover over pipe.

B. Compaction will be performed in accordance with Section 02200.

3.7 PROTECTION

A. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

END OF SECTION 02721

SECTION 02900
LANDSCAPING

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The work of this section consists of all labor, materials, equipment, appliances, and services necessary to provide all site planting within the Contract Limit Lines, as required by the drawings and as specified herein, including mulching and pruning existing trees.

B. The following list of items is to be used as a guide and shall not be considered limiting the scope of the work.

1. Plant Materials Furnished and Placed

2. Pruning, new and existing plants

3. Plant Material Guarantee and Acceptance

4. Maintenance

5. Clean-up

1.02 RELATED WORK UNDER OTHER SECTIONS

A. Site preparation is included in Section 02100.

B. Site improvements are included in Section 02850.

C. Topsoil and Hydroseeding is included in Section 02930.

1.03 APPLICABLE SPECIFICATIONS AND STANDARDS

A. "STANDARDIZED PLANT NAMES", 1942 Edition, American Joint Committee on Horticultural Nomenclature.

B. "AMERICAN STANDARD FOR NURSERY STOCK", latest edition, American Association of Nurserymen (ANSI 260.1).

1.04 SAMPLES

A. The following samples shall be submitted:

1. Mulch - Shredded softwood pine bark

2. Stakes

3. Wire

4. Hose

5. Prepared planting mix

6. Bone meal

7. Tree Paint

1.05 TESTING

A. Provide samples for testing as required by the Landscape Architect/Engineer.

1.06 PERSONNEL QUALIFICATIONS

A. The planting shall be done by skilled workers, trained and experienced in accepted nursery practices. The work shall be done under the supervision of a qualified planting foreman.

B. Personnel assigned to perform pruning vegetation shall be subject to the approval by the Owner, and shall be a state certified arborist qualified to perform American Arborist Association class II pruning.

1.07 PLANTING SEASON

A. Deciduous plants shall be planted only when dormant, that is, before leaves appear in the spring and subsequent to their loss in the fall, unless otherwise directed by the Landscape Architect/ Engineer.

B. Shrubs may be planted in the spring until new growth appears and any time between September 15 and November 30.

C. Perennials shall be planted in early spring or early fall. Summer planting will be allowed only if adequate water is provided.

D. If the construction completion date prohibits in-season planting, the Contractor shall complete his work within the project date and prepare himself for out-of-season planting, including wiltproofing and extra watering. Plant guarantee periods remain as stated below. No frozen ground planting will be permitted.

PART 2 PRODUCTS

2.01 PREPARED PLANTING MIX

A. The prepared planting soil mix shall consist of the following materials and quantities:

1. Seven parts backfill mixture as specified in these Specifications.

2. One part peat borrow.

3. To this mixture add ten (10) pounds of bone meal per cubic yard of mixture. It shall be commercial raw bone meal, finely ground, having a minimum analysis of four percent (4%) nitrogen and twenty percent (20%) phosphoric acid.

2.02 BACKFILL MIXTURE

A. Backfill mixture for plant pit backfill material shall be Type I loam as specified in Section 02930, as provided by the Contractor, with soil amendments to achieve quality standards as specified herein. Backfill mixture shall be a fertile, friable, processed screened loam capable of sustaining vigorous plant growth. It shall be free of any admixture of subsoil, stones larger than three-quarter inch (3/4"), clods of hard earth, plant roots, sticks or other extraneous materials.

B. Maximum size shall be three quarter inch (3/4") largest dimension. The maximum retained on the No. 4 sieve shall be 10 percent (10%) by weight of the total sample. Tests shall be combined hydrometer and wet sieving in compliance with ASTM D422 after destruction of organic matter by ignition.

C. The organic content shall be between 3.5 and 6.0 percent by weight as determined by loss on ignition of test samples oven-dried to a constant weight at a temperature of 105 degrees, Centigrade. The pH value shall be between pH 5.5 and pH 6.0. It shall contain no toxic materials. Soluble salts shall not be greater than 75 parts per million. Add soil amendments if required at no additional cost to the Owner.

D. At least 1 representative samples of backfill mixture shall be tested after backfill mixture has been stockpiled. The Contractor shall deliver samples to testing laboratory, have testing report sent directly to the Landscape Architect/Engineer, and shall pay all costs.

E. Mechanical and chemical (pH soluble salts) analysis shall be by a public extension service agency or a certified private testing laboratory in accordance with the current standards of the "Association of Official Agricultural Chemists".

F. Reports shall be submitted at least one month before any planting is to be done. Soil samples shall be tested for Nitrate Nitrogen, Ammonium Nitrogen, Phosphorus, Potassium, Calcium Aluminum, Soluble Salts and show the acidity of the soil.

G. Fertilizer:

1. Commercial fertilizer, peat, humus or other additives shall be used to counteract soil deficiencies as recommended by the soil analysis and as directed by the Landscape Architect/Engineer.

2. Commercial fertilizer shall be a product complying with the State and United States Fertilizer Laws. Deliver to the site in the original unopened containers which shall bear the manufacturer's certificate of compliance covering analysis which shall be furnished to the Landscape Architect/Engineer. At least 50% by weight of the Nitrogen content shall be derived from organic materials. Fertilizer shall contain not less than the percentages of weight of ingredients as follows or as recommended by the soil analysis:

	Nitrogen	Phosphorous	Potash
For Deciduous trees	10%	6%	4%

3. Ground limestone shall be an approved agricultural dolemite limestone containing not less than 85% of total calcium or magnesium carbonates. Limestone shall be ground to such

fineness that 50% will pass through a 100 mesh sieve and 95 will pass through a 20 mesh sieve.

4. Humus shall be natural humus, reed peat or sedge peat which has been stockpiled for at least one year prior to its use. It shall be free from excessive amounts of zinc, low in wood content, free from hard lumps and in a shredded or granular form. According to the methods of testing of Association of Official Agricultural Chemists, latest edition, the acidity range shall be approximately 5.5 pH to 7.6 pH and the organic matter shall be not less than 85% as determined by loss on ignition. The minimum water absorbing ability shall be 200% by weight on an oven-dry basis.

5. Peat moss shall-be composed of the partly decomposed stems and leaves of any or several species of sphagnum moss. It shall be free from wood, decomposed colloidal residue and other foreign matter. It shall have an acidity range of 3.5 pH to 5.5 pH as determined in accordance with the methods of testing of A.O.A.C., latest edition. Its water absorbing ability shall be a minimum of 1,000% by weight on an oven dry basis.

6. Superphosphate: Superphosphate shall be composed of finely ground phosphate rock as commonly used for agricultural purposes containing not less than 18% available phosphoric acid.

2.03 PLANTING MULCH

A. Shredded softwood pine bark mulch shall be fibrous pliable slices, not exceeding 1/2 inch in width or 3 inches in length. It shall be 98 percent organic matter with the pH range of 3.5 to 4.5 and a moisture content of packaged material not to exceed 35 percent.

2.04 PLANT MATERIALS

A. Selection of the Nursery Stock

1. At least twenty (20) days prior to the expected planting date, the Contractor shall request, in writing, that the Landscape Architect/Engineer provide a representative to select and tag stock to be planted under this Section. This request shall be made ten (10) days prior to the date on which stock selections are to be made. The Contractor shall arrange for and bear the cost of transportation, meals in transit, and overnight accommodations, if necessary, for the Landscape Architect/Engineer's representative during the period of time required to select and tag the required number of sized stock. The letter of request shall also have attached a letter of certification from the supplier attesting to the fact that the stock to be selected is, in fact, in conformance to the Plant List as shown on the Drawings. The Contractor shall supply the necessary tags or seals which shall be durable and capable of accepting weather-resistant ink or an embossed process. The tags or seals shall be attached directly and securely to each selected plant.

B. The Contractor shall furnish and plant all plants shown on the drawings, as specified, and in quantities as listed on the PLANT LIST. No substitutions will be permitted. All plants shall be nursery grown.

C. Plants shall be in accordance with the USDA Standard for Nursery Stock of the American Association of Nurserymen, latest addition.

D. All plants shall be typical of their species or variety and shall have a normal habit of growth and be legibly tagged with the proper name. Trees shall have straight trunks and all abrasions and cuts shall be completely callused over.

E. The root system of each shall be well provided with fibrous roots. All parts shall be sound, healthy, and vigorous, well branched and densely foliated when in leaf. They shall be free of disease, insect pests, eggs or larvae.

F. All plants must be moved with the root systems as solid units with balls of earth firmly wrapped with burlap. The diameter and depth of the balls of earth must be sufficient to encompass the fibrousroot feeding system necessary for the healthy development of the plant. No plant shall be accepted when the ball of earth surrounding its roots has been badly cracked or broken preparatory to or during the process of planting or after the burlap, staves, ropes or platform required in connection with its transplanting have been removed. The plants and balls shall remain intact during all operations. All plants shall be freshly dug. No plants from cold storage or previously heeled-in will be accepted. All plants that cannot be planted at once must be heeled in by setting in the ground and covering the balls with soil and then watering.

G. The height of the trees (measure from the crown of the roots to the tip of the top branch) shall be not less than the minimum size designated. The caliper measurement six (6) inches above ground level up to and including four (4) inch caliper size and twelve (12) inches above ground level for larger sizes. The branching height for shade trees next to walks shall be seven (7) feet. This may be obtained by pruning after delivery if this does not ruin the shape or form of the trees or cause unsightly scars. All cuts shall be shellacked. The trunk of each tree shall be a single trunk growing from a single unmutilated crown of roots. No part of the trunk shall be conspicuously crooked as compared with normal tress of the same variety. The trunk shall be free from sunscald, frost cracks, or wounds resulting from abrasions, fire or other causes. No pruning wounds shall be present having a diameter exceeding two inches and such wounds must show vigorous bark on all edges. No trees which have had their leaders cut will be accepted.

PART 3 EXECUTION

3.01 PLANTING LOCATIONS

A. All plant locations shall be staked out on the ground and the locations must be approved by the Landscape Architect/Engineer before any excavation is started. If it is necessary to adjust any of the locations, because of unforeseen problems, the changes shall be under the direction of the Landscape Architect/Engineer and there shall be no extra charges for these adjustments.

3.02 PLANTING OPERATIONS

A. Planting shall be done by experienced workmen familiar with planting procedures under the supervision of a qualified foreman.

B. Holes for tree pits shall be at least two times the diameter of the spread of the root ball or root system and at least 12 inches deeper than the depth of the root ball.

C. All plant pits shall be excavated with vertical sides.

3.03 PLANTING TREES

A. The planting excavation shall be filled with enough of the specified planting soil mix to provide a 12 inch depth when firmly tamped.

B. The tree shall be lifted and set in place, being careful to not disturb the root ball and to keep it intact.

C. The tree shall be set to line and grade shown in the Drawings and plumbed straight. The tree shall be set at the same depth as they were previously grown.

D. If the root ball is wrapped in burlap and rope tied, the rope shall be cut off and removed and the burlap shall be laid back and away from the ball half way down the ball. If the ball is in a metal basket, the metal basket shall be cut away and completely removed.

E. The planting pit shall be backfilled with planting soil mix in layers not to exceed eight inches. Each layer is to be firmly tamped. When the pit is approximately 2/3 full, thoroughly water, do not puddle mix but allow water to drain through, undisturbed. Continue backfilling and tamping in eight inch layers until planting mix level is at level plant was grown at. Water thoroughly and adjust soil level.

F. Immediately after planting operations are completed, all tree pits shall be covered with a 3-in layer of the specified mulch. Mulch should not be placed in contact with the trunk in accordance with the construction detail.

G. Stake tree and guy as shown in the Drawings being careful so that the stakes are clear of the root ball mass.

3.04 PLANTING SHRUBS

A. Place planting soil mix in bottom of excavated planting pit in 8-in layers and tamp firmly.

B. Place shrubs carefully in areas as shown on the Drawings, and position so that the shrub shall be at the same soil height as it was previously grown. Remove rope from ball and burlapped root mass and lay burlap back from ball at least 2/3 down.

C. Place planting soil mix in 8-in layers and tamp firmly. When planting soil mix is 2/3 way up the ball, water thoroughly. Do not puddle. Allow water to drain through undisturbed. Finish layering and tamping as previously explained and bring final soil level to the same height that the plant was previously grown at.

D. Shrub and ground cover beds shall be treated with weed retardant in accordance with manufacturer's instructions and covered with 3-in layer of mulch.

3.05 PRUNING NEW AND EXISTING PLANTS

A. Existing trees identified to be pruned in the field by the Landscape Architect/Engineer shall receive class II pruning as outlined by the standards of the National Arborist Association.

B. Each tree and shrub shall be pruned in accordance with American Nurserymen Association Standards to preserve the natural character of the plant.

C. All dead wood or suckers and all broken or badly bruised branches shall be removed. In addition, one-third of the wood may be removed by thinning out to balance root loss due to

transplanting providing the natural character and form of the tree is preserved. Never cut a leader.

D. Pruning shall be done with clean, sharp tools.

E. Cuts over one inch in diameter shall be painted with an approved non-toxic tree paint. Paint shall cover all exposed living tissue.

3.06 MAINTENANCE OF PLANT MATERIAL

A. Maintenance on all plants, shall begin immediately after each plant is planted. When all planting operations are complete the Contractor shall request an inspection of the work by the Landscape Architect/Engineer and the Owner. If all planting is provisionally accepted by Landscape Architect/Engineer and Owner, a 120 day maintenance period shall begin. The 120 day maintenance period shall occur during the active growing season as specified in Section 02930.

B. Maintenance shall include watering of planted areas, weeding, mulching, tightening and repairing of guys, removal/replacement of dead material, resetting plants to proper grades on upright position, edging, repairs of washouts and gullies, repairs to protecting fences and all other necessary works of maintenance.

1. All plants during the maintenance period shall be watered at least twice each week. At each watering the soil around each tree or shrub shall be thoroughly saturated. If sufficient moisture is retained in the soil, as determined by the Landscape Architect/Engineer, the required watering may be reduced. Trees will require a minimum of ten (10) gallons of water each.

2. Stakes shall be kept plumb and neat in appearance. Guys shall be tightened and repaired weekly.

3. Individual plant pits shall be kept free of weeds and mulch shall be replaced as required to maintain a three inch (3") layer of mulch. Beds and individual pits shall be neat in appearance and maintained to the lines originally laid out.

4. Plants that die during the maintenance period shall be replaced as directed by the Landscape Architect/Engineer at no cost to the owner.

5. Spraying for both insect pests and diseases shall be included during the maintenance period as required and as directed by the Landscape Architect/Engineer.

3.07 GUARANTEE PERIOD AND REPLACEMENTS

A. The guarantee period for plants shall be for (1) years following project acceptance.

B. The guarantee period for all plants, shall start at the date of Project Acceptance.

C. During the guarantee period, the Contractor shall replace, at his/her expense, in accordance with the Drawings and Specifications, any plants that are dead, or in the opinion of the Landscape Architect/Engineer in an unhealthy or unsightly condition and/or have lost their natural shape due to dead branches, excessive pruning, or other cause.

D. All replacements shall be of the same kind and size as specified. Replacement shall be made as soon as weather or seasonal conditions permit. The Contractor shall notify the Landscape Architect/Engineer of the dates of all replacements, at which time the guarantee periods for

replacements shall start, provided the Landscape Architect/Engineer decided that the replacement conforms with the Contract requirements.

3.08 FINAL INSPECTION AND ACCEPTANCE

A. At the end of the guarantee period, inspection will be made by the engineer upon written request submitted by the Contractor at least 10 days before the anticipated date.

B. After all necessary corrective work has been completed, the Landscape Architect/Engineer will certify in writing the Final Acceptance of the planting.

C. Remove all stakes, guys, and protective barriers, if existing, weed, and remulch, straighten trees and complete all replacements and repairs and issue maintenance instructions to Owner as a requirement of Final Acceptance.

END OF SECTION

SECTION 02901

MISCELLANEOUS WORK AND CLEANUP

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Furnish all labor, materials, equipment and incidentals required to do the miscellaneous work not specified in other sections but obviously necessary for the proper completion of the work as shown on the Drawings.

B. When applicable the Contractor shall perform the work in accordance with other sections of this Specification. When no applicable specification exists the Contractor shall perform the work in accordance with the best modem practice and/or as directed by the Engineer.

C. The work of this Section includes, but is not limited to, the following:

1. Installing and maintaining construction warning signs.

2. Crossing and relocating existing utilities.

3. Restoring of driveways and sidewalks.

4. Cleaning up.

5. Incidental work.

6. Job photographs.

7. Protection and/or removal and reinstallation of existing signs, lampposts, fence posts, fencing and mailboxes.

8. Protection and bracing of utility poles.

9. Restoration and replacement of curbing.

10. Raking and re-seeding of grassed areas disturbed during construction and/or dewatering activities, including silt basin/dewatering activity areas.

PART2 PRODUCTS

2.1 MATERIALS

A. Materials required for this Section shall be the same quality of materials that are to be restored. Where possible, the Contractor may re-use existing materials that are removed.

PART 3- EXECUTION

3.1 INSTALLING AND MAINTAINING CONSTRUCTION WARNING SIGNS

A. Construction work zone traffic control shall be the contractor's responsibility. Generally, conformance with Part VI of the Manual of Uniform Traffic Control Devices (MUTCD), latest edition, "Standards and Guides for Traffic Controls for Street and Highway Construction, Maintenance, Utility, and Incident Management Operations", will be considered to meet this requirement.

3.2 CROSSING AND RELOCATING EXISTING UTILITIES

A. This Item includes any extra work required in crossing culverts, water courses, including brooks and drainage ditches, storm drains, gas mains, water mains, electric, telephone, gas and water services and other utilities. This work shall include but is not limited to the following: bracing, hand excavation and backfill (except screened gravel) and any other work required for crossing the utility or obstruction not included for payment in other items of this specification. Notification of Utility Companies shall be as specified in Section 01046.

B. In locations where existing utilities cannot be crossed without interfering with the construction of the work as• shown on the Drawings, the Contractor shall remove and relocate the utility as directed by the Engineer or cooperate with the Utility Companies concerned if they relocate their own utility.

C. At pipe crossings and where designated by the Engineer, the Contractor shall furnish and place screened gravel bedding so that the existing utility or pipe is firmly supported for its entire exposed length. The bedding shall extend to the mid- diameter of the pipe crossed. Payment for screened gravel at pipe crossings will be made according to the unit price bid established in the Bid F01m.

RESTORING OF DRIVEWAYS AND SIDEWALKS

A. Existing public and private driveways disturbed by the construction shall be replaced. Paved drives shall be repaved to the limits and thickness existing prior to construction. Gravel drives shall be replaced and regraded.

B. Existing public and private sidewalks disturbed by the construction shall be replaced with sidewalks of equal quality and dimension. In general, sidewalks shall be 2-1/2

inches thick after rolling and compacting and the material shall be top course bituminous asphalt.

3.4 CLEANING UP

A. The Contractor shall remove all construction material, excess excavation, buildings, equipment and other debris remaining on the job as a result of construction operations and shall restore the site of the work to a neat and orderly condition. Any materials, and sand or concrete materials shall be cleaned out of the manholes and catch basins. Haybales and siltfence as well as any silt and debris retained by same shall be removed.

3.5 INCIDENTAL WORK

A. Do all incidental work not otherwise specified, but obviously necessary to the proper completion of the Contract as specified and as shown on the Drawings.

3.6 PHOTOGRAPHS OF PROJECT

A. Prior to commencing work, Contractor may document existing conditions using construction photographs. Photographs for this purpose shall be at the Contractors' expense.

3.7 RESTORATION AND REPLACEMENT OF SIGNS, LAMPPOSTS, FENCE POSTS, FENCING, AND MAILBOXES

A. Existing signs, lamp posts, fence posts, fencing and mailboxes which may be damaged by the Contractor or removed by the Contractor during the course of installing the new pipelines shall be reinstalled in a vertical position at the same location from which they were removed. Damaged items shall be replaced with an item equal to or better than the damaged items. A concrete anchor shall be provided as necessary, at no additional cost, to ensure a rigid alignment. Care shall be exercised in the reinstallation of all items to prevent damage to the newly installed pipelines.

3.8 RESTORATION AND REPLACEMENT OF CURBING

A. Existing concrete, bituminous, timber or granite curbing shall be protected. If necessary, curbing shall be removed and replaced after backfilling. Curbing which is damaged during construction shall be replaced with curbing of equal quality and dimension at the Contractor's expense. Granite curbing removed and reset shall

3.9 PROTECTION AND BRACING OF UTILITY POLES

A. The Contractor shall be responsible for making all arrangements with the proper utility companies for the bracing and protection of all utility poles that may be damaged or endangered by the Contractors operations. Work under this item shall include the related removal and reinstallation of guy wires, or support poles whether shown on the Drawings or not.

3.10 RAKING AND RE-SEEDING

A. Grass and landscaped areas disturbed by the Contractor shall be raked and replenished with loam if required. Areas shall be re-seeded as required.

END OF SECTION 02901

SECTION 02930
TOPSOIL AND HYDROSEEDING

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment and incidentals required, provide erosion control and place topsoil, seed, finish grade, apply lime and fertilizer, hydraulically apply seed and maintain all seeded areas as shown on the Drawings and as specified herein, including all areas disturbed by construction.

B. Topsoil specified herein shall be used for construction of the landfill cap, lower field area, and stabilization areas as shown on the Drawings.

1.02 RELATED WORK

A. Site preparation including clearing, grubbing and stripping is included in Section 02100.

B. Earthwork including excavation, backfill, fill and grading including the environmental testing of topsoil is included in Section 02200.

C. Sedimentation and erosion control is included in Section 02270.

1.03 SUBMITTALS

A. Samples of all materials shall be submitted for inspection and acceptance upon Engineer's request.

B. Contractor shall be responsible for implementing a Topsoil Sampling Program as specified in Part 2. He/she shall obtain samples of topsoil and submit them for testing to ensure that topsoil conforms to specifications as stated herein. All costs shall be paid for by the Contractor.

C. Engineer may collect samples of topsoil for laboratory analysis and may direct soils with concentrations of contaminants that exceed standards established by the Massachusetts Department of Environmental Protection to be immediately removed from the site.

PART 2 PRODUCTS

2.01 MATERIALS

A. Topsoil shall be fertile, friable, and typical of topsoil of the locality and shall be obtained from a well drained site that is free of flooding. It shall be without admixture of subsoil or slag and free of stones, lumps, plants or their roots, sticks, clay, peat and other extraneous matter and shall not be delivered to the site or used while in a frozen or muddy condition. In addition, the soil shall not have been used for corn production two years prior to being used for this project unless the soil is free of the herbicide atrazine.

B. Topsoil shall be classified as a sandy loam using the USDA textural classification system and shall meet the following mechanical analysis:

Sieve Size (Particle Size)	Percentage Finer
1-inch	100
#10	97 to 100
#20	94 to 100
#40	81 to 93
#100	40 to 55
#200	22 to 39
0.002 mm	7 to 18

C. Tests shall be combined hydrometer and wet sieving in compliance with ASTM D422 after destruction of organic matter by ignition.

D. The organic matter content for topsoil shall be between 8 and 10 percent by weight as determined by loss on ignition of moisture free test samples oven dried to a constant weight at a temperature of 100 degrees, Centigrade. To adjust organic matter content, the topsoil may be amended, by the addition of leaf compost or peat moss. Use of organic amendments is acceptable only if random sampling indicates thorough incorporation. The pH value of finished topsoil shall be between pH 5.5 and pH 7.0. It shall contain no toxic materials. Soluble salts shall not be greater than 75 parts per million. Add soil amendments if required at no additional cost to the Owner.

E. Fertilizer shall be commercial mixed free flowing granules or pelleted fertilizer, 10-20-10 (N-P2O5-K2O) grade for lawn and naturalized areas. Fertilizer shall be delivered to the site in original unopened containers each showing the manufacturer's guaranteed analysis conforming to applicable state fertilizer laws. At least 40 percent of the nitrogen in the fertilizer used shall be in slowly available (organic) form.

F. Lime shall be ground limestone containing not less than 85 percent calcium and magnesium carbonates and be ground to such fineness that at least 50 percent shall pass a 100-mesh sieve and at least 90 percent shall pass a 20-mesh sieve.

G. Mulch for hydroseed shall be a specially processed cellulose fiber containing no growth of germination–inhibiting factors. It shall be manufactured in such a manner that after addition and agitation in slurry tanks with water, the fibers in the material become uniformly suspended to form a homogeneous slurry. When sprayed on the ground, the material shall allow absorption and percolation of moisture. Each package of the cellulose fiber shall be marked by the manufacturer to show the air dry weight content and not contain in excess of 10 percent moisture colored green dye to visual application location referencing.

G. Seed shall be labeled in accordance with USDA Rules and Regulations under the Federal Seed Act and applicable State seed laws. Seed shall be furnished in sealed bags or containers bearing the date of the last germination, which date shall be within a period of six months prior to commencement of planting operations. Seed shall be from same or previous year's crop; each variety of seed shall have a purity of not less than 85 percent, a percentage of germination not less than 90 percent, shall have a weed content of not more than 1 percent and contain no noxious weeds. The seed mixtures shall consist of seed proportioned by weight as follows:

1. Natural area seed mix and proportions (For all slopes and disturbed areas not otherwise indicated):

Percent by Weight	Common Name
40%	Clemfine, Rebel II or Tribute Tall Fescue
15%	Palmer II Perennial Ryegrass
10%	Jamestown Chewings Fescue
10%	Reliant Hard Fescue
10%	Birdsfoot Trefoil (Arvenis variety)
5%	Switchgrass
5%	White Clover
5%	Redtop (Streaker variety)

Also provide 3% (2 lbs./acre) by weight Native Grass and Forb Mix of the following Forb seed mix (herbaceous perennials) in the following 10 species and proportions:

Percent by Weight	Common Name
5.5%	Lance-leaved Coreopsis (Coreopsis lanceolata)
6.5%	Wild Blue Lupine (Lupinus perennis)
5.5%	Showy Goldenrod (Solidago speciosa)
5.5%	Butterfly Milkweed (Ascleias tuberosa)
5.5%	New England Aster (Aster novae-anglia)
5.5%	Showy Tick-trefoil (Desmodium canadense)
50%	Roundhead Bush Clover (Lespidesa capitata)
5.5%	Wild Bergamot (Monarda fistulosa)
5.0%	Blackeyed Susan (Rudbeckia Hirta)
5.5%	Showy Sunflower (Helianthus latiflora)

Contractor shall make every effort to supply seeds in native flower species and quantities specified. Minimum quantity of seed per flower species shall be 1 ounce/acre.

2. Lawn Area Seed Mix shall be a naturalized area mix as follows:

70%	Rebel Jr. Tall Fescue
15%	Palmer II perennial Ryegrass
10%	Jamestown Chewings Fescue
5%	Baron Bluegrass

E. The seed shall be furnished and delivered premixed in the proportions specified above. A manufacturer's certificate of compliance to the specified mixes shall be submitted by the manufacturers for each seed type. These certificates shall include the guaranteed percentages of purity, weed content and germination of the seed and also the net weight and date of shipment. No seed may be sown until the certificates have been submitted.

F. Seed shall be delivered in sealed containers bearing the dealer's guaranteed analysis.

G. Erosion control matting is specified in Section 02270.

H. Tackifier is specified in Section 02270.

2.02 TOPSOIL SAMPLING PROGRAM

A. Contractor shall submit at least 1 test sample of new topsoil for every source and for every 1000 cubic yards of topsoil delivered for installation. Tests shall be conducted for total organic matter as outlined in paragraph 2.01D above. One test of topsoil for each new source and for every 1,000 cubic yards shall be submitted for grain size analysis by ASTM Method D422 to demonstrate compliance with the standards outlined in paragraph 2.01B above. Samples from topsoil delivered shall be taken and submitted to the approved testing laboratory before topsoil has been placed on site. Contractor shall deliver samples to the testing laboratory, have the testing report submitted to the Engineer, and shall pay all costs. Based on the test results, the Contractor shall amend soils to meet the specification and if deemed necessary by the Engineer, amended samples shall be submitted for testing. Contractor shall be responsible for screening topsoil and providing additional amendments and topsoil as required at the Contractor's expense.

B. Reports shall be submitted at least one month before any topsoil is to be placed. Source soil samples shall be tested for Nitrogen supplying capacity, Phosphorus, Potassium, Soluble Salts, pH, grain size distribution, and percent organics. Conformance samples shall be tested for grain size distribution and percent organics every 1,000 cy.

PART 3 EXECUTION

3.01 APPLICATION

A. Topsoil shall be placed to a minimum compacted depth of 8-inches on all natural turf areas receiving the final cap. For those disturbed areas of the site outside the limit of the cap such as the waste relocation area not covered with structures, pavement, or existing woodland, topsoil shall be placed to a minimum compacted depth of 5-inches.

B. For all areas to be seeded:

1. Lime shall be applied at the rate of fifty pounds per 1,000 square feet or as determined by the soil test to bring topsoil pH to a range of 5.5 to 7.0.

2. Fertilizer (10-20-10) with a 50% slow release shall be applied at the rate of twenty pounds per 1,000 square feet or as determined by the soil test.

3. Seed shall be applied at the rate of eight (8) pounds per 1,000 square feet.

4. Erosion Control Matting shall be installed on all slopes greater than 4H:1V (4 vertical to 1 horizontal), in grassed swales and in the proposed sedimentation basin, per manufacturer's instructions.

C. If possible, limestone shall be applied two to three months before the application of fertilizer. Limestone may not be mixed with fertilizer for application and shall be applied a minimum of two weeks prior to fertilizer application.

D. After the topsoil is placed and before it is raked to true lines and rolled, limestone shall be spread evenly over the topsoil surface and thoroughly incorporated by heavy raking to at least one half the depth of topsoil.

E. Seed shall be applied hydraulically at the rates and percentages indicated. The spraying equipment and mixture shall be so designed that when the mixture is sprayed over an area, the grass seed and mulch shall be equal in quantity to the specified rates. Prior to the start of work,

the Engineer shall be furnished with a certified statement for approval as to the number of pounds of materials to be used per 100 gallons of water. This statement shall also specify the number of square feet of seeding that can be covered with the quantity of solution in the hydroseedeer.

F. The application of fertilizer may be performed hydraulically in one operation with hydroseeding and fiber mulching. Clean all structures and paved areas of unwanted deposits of the hydroseeded mixture.

G. Reuse of existing onsite materials must be approved by the Engineer.

3.02 INSTALLATION

A. Previously established grades, as shown on Drawings shall be maintained in a true and even condition.

B. Topsoil shall be placed over approved areas to a depth sufficiently greater than required so that after natural settlement and light rolling the depth of the topsoil will meet that specified herein and on the Drawings. No topsoil shall be spread in water or while frozen or muddy.

C. After topsoil has been spread, it shall be carefully prepared by scarifying or harrowing and hand raking. All stiff clods, lumps, roots, litter and other foreign material shall be removed from the topsoil areas and disposed of. The areas shall also be free of smaller stones, in excessive quantities, as determine by the Engineer. The whole surface shall then be rolled with a hand roller weighing not more than 100 pounds per foot of width. During the rolling, all depressions caused by settlement of rolling shall be filled with additional topsoil and the surface shall be regraded and rolled until a smooth and even finished grade is created.

D. Seeding, mulching and conditioning shall only be performed during those periods within the seasons which are normal for such work as determined by the weather and locally accepted practice, as approved by the Engineer. Hydroseed only when wind speeds are less than five (5) miles per hour. Overspray will not be allowed. Extra care shall be taken within the wetland buffer to insure no overspray occurs beyond the limit of work.

E. Schedules for seeding and fertilizing must be submitted to the Engineer for approval prior to the work. Seeding for the work as specified herein shall be accomplished between the period of April 1 to June 1 or August 15 to October 1. Seeding during the period from October 2 to March 31 shall only be undertaken upon approval of the Engineer. Seeding during the period from June 1 to August 14 shall only be performed if irrigation is provided.

F. Seed shall be applied hydraulically at the rates and percentages indicated. The spraying equipment and mixture shall be so designed that when the mixture is sprayed over an area, the grass seed and mulch shall be equal in quantity to the specified rates. Prior to the start of work, furnish the Engineer with a certified statement as to the number of pounds of materials to be used per 100 gallons of water. This statement shall also specify the number of square feet of seeding that can be covered with the quantity of solution in the hydroseeder. Upon completion of seeding operations, furnish the Engineer with a certified statement on the actual quantity of solution applied.

G. In order to prevent unnecessary erosion of newly topsoiled and graded slopes and unnecessary siltation of drainageways, carry out seeding and mulching no later than two days after unit or

portion of the project has been satisfactorily completed. For the purpose of this project a unit is defined as 10,000 square feet. When protection of areas graded with new topsoil is necessary at a time which is outside of the normal seeding season, protect those areas by what ever means necessary as approved by the Engineer and be responsible for prevention of siltation in the areas beyond the limit of work.

H. Erosion control matting shall be installed on all slopes greater than 4H:1V, on the landfill slopes, sedimentation basin and in all drainage swales and ditches as shown on the Drawings and as directed by the Engineer in accordance with manufacturer's instructions. The area to be covered shall be properly prepared, fertilized and seeded before the mat is applied. When the mat is unrolled, the netting shall be on top and the fibers in contact with the soil over the entire area. The mats shall be applied in the direction of water flow, butted snugly at the ends and side and stapled. Mats shall be placed a minimum of three rows (of four foot) wide (total 12-ft width) within the drainage swale/ditch and stapled together in accordance with manufacturer's instructions. The staples shall be made of wire, 0.091-in in diameter or greater, "U" shaped with legs 6-in in length and a 1-in crown. The staples shall be driven vertically into the ground, spaced approximately two linear yards apart, on each side and one row in the center alternately spaced between each side. Adjoining shall not be overlapped and shall utilize a common row of staples to attach.

I. When newly graded subgrade areas cannot be topsoiled and seeded because of season or weather conditions and will remain exposed for more than 30 days, protect those areas against erosion and washouts by whatever means necessary such as straw applied with a tar tack or by other measures as approved by the Engineer. Prior to application of topsoil, any such materials applied for erosion control shall be thoroughly incorporated into the subgrade by discing. Fertilizer shall be applied prior to spreading of topsoil.

J. On slopes in addition to straw mulch and tackifier, provide protection against washouts by an approved method. Any washout which occurs shall be regraded and reseeded at the Contractor's expense until a good turf is established.

3.03 MAINTENANCE AND PROVISIONAL ACCEPTANCE

A. Keep all seeded areas watered and mowed and in good condition, reseeding all seeded areas if and when necessary until a good, healthy, uniform growth is established over the entire area seeded and maintain all seeded areas in an approved condition until provisional acceptance.

B. The Engineer will inspect all work for provisional acceptance at the end of the maintenance period, upon the written request received at least ten days before the anticipated date of inspection. The maintenance period shall include a minimum of one mowing prior to provisional acceptance as approved by Engineer.

C. A satisfactory turf will be defined as:

1. No bare spots larger than three square feet.

2. No more than ten percent of total area with bare spots larger than one square foot.

3. Not more than fifteen percent of total area with bare spots larger than 6-in square.

D. After the inspection has occurred but prior to provisional acceptance, a soil test by an approved laboratory shall be performed to determine soil fertilization requirements. Additional fertilizer not to exceed 10 lbs per 1000 sq ft of 20-10-10 (with 50% slow release) shall be applied as directed by the Engineer.

E. Furnish full and complete written instructions for maintenance of the seeded areas to the Owner at the time of provisional acceptance.

F. The inspection by the Engineer will determine whether maintenance shall continue. Contractor shall continue maintenance of entire site until all areas of the site meet the minimum requirements specified above.

G. After all necessary corrective work and clean-up has been completed, and maintenance instructions have been received by the Owner, the Engineer will certify in writing the provisional acceptance of the turf areas. Maintenance of all turf areas shall cease on receipt of provisional acceptance.

3.04 GUARANTEE PERIOD AND FINAL ACCEPTANCE

A. All seeded areas shall be guaranteed for not less than one full year from the time of provisional acceptance.

B. At the end of the guarantee period, inspection will be made by the Engineer upon written request submitted at least ten days before the substantial completion. Seeded areas not demonstrating satisfactory stands as outlined above, as determined by the Engineer, shall be renovated, reseeded and maintained meeting all requirements as specified herein.

C. After all necessary corrective work has been completed, the Engineer shall certify in writing the final acceptance of the seeded areas.

END OF SECTION

SECTION 02930
TOPSOIL AND HYDROSEEDING

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment and incidentals required, provide erosion control and place topsoil, seed, finish grade, apply lime and fertilizer, hydraulically apply seed and maintain all seeded areas as shown on the Drawings and as specified herein, including all areas disturbed by construction.

B. Topsoil specified herein shall be used for construction of the landfill cap, lower field area, and stabilization areas as shown on the Drawings.

1.02 RELATED WORK

A. Site preparation including clearing, grubbing and stripping is included in Section 02100.

B. Earthwork including excavation, backfill, fill and grading including the environmental testing of topsoil is included in Section 02200.

C. Sedimentation and erosion control is included in Section 02270.

1.03 SUBMITTALS

A. Samples of all materials shall be submitted for inspection and acceptance upon Engineer's request.

B. Contractor shall be responsible for implementing a Topsoil Sampling Program as specified in Part 2. He/she shall obtain samples of topsoil and submit them for testing to ensure that topsoil conforms to specifications as stated herein. All costs shall be paid for by the Contractor.

C. Engineer may collect samples of topsoil for laboratory analysis and may direct soils with concentrations of contaminants that exceed standards established by the Massachusetts Department of Environmental Protection to be immediately removed from the site.

PART 2 PRODUCTS

2.01 MATERIALS

A. Topsoil shall be fertile, friable, and typical of topsoil of the locality and shall be obtained from a well drained site that is free of flooding. It shall be without admixture of subsoil or slag and free of stones, lumps, plants or their roots, sticks, clay, peat and other extraneous matter and shall not be delivered to the site or used while in a frozen or muddy condition. In addition, the soil shall not have been used for corn production two years prior to being used for this project unless the soil is free of the herbicide atrazine.

B. Topsoil shall be classified as a sandy loam using the USDA textural classification system and shall meet the following mechanical analysis:

Sieve Size (Particle Size)	Percentage Finer
1-inch	100
#10	97 to 100
#20	94 to 100
#40	81 to 93
#100	40 to 55
#200	22 to 39
0.002 mm	7 to 18

C. Tests shall be combined hydrometer and wet sieving in compliance with ASTM D422 after destruction of organic matter by ignition.

D. The organic matter content for topsoil shall be between 8 and 10 percent by weight as determined by loss on ignition of moisture free test samples oven dried to a constant weight at a temperature of 100 degrees, Centigrade. To adjust organic matter content, the topsoil may be amended, by the addition of leaf compost or peat moss. Use of organic amendments is acceptable only if random sampling indicates thorough incorporation. The pH value of finished topsoil shall be between pH 5.5 and pH 7.0. It shall contain no toxic materials. Soluble salts shall not be greater than 75 parts per million. Add soil amendments if required at no additional cost to the Owner.

E. Fertilizer shall be commercial mixed free flowing granules or pelleted fertilizer, 10-20-10 (N-P2O5-K2O) grade for lawn and naturalized areas. Fertilizer shall be delivered to the site in original unopened containers each showing the manufacturer's guaranteed analysis conforming to applicable state fertilizer laws. At least 40 percent of the nitrogen in the fertilizer used shall be in slowly available (organic) form.

F. Lime shall be ground limestone containing not less than 85 percent calcium and magnesium carbonates and be ground to such fineness that at least 50 percent shall pass a 100-mesh sieve and at least 90 percent shall pass a 20-mesh sieve.

G. Mulch for hydroseed shall be a specially processed cellulose fiber containing no growth of germination–inhibiting factors. It shall be manufactured in such a manner that after addition and agitation in slurry tanks with water, the fibers in the material become uniformly suspended to form a homogeneous slurry. When sprayed on the ground, the material shall allow absorption and percolation of moisture. Each package of the cellulose fiber shall be marked by the manufacturer to show the air dry weight content and not contain in excess of 10 percent moisture colored green dye to visual application location referencing.

G. Seed shall be labeled in accordance with USDA Rules and Regulations under the Federal Seed Act and applicable State seed laws. Seed shall be furnished in sealed bags or containers bearing the date of the last germination, which date shall be within a period of six months prior to commencement of planting operations. Seed shall be from same or previous year's crop; each variety of seed shall have a purity of not less than 85 percent, a percentage of germination not less than 90 percent, shall have a weed content of not more than 1 percent and contain no noxious weeds. The seed mixtures shall consist of seed proportioned by weight as follows:

1. Natural area seed mix and proportions (For all slopes and disturbed areas not otherwise indicated):

Percent by Weight	Common Name
40%	Clemfine, Rebel II or Tribute Tall Fescue
15%	Palmer II Perennial Ryegrass
10%	Jamestown Chewings Fescue
10%	Reliant Hard Fescue
10%	Birdsfoot Trefoil (Arvenis variety)
5%	Switchgrass
5%	White Clover
5%	Redtop (Streaker variety)

Also provide 3% (2 lbs./acre) by weight Native Grass and Forb Mix of the following Forb seed mix (herbaceous perennials) in the following 10 species and proportions:

Percent by Weight	Common Name
5.5%	Lance-leaved Coreopsis (Coreopsis lanceolata)
6.5%	Wild Blue Lupine (Lupinus perennis)
5.5%	Showy Goldenrod (Solidago speciosa)
5.5%	Butterfly Milkweed (Ascleias tuberosa)
5.5%	New England Aster (Aster novae-anglia)
5.5%	Showy Tick-trefoil (Desmodium canadense)
50%	Roundhead Bush Clover (Lespidesa capitata)
5.5%	Wild Bergamot (Monarda fistulosa)
5.0%	Blackeyed Susan (Rudbeckia Hirta)
5.5%	Showy Sunflower (Helianthus latiflora)

Contractor shall make every effort to supply seeds in native flower species and quantities specified. Minimum quantity of seed per flower species shall be 1 ounce/acre.

2. Lawn Area Seed Mix shall be a naturalized area mix as follows:

70%	Rebel Jr. Tall Fescue
15%	Palmer II perennial Ryegrass
10%	Jamestown Chewings Fescue
5%	Baron Bluegrass

E. The seed shall be furnished and delivered premixed in the proportions specified above. A manufacturer's certificate of compliance to the specified mixes shall be submitted by the manufacturers for each seed type. These certificates shall include the guaranteed percentages of purity, weed content and germination of the seed and also the net weight and date of shipment. No seed may be sown until the certificates have been submitted.

F. Seed shall be delivered in sealed containers bearing the dealer's guaranteed analysis.

G. Erosion control matting is specified in Section 02270.

H. Tackifier is specified in Section 02270.

2.02 TOPSOIL SAMPLING PROGRAM

A. Contractor shall submit at least 1 test sample of new topsoil for every source and for every 1000 cubic yards of topsoil delivered for installation. Tests shall be conducted for total organic matter as outlined in paragraph 2.01D above. One test of topsoil for each new source and for every 1,000 cubic yards shall be submitted for grain size analysis by ASTM Method D422 to demonstrate compliance with the standards outlined in paragraph 2.01B above. Samples from topsoil delivered shall be taken and submitted to the approved testing laboratory before topsoil has been placed on site. Contractor shall deliver samples to the testing laboratory, have the testing report submitted to the Engineer, and shall pay all costs. Based on the test results, the Contractor shall amend soils to meet the specification and if deemed necessary by the Engineer, amended samples shall be submitted for testing. Contractor shall be responsible for screening topsoil and providing additional amendments and topsoil as required at the Contractor's expense.

B. Reports shall be submitted at least one month before any topsoil is to be placed. Source soil samples shall be tested for Nitrogen supplying capacity, Phosphorus, Potassium, Soluble Salts, pH, grain size distribution, and percent organics. Conformance samples shall be tested for grain size distribution and percent organics every 1,000 cy.

PART 3 EXECUTION

3.01 APPLICATION

A. Topsoil shall be placed to a minimum compacted depth of 8-inches on all natural turf areas receiving the final cap. For those disturbed areas of the site outside the limit of the cap such as the waste relocation area not covered with structures, pavement, or existing woodland, topsoil shall be placed to a minimum compacted depth of 5-inches.

B. For all areas to be seeded:

1. Lime shall be applied at the rate of fifty pounds per 1,000 square feet or as determined by the soil test to bring topsoil pH to a range of 5.5 to 7.0.

2. Fertilizer (10-20-10) with a 50% slow release shall be applied at the rate of twenty pounds per 1,000 square feet or as determined by the soil test.

3. Seed shall be applied at the rate of eight (8) pounds per 1,000 square feet.

4. Erosion Control Matting shall be installed on all slopes greater than 4H:1V (4 vertical to 1 horizontal), in grassed swales and in the proposed sedimentation basin, per manufacturer's instructions.

C. If possible, limestone shall be applied two to three months before the application of fertilizer. Limestone may not be mixed with fertilizer for application and shall be applied a minimum of two weeks prior to fertilizer application.

D. After the topsoil is placed and before it is raked to true lines and rolled, limestone shall be spread evenly over the topsoil surface and thoroughly incorporated by heavy raking to at least one half the depth of topsoil.

E. Seed shall be applied hydraulically at the rates and percentages indicated. The spraying equipment and mixture shall be so designed that when the mixture is sprayed over an area, the grass seed and mulch shall be equal in quantity to the specified rates. Prior to the start of work,

the Engineer shall be furnished with a certified statement for approval as to the number of pounds of materials to be used per 100 gallons of water. This statement shall also specify the number of square feet of seeding that can be covered with the quantity of solution in the hydroseedeer.

F. The application of fertilizer may be performed hydraulically in one operation with hydroseeding and fiber mulching. Clean all structures and paved areas of unwanted deposits of the hydroseeded mixture.

G. Reuse of existing onsite materials must be approved by the Engineer.

3.02 INSTALLATION

A. Previously established grades, as shown on Drawings shall be maintained in a true and even condition.

B. Topsoil shall be placed over approved areas to a depth sufficiently greater than required so that after natural settlement and light rolling the depth of the topsoil will meet that specified herein and on the Drawings. No topsoil shall be spread in water or while frozen or muddy.

C. After topsoil has been spread, it shall be carefully prepared by scarifying or harrowing and hand raking. All stiff clods, lumps, roots, litter and other foreign material shall be removed from the topsoil areas and disposed of. The areas shall also be free of smaller stones, in excessive quantities, as determine by the Engineer. The whole surface shall then be rolled with a hand roller weighing not more than 100 pounds per foot of width. During the rolling, all depressions caused by settlement of rolling shall be filled with additional topsoil and the surface shall be regraded and rolled until a smooth and even finished grade is created.

D. Seeding, mulching and conditioning shall only be performed during those periods within the seasons which are normal for such work as determined by the weather and locally accepted practice, as approved by the Engineer. Hydroseed only when wind speeds are less than five (5) miles per hour. Overspray will not be allowed. Extra care shall be taken within the wetland buffer to insure no overspray occurs beyond the limit of work.

E. Schedules for seeding and fertilizing must be submitted to the Engineer for approval prior to the work. Seeding for the work as specified herein shall be accomplished between the period of April 1 to June 1 or August 15 to October 1. Seeding during the period from October 2 to March 31 shall only be undertaken upon approval of the Engineer. Seeding during the period from June 1 to August 14 shall only be performed if irrigation is provided.

F. Seed shall be applied hydraulically at the rates and percentages indicated. The spraying equipment and mixture shall be so designed that when the mixture is sprayed over an area, the grass seed and mulch shall be equal in quantity to the specified rates. Prior to the start of work, furnish the Engineer with a certified statement as to the number of pounds of materials to be used per 100 gallons of water. This statement shall also specify the number of square feet of seeding that can be covered with the quantity of solution in the hydroseeder. Upon completion of seeding operations, furnish the Engineer with a certified statement on the actual quantity of solution applied.

G. In order to prevent unnecessary erosion of newly topsoiled and graded slopes and unnecessary siltation of drainageways, carry out seeding and mulching no later than two days after unit or

portion of the project has been satisfactorily completed. For the purpose of this project a unit is defined as 10,000 square feet. When protection of areas graded with new topsoil is necessary at a time which is outside of the normal seeding season, protect those areas by what ever means necessary as approved by the Engineer and be responsible for prevention of siltation in the areas beyond the limit of work.

H. Erosion control matting shall be installed on all slopes greater than 4H:1V, on the landfill slopes, sedimentation basin and in all drainage swales and ditches as shown on the Drawings and as directed by the Engineer in accordance with manufacturer's instructions. The area to be covered shall be properly prepared, fertilized and seeded before the mat is applied. When the mat is unrolled, the netting shall be on top and the fibers in contact with the soil over the entire area. The mats shall be applied in the direction of water flow, butted snugly at the ends and side and stapled. Mats shall be placed a minimum of three rows (of four foot) wide (total 12-ft width) within the drainage swale/ditch and stapled together in accordance with manufacturer's instructions. The staples shall be made of wire, 0.091-in in diameter or greater, "U" shaped with legs 6-in in length and a 1-in crown. The staples shall be driven vertically into the ground, spaced approximately two linear yards apart, on each side and one row in the center alternately spaced between each side. Adjoining shall not be overlapped and shall utilize a common row of staples to attach.

I. When newly graded subgrade areas cannot be topsoiled and seeded because of season or weather conditions and will remain exposed for more than 30 days, protect those areas against erosion and washouts by whatever means necessary such as straw applied with a tar tack or by other measures as approved by the Engineer. Prior to application of topsoil, any such materials applied for erosion control shall be thoroughly incorporated into the subgrade by discing. Fertilizer shall be applied prior to spreading of topsoil.

J. On slopes in addition to straw mulch and tackifier, provide protection against washouts by an approved method. Any washout which occurs shall be regraded and reseeded at the Contractor's expense until a good turf is established.

3.03 MAINTENANCE AND PROVISIONAL ACCEPTANCE

A. Keep all seeded areas watered and mowed and in good condition, reseeding all seeded areas if and when necessary until a good, healthy, uniform growth is established over the entire area seeded and maintain all seeded areas in an approved condition until provisional acceptance.

B. The Engineer will inspect all work for provisional acceptance at the end of the maintenance period, upon the written request received at least ten days before the anticipated date of inspection. The maintenance period shall include a minimum of one mowing prior to provisional acceptance as approved by Engineer.

C. A satisfactory turf will be defined as:

1. No bare spots larger than three square feet.

2. No more than ten percent of total area with bare spots larger than one square foot.

3. Not more than fifteen percent of total area with bare spots larger than 6-in square.

D. After the inspection has occurred but prior to provisional acceptance, a soil test by an approved laboratory shall be performed to determine soil fertilization requirements. Additional fertilizer not to exceed 10 lbs per 1000 sq ft of 20-10-10 (with 50% slow release) shall be applied as directed by the Engineer.

E. Furnish full and complete written instructions for maintenance of the seeded areas to the Owner at the time of provisional acceptance.

F. The inspection by the Engineer will determine whether maintenance shall continue. Contractor shall continue maintenance of entire site until all areas of the site meet the minimum requirements specified above.

G. After all necessary corrective work and clean-up has been completed, and maintenance instructions have been received by the Owner, the Engineer will certify in writing the provisional acceptance of the turf areas. Maintenance of all turf areas shall cease on receipt of provisional acceptance.

3.04 GUARANTEE PERIOD AND FINAL ACCEPTANCE

A. All seeded areas shall be guaranteed for not less than one full year from the time of provisional acceptance.

B. At the end of the guarantee period, inspection will be made by the Engineer upon written request submitted at least ten days before the substantial completion. Seeded areas not demonstrating satisfactory stands as outlined above, as determined by the Engineer, shall be renovated, reseeded and maintained meeting all requirements as specified herein.

C. After all necessary corrective work has been completed, the Engineer shall certify in writing the final acceptance of the seeded areas.

END OF SECTION

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1-GENERAL

1.1 SUMMARY

In general, the Contractor shall supply all labor, equipment, temporary protection, tools and appliances necessary for the proper completion of the work as required in the specifications and in accordance with good construction practice. Refer to the Contract Drawings for locations of work included in the contract.

A. Work Included - The work under this section generally includes the following:

1. Concrete building foundations
2. Concrete slabs
3. Exterior concrete stairs
4. Concrete retaining walls

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section, and:

1. Section 02200 Earthwork

1.3 SUBMITTALS

A. In addition to Product Data, submit design mixes for each concrete mix.

1.4 QUALITY ASSURANCE

A. Quality Assurance: Comply with ACI 301, "Specification for Structural Concrete," and ACI117, "Specifications for Tolerances for Concrete Construction and Materials."

1. Installer Qualifications: An experienced installer who has completed concrete Work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in- service performance.

2. Manufacturer Qualifications: A firm experienced in manufacturing ready-Mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.

PART 2-PRODUCTS

2.1 MATERIALS

A. Steel Reinforcement: As follows:

1. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
2. Plain-Steel Wire: ASTM A 82, as drawn.
3. Deformed-Steel Wire: ASTM A 496.
4. Plain-Steel Welded Wire Fabric: ASTM A 185, flat sheets.

B. Concrete Materials: As follows:

1. Portland Cement: ASTM C 150, Type I or II.
2. Aggregate: ASTM C 33, uniformly graded, from a single source.
3. Water: ASTM C 94.
4. Air-Entraining Admixture: ASTM C 260.
5. Water-Reducing Admixture: ASTM C 494, Type A.
6. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.
7. Water-Reducing and Accelerating Admixture: ASTM C 494, Type
8. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.

B. Related Materials: As follows:

1. Vapor Retarder: ASTM E 1745, Class C, not less than 7.8 mils polyethylene sheet.
2. Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber, or ASTM D 1752, cork or self-expanding cork.
3. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
4. Epoxy-Bonding Adhesive: ASTM C 881, two-component epoxy resin, of class and grade to suit requirements.

D. Curing Materials: As follows:

1. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
2. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.
3. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
4. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
   a. 2 coats Sonneborn "Kure-N-Seal" or equal.

2.2 CONCRETE MIXES

A. Concrete Mixes, General; - Prepare design mixes, proportioned according to ACI 211.1 and ACI 301, with the following properties:

B. Footings, Foundations, Retaining Walls

1. Con1pressive Strength (28 Days): 3000 psi.
2. Slump: 4 inches.
3. Air Content: 4.5 to 7.0 percent.

C. Slabs

1. Compressive Strength (28 Days): 4000 psi.
2. Slump: 3 inches.
3. Air Content: 4.5 to 7.0 percent

D. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94 and ASTM C 1116, and furnish batch ticket information.

PART 3 EXECUTION

3.1 FORMWORK

A. Design, construct, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until concrete structure can support such loads.

B. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use Setting Drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

C. Leave formwork, for beam soffits, joists, slabs, and other structural elements, that supports weight of concrete in place until concrete has achieved 28-day design compressive strength.

D. Comply with ACI 318, ACI 301, and recommendations in ACI 347R for design, installation, and removal of shoring and reshoring.

E. Vapor Retarder: Place, protect, and repair vapor-retarder sheets according to ASTME 1643.

3.2 PLACING REINFORCEMENT

A. Steel Reinforcement: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

3.3 JOINTS

A. Locate and install construction, isolation, and contraction joints as indicated.

3.4 CONCRETE PLACEMENT

A. Deposit concrete continuously and avoid segregation. Deposit concrete in forms in horizontal layers no deeper than 24 inches, avoiding cold joints.

1. Consolidate concrete with mechanical vibrating equipment.
2. Screed and initial-float concrete floors and slabs using bull floats or darbies to form a uniform and open-textured surface plane, free of humps or hollows, before excess moisture or bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
3. Comply with ACI 306.1 for cold-weather concrete placement.
4. Place concrete according to recommendations in ACI 305R when hot-weather conditions exist.

3.5 FINISHING

A. Finish formed surfaces as follows:

1. Apply rough-formed finish, defined in ACI 301, to concrete surfaces indicated or not exposed to public view.

B. Finishing Floors and Slabs: Comply with recommendations in ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces.

1. Float Finish: Apply float finish, defined in ACI 301, to surfaces indicated, to surfaces to receive trowel finish,

2. Trowel Finish: Apply a trowel finish to surfaces indicated and to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin film-finish coating system.

   a. After applying float finish, apply first trowel finish and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

   b. Finish and measure surface so gap at any point between concrete surface and an unleveled freestanding 10-foot long straightedge, resting on two high spots and placed anywhere on the surface, does not exceed the following: 1/8 inch.

3. Trowel and Fine-Broon1 Finish: Apply a partial trowel finish, stopping second troweling, to surfaces indicated and to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. Immediately after second troweling, and when concrete is still plastic, slightly scarify surface with a fine broom.

4. Broom Finish: Apply a broom finish to exterior concrete, bro01ning with fiber-bristle broom perpendicular to main traffic route, to platforms, steps, and ramps, and elsewhere as indicated.

3.6 CONCRETE PROTECTION AND CURING

A. Concrete Protection and Curing: Protect concrete from excessive cold or hot temperatures. Con1ply with ACI 306.1 for cold-weather protection and with recommendations in ACI 305R for hot-weather protection during curing.

1. Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause excessive moisture loss.
2. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
3. Cure formed and unformed concrete for at least seven days by moisture curing, moisture-retaining-cover curing, or curing compound.
4. Cure and seal floors and slabs with a curing and sealing compound according to manufacturer's written instructions.

3.7 QUALITY CONTROL

A. Testing Agency: The Contractor will engage a qualified independent testing and inspecting agency subject to Owner approval to sample materials, perform tests, and submit test reports during concrete placement. Tests shall be performed according to ACI 301.

B. Defective Concrete: Repair and patch defective areas when approved by Engineer. Remove and replace concrete that cannot be repaired and patched to Engineer's approval.

END OF SECTION 03300

SECTION 03600

GROUT

PART 1-GENERAL

1.1 SUMMARY

A. Furnish all labor, materials, equipment and incidentals required to install grout for modifications to existing foundations, walls and manholes as shown on the Drawings and as specified herein.

1.2 RELATEDWORK

A. Cast-in-Place Concrete is included in Section 03300.

1.3 SUBMITTALS

A. Submit, in accordance with Section 01300, shop drawings and product data showing materials of construction and details of installer for:

1. Commercially manufactured nonshrink cementitious grout. The submittal shall include catalog cuts, technical data, storage requirements, product life, working time after mixing, temperature considerations, conformity to required ASTM standards and Material Safety Data Sheet.

B. Submit to Engineer, in accordance with Section 01300, proposed method of repairing penetrations of existing foundations (all types), including formwork arrangement and grout installation.

1.4 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM)

1. ASTM C531 - Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical Resistant Mortars, Grouts and Monolithic Surfacings and Polymer Concretes.

2. ASTM C579- Standard Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts and Monolithic Surfacings and Polymer Concretes.

3. ASTM C827 - Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens for Cementitious Mixtures.

4. ASTM C1107- Standard Specification for Packaged D1y, Hydraulic-Cement Grout

B. U.S. Army Corps of Engineers (CRD)

1. CRD C-621 - Corps of Engineers Specification for Nonshrink Grout.

C. Where reference is made to one of the above standards, the revision in effect at the time of the bid opening shall apply.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the jobsite in original, unopened packages, clearly labeled with the manufacturer's name, product identification, batch numbers and printed instructions.

B. Store materials in full compliance with the manufacturer's recommendations. Total storage time from date of manufacture to date of installation shall be limited to 6 months or the manufacturer's recommended storage time, whichever is less.

C. Material which becomes damp or otherwise unacceptable shall be immediately removed from the site and replaced with acceptable material at no additional expense to the Owner.

PART 2- PRODUCTS

2.1 GENERAL

A. The use of a manufacturer's name and product or catalog number is for the purpose of establishing the standard of quality desired.

B. Like materials shall be the product of one manufacturer or supplier in order to provide standardization of appearance.

2.2 MATERIALS

A. Nonshrink Cementitious Grout:

1. Nonshrink cementitious grouts shall meet or exceed the requirements of ASTM C1107, Grades B or C and CRD C-621. Grouts shall be Portland cement based, contain a pre-proportioned blend of select aggregates and shrinkage compensating agents and shall require only the addition of water. Nonshrink cementitious grouts shall not contain expansive cement or metallic particles. The grouts shall exhibit no shrinkage when tested in conformity with ASTM C827.

a. General purpose nonshrink cementitious grout shall conform to the standards stated above and shall be SikaGrout 212 by Sika Corp.; Set Grout by master Builders, Inc.; Gilco Construction Grout by Gifford Hill & Co.; Euco NS by The Euclid Chemical Co. NBEC Grout by U.S. Grout Corp. or equal.

b. Flowable (Precision) nonshrink cementitious grout shall conform to the standards stated above and shall be Masterflow 928 by Master Builders, Inc.; Hi-Flow Grout by the Euclid Chemical Co.; SikaGrout 212 by Sika Cotp.; Supreme Grout by Gifford Hill & Co.; Five Star Grout by U.S. Grout Corp. or equal.

B. Water:

1. Potable water, free from injurious amounts of oil, acid, alkali, organic matter or other deleterious substances.

PART 3 EXECUTION

3.1 PREPARATION

A. Surfaces to receive grout shall be clean and sound; free of ice, frost ice, dirt, grease, oil, curing compounds, laitance and paints and free of all loose material or foreign matter which may affect the bond or performance of the grout.

B. Roughen concrete surfaces by chipping, sandblasting, or other mechanical means to ensure bond of the grout to the concrete. Remove loose or broken concrete. Irregular voids or projecting coarse aggregate need not be removed if they are sound, free of lattice and firmly embedded into the parent concrete.

1. Air compressors used to clean surfaces in contact with the grout shall be the oilless type or equipped with an oil trap in the airline to prevent oil from being blown onto the surface.

C. Construct grout forms or other leakproof containment as required. Forms shall be lined or coated with release agents recommended by the manufacturer. Forms shall be of adequate strength, securely anchored in place and shored to resist the forces imposed by the grout and its placement.

3.2 INSTALLATION- GENERAL

A. Mix, apply and cure products In strict compliance with the manufacturer's recommendations and this section.

B. Have sufficient manpower and equipment available for rapid and continuous mixing and placing. Keep all necessary tools and materials ready and close at hand.

C. Maintain temperatures of the grout between 60 and 90 degrees F during grouting and until the grout compressive strength reaches 1000 psi or as recon1mended by the grout manufacturer, whichever is longer. Take precautions to minimize differential heating or cooling of existing surfaces and grout during the curing period.

D. Take special precautions for hot weather or cold weather grouting as recommended by the manufacturer when ambient temperatures and/or the temperature of the materials in contact with the grout are outside of the 60 and 90 degrees F range.

3.3 INSTALLATION- NONSHRINK CEMENTITIOUS GROUT

A. Mix in accordance with the manufacturer's recommendations. Do not add cement, sand, pea gravel or admixtures.

B. When mixing, add premeasured amount of water for mixing, followed by the grout.

Begin with the minimum amount of water recommended by the manufacturer and then add the minimum additional water required to obtain the workability. Do not exceed the manufacturer's maximum recommended water content.

C. Placements greater than 3-inches in depth shall include the addition of clean, washed pea-gravel to the grout mix when approved by the manufacturer. Comply with the manufacturer's recommendations for the size and amount of aggregate to be added.

D. Place grout into the designated• areas in a manner which will avoid segregation or entrapment of air. Do not vibrate grout to release air or to consolidate the material. Placement shall proceed in a manner which will ensure the filling of all spaces and provide full contact between the grout and adjoining surfaces. Provide grout holes as necessary.

E. Place grout rapidly and continuously to avoid cold joints. Do not place cement grouts in layers. Do not add additional water to mix (retemper) after initial stiffening.

F. Finish this surface with a wood float (brush) finish.

G. Begin curing immediately after form removal and finishing. Keep grout moist and within its recommended placement temperature range for at least 24 hours after placement or longer if recommended by the manufacturer. Saturate the grout surface by use of wet burlap, soaker hoses, ponding or other approved means. Provide sunshades as necessary. If drying winds inhibit the ability of a given curing method to keep grout moist, erect wind breaks until wind is no longer a problem or curing is finished.

END OF SECTION 03600

ATTACHMENTS

ATTACHMENT A

WALTER E. FERNALD DEVELOPMENTAL CENTER
WETLANDS RESTORATION & STREAM DAYLIGHTING

WALTHAM, MA

MAYOR
JEANNETTE A. MCCARTHY

CITY ENGINEER
ROBERT WINN, P.E.

LIST OF DRAWINGS

GN–1	GENERAL NOTES
EX–1	EXISTING CONDITIONS AND DEMOLITION PLAN
L–1	LAYOUT AND MATERIALS PLAN I
L–2	LAYOUT AND MATERIALS PLAN II
L–3	LAYOUT AND MATERIALS PLAN III
G–1	GRADING PLAN I
G–2	GRADING PLAN II
G–3	GRADING PLAN III
LA–1	LANDSCAPE PLAN I
LA–2	LANDSCAPE PLAN II
LA–3	LANDSCAPE PLAN III
LA–4	PLANTING SCHEDULE
P–1	STREAM PROFILE
S–1	CROSS SECTIONS I
S–2	CROSS SECTIONS II
D–1	DETAILS I
D–2	DETAILS II
D–3	DETAILS III

OCTOBER 2021

SSV ENGINEERING INC.
609 WINTER STREET
FRAMINGHAM MA

JCLA
JOSEPH COAN LANDSCAPE ARCHITECTURE
STURBRIDGE MA (413)-668-4553

GENERAL NOTES:
1. EXISTING CONDITIONS SURVEY WAS COMPLETED BY A.S. ELLIOTT & ASSOCIATES, P.O. BOX 85, HOPEDALE MA.

2. THE LOCATION AND DEPTH OF EXISTING UTILITIES ARE APPROXIMATE AND HAVE BEEN PLOTTED FROM THE LATEST AVAILABLE INFORMATION. THEUTILITY LOCATIONS ARE APPROXIMATE AND MAY NOT BE ALL INCLUSIVE. THE CONTRACTOR SHALL CHECK AND VERIFY THE LOCATIONS OF ALL EXISTING UTILITIES, BOTH OVERHEAD AND UNDERGROUND, AND "DIG-SAFE" MUST BE NOTIFIED PRIOR TO COMMENCING ANY CONSTRUCTION OPERATIONS. RESTORATION AND REPAIR OF DAMAGE TO EXISTING UTILITIES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR WITH NO ADDITIONAL COST TO THE OWNER. NO EXCAVATION SHALL COMMENCE UNTIL ALL INVOLVED UTILITY COMPANIES AND/OR TOWN WHOSE FACILITIES MIGHT BE AFFECTED BY ANY WORK TO BE PERFORMED BY THE CONTRACTOR ARE NOTIFIED AT LEAST 72 HOURS IN ADVANCE.

3. WETLAND RESOURCES WERE FLAGGED BY EPSILON ASSOCIATES, INC. 3 MILL & MAIN PLACE, MAYNARD MA. 01754

SITE NOTES:

1. CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING AND LEGALLY DISPOSING (R&D) OF ALL MATERIALS INDICATED ON THE PLANS.

2. STOCKPILES OF EARTH MATERIALS SHALL NOT BE LOCATED ADJACENT TO DRAINAGE STRUCTURES INCLUDING SWALES OR WITHIN THE 100-WETLAND BUFFER.

3. ALL DISTURBED AREAS OUTSIDE OF THE STREAM CHANNEL AND WITHIN THE LIMIT OF DISTURBANCE WILL RECEIVE A MINIMUM OF 6" OF LOAM AND SEED UNLESS OTHERWISE SHOWN ON THE PLANS.

4. THE CONTRACTOR SHALL PROVIDE AND MAINTAIN SURVEY LAYOUT SERVICES FOR THE WORK AND SHALL SUBMIT "AS-BUILT" DRAWINGS OF ALL WORK, WHICH SHALL BE STAMPED AND CERTIFIED BY A MASSACHUSETTS REGISTERED PROFESSIONAL LAND SURVEYOR.

5. ANY ITEM OF WORK NOT SPECIFICALLY INDICATED ON THE PLANS BUT IS REQUIRED FOR THE COMPLETE CONSTRUCTION OF THE PROJECT WILL BE CONSIDERED INCIDENTAL TO THE CONTRACT AND INCLUDED IN THE CONTRACT BID PRICE. IT WILL BE THE CONTRACTOR'S RESPONSIBILITY TO VERIFY ALL EXISTING SITE CONDITIONS.

6. ANY EXISTING PIPE OR UTILITY DAMAGED BY THE CONTRACTOR'S OPERATIONS SHALL BE REPAIRED IMMEDIATELY BY THE CONTRACTOR AT NO COST TO THE OWNER, STATE OR TOWN.

7. THE CONTRACTOR SHALL RESTORE TO ITS ORIGINAL CONDITION OR REPLACE TREES, SHRUBS, FENCES, SIGNS, GUARDRAILS, DRIVEWAYS, SIDEWALKS AND ANY OTHER OBJECT AFFECTED BY THIS OPERATION.

8. THE TOPS OF ALL VALVE BOXES, MANHOLES, CATCHBASINS, AND OTHER RIMS SHALL BE FLUSH WITH GROUND OR PAVEMENT SURFACE LEVEL AND PLUMB, UNLESS OTHERWISE DIRECTED.

9. ALL LEDGE TO BE REMOVED BY MECHANICAL MEANS.

10. ALL CONSTRUCTION WORK SHALL BE PERFORMED IN THE DRY. THE CONTRACTOR SHALL PROVIDE, OPERATE AND MAINTAIN ALL PUMPS, DRAINS, WET POINTS, SCREENS, OR OTHER FACILITIES NECESSARY TO CONTROL, COLLECT AND DISPOSE OF ALL SURFACE AND SUBSURFACE WATER ENCOUNTERED IN THE PERFORMANCE OF THE WORK.

11. ALL DEMOLITION AND DISPOSAL ACTIVITIES SHALL BE DONE IN ACCORDANCE WITH STATE AND LOCAL REGULATIONS.

12. EXISTING UTILITIES SHOWN ON THE PLAN WERE COMPILED FROM AVAILABLE RECORD PLANS. OTHER EXISTING UTILITIES MAY BE PRESENT. ANY EXISTING UTILITY ENCOUNTERED DURING CONSTRUCTION ACTIVITIES SHALL BE BROUGHT TO THE ATTENTION OF THE OWNER'S REPRESENTATIVE AND SITE ENGINEER IMMEDIATELY.

LAYOUT NOTE:
1. THE LAYOUT SHOWN REPRESENTS A GRAPHICAL DESIGN, AND PRIOR TO THE CONSTRUCTION, THE CONTRACTOR SHALL ENGAGE A PROFESSIONAL LAND SURVEYOR (PLS) REGISTERED IN THE STATE OF MASSACHUSETTS TO SET AND VERIFY ALL LINES AND GRADES. ANY ITEM FOUND WHICH DOES NOT MATCH THE PLANS MUST BE BROUGHT TO THE ENGINEERS ATTENTION PRIOR TO CONSTRUCTION FOR REVIEW. ANY WORK PREFORMED BY CONTRACTOR THAT IS NOT NOTED TO ENGINEER IS AT CONTRACTORS OWN RISK.

DRAINAGE SYSTEM MAINTENANCE SCHEDULE:

1. ALL MAINTENANCE (INCLUDING CLEANING) REQUIRED DURING THE CONSTRUCTION PHASE OF THE PROJECT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AND SHALL INCLUDE:

a. MEASURES NEEDED TO ENSURE THE PROPER OPERATION OF THE STORMWATER RUNOFF (DRAINAGE) AND WATER QUALITY CONTROL SYSTEMS TO INCLUDE INSPECTION, CLEANING AND REPAIRS TO ALL PIPES, INTAKE AND DISCHARGE STRUCTURES (INCLUDING RIP-RAP SPLASH PADS), DETENTION PONDS, SWALES, CATCH BASIN SUMPS, AND MANHOLES.
b. INSPECTION OF ALL SLOPES, BERMS, AND OTHER CONTROL STRUCTURES FOR STRUCTURAL ITEGRITY/STABILITY AND EVIDENCE OF SOIL EROSION PROCESSES. MAINTAIN THESE STRUCTURES AS NECESSARY OR AS DIRECTED BY THE ENGINEER. INSPECTIONS SHALL BE PERFORMED FOLLOWING ALL RAIN EVENTS OF ½ INCH RAINFALL OR MORE IN A 24-HOUR PERIOD, OR BIMONTHLY IF NO RAINFALL EVENT OCCURS.
c. FOLLOWING THE CONSTRUCTION OF ANY SWALES, A PERMANENT COVER OF GRASS OR PLANTING SHALL BE INSTALLED AS SHOWN ON THE PLANS. ALL OTHER DISTURBED AREAS SHALL BE SEEDED AND STABILIZED IMMEDIATELY UPON COMPLETION OF THE THEIR CONSTRUCTION TO PREVENT EROSION.
d. UPON COMPLETION OF PROJECT CONSTRUCTION, AND PRIOR TO VACATING THE SITE, THE CONTRACTOR SHALL CONDUCT A FINAL INSPECTION, REPAIR ANY VEGETATIVE SOIL EROSION AND SEDIMENTATION CONTROL MEASURES (SEEDING, PLANTING, ETC.) WHERE REQUIRED, AND REPAIR (OR REMOVE WHERE APPROPRIATE) ANY TEMPORARY SOIL EROSION AND SEDIMENTATION CONTROL DEVICES. AFTER PERMANENT SOIL STABILIZATION ON THE ENTIRE SITE HAS OCCURRED, ALL TEMPORARY CONTROL MEASURES MUST BE REMOVED.

2. WHEN ALL CONSTRUCTION IS COMPLETED, THE SITE HAS BEEN STABILIZED TO PREVENT EROSION AND SEDIMENTATION BY A WELL ESTABLISHED VEGETATIVE COVER, AND THE DRAINAGE IMPROVEMENTS HAVE BEEN INSPECTED AND ACCEPTED BY THE TOWN, THE PARTY RESPONSIBLE FOR LONG TERM MAINTENANCE, INSPECTION AND REPAIRS TO ALL DRAINAGE FACILITIES SHOWN ON THESE PLANS, SHALL BE THE OWNER. THE OWNER'S RESPONSIBILITY SHALL INCLUDE THE FOLLOWING:

a. REPLANTING, REGRADING, OR OTHER REPAIRS NEEDED AS A RESULT OF SOIL EROSION AND SEDIMENTATION PROCESSES. THESE SHALL BE DONE PROMPTLY TO ENSURE PROPER FUNCTIONING OF THE ENTIRE SYSTEM.
b. ANY TRASH, DEBRIS, ETC. SHOULD BE REMOVED FROM THE PONDS, STREAM CHANNEL, INLETS, AND PIPE OUTLETS.

SOIL EROSION AND SEDIMENTATION CONTROL NOTES

1. THE LIMIT OF WORK LINE ILLUSTRATED ON THESE PLANS SHALL SERVE AS THE STRICT LIMIT OF DISTURBANCE FOR THE PROJECT WITHIN OR ADJACENT TO REGULATED WETLAND AREAS.

2. THE LIMITS OF CLEARING, GRADING, AND DISTURBANCE SHALL BE KEPT TO A MINIMUM WITHIN THE PROPOSED AREA OF CONSTRUCTION. ALL AREAS OUTSIDE OF THESE LIMITS, AS DEPICTED ON THE PLAN SHALL BE TOTALLY UNDISTURBED, TO REMAIN IN NATURAL CONDITION.

3. ALL DISTURBED SLOPES EITHER NEWLY CREATED OR CURRENTLY EXPOSED SHALL BE SEEDED, PROTECTED AND MAINTAINED BY THE CONTRACTOR. THE CONTRACTOR SHALL REGULARLY CHECK ALL SEEDED AREAS TO ENSURE THAT A GOOD STAND OF VEGETATION IS MAINTAINED.

4. ALL SEDIMENT FENCE, TEMPORARY TREATMENT AND TEMPORARY EROSION PROTECTION SHALL BE MAINTAINED BY THE CONTRACTOR THROUGHOUT CONSTRUCTION AND SHALL REMAIN IN PLACE UNTIL AN ACCEPTABLE STAND OF GRASS OR APPROVED GROUND COVER IS ESTABLISHED.

5. STOCKPILES OF TOPSOIL SHALL NOT BE LOCATED WITHIN THE 100-FT WETLAND BUFFER SHOWN ON THE PLANS. THEY SHALL HAVE SIDE SLOPES OF NO GREATER THAN 2:1 AND SHALL BE TEMPORARILY SEEDED AND/OR STABILIZED.

6. THE SEDIMENT FENCE SHALL BE CHECKED BY THE CONTRACTOR ON A WEEKLY BASIS AND AFTER EACH STORM FOR UNDERMINING OR DETERIORATION. THE CONTRACTOR SHALL REPAIR OR REPLACE ANY SEDIMENT FENCE AS NEEDED. THE CONTRACTOR SHALL CLEAN THE ACCUMULATED SEDIMENT IF HALF OF THE ORIGINAL HEIGHT OF THE FENCE BECOMES FILLED WITH SEDIMENTS.

7. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO MAINTAIN ALL SOIL EROSION AND SEDIMENT CONTROLS ON THE PROJECT SITE FOR THE ENTIRE DURATION OF THE CONSTRUCTION PERIOD. THE CONTRACTOR SHALL FOLLOW THE DIRECTION OF THE RESIDENT ENGINEER WITH REGARD TO INSTALLATION, MAINTENANCE, AND REPAIR OF ALL SOIL EROSION AND SEDIMENTATION CONTROLS ON THE PROJECT SITE. TEMPORARY SOIL EROSION AND SEDIMENTATION CONTROLS SHALL BE MAINTAINED UNTIL ALL EXPOSED SOILS ARE SATISFACTORILY STABILIZED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIRING AND/OR RESEEDING ALL AREAS THAT DO NOT DEVELOP WITHIN ONE YEAR FROM THE COMPLETION OF CONSTRUCTION.

8. ALL REFERENCED SOIL EROSION AND SEDIMENTATION CONTROLS INCLUDING MATERIALS USED, APPLICATION RATES AND THE INSTALLATION PROCEDURES SHALL BE PERFORMED PER THE "MASSACHUSETTS EROSION AND SEDIMENTATION HANDBOOK" LATEST EDITION.

GRADING GENERAL NOTES:

1. BENCHMARKS: SEE SHEET EX-1, EXISTING CONDITIONS FOR SITE BENCHMARKS

2. CONTRACTOR SHALL NOTIFY ENGINEER OF OBSTRUCTIONS ENCOUNTERED DURING EXCAVATION PRIOR TO CONTINUING WITH CONSTRUCTION ACTIVITIES.

3. CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLATION AND MAINTENANCE OF GRADE STAKES THROUGHOUT THE DURATION OF THE SITE GRADING.

4. IF EXISTING TREES, UTILITIES, OR STRUCTURES IMPEDE EXCAVATION ACTIVITIES IN ANY MANNER, CONTRACTOR SHALL INFORM THE ENGINEER PRIOR TO CONTINUING WITH CONSTRUCTION ACTIVITIES.

5. ALL GRADES SHALL BE UNIFORM. MATCH EXISTING GRADES FLUSH AT THE LIMITS OF WORK. DEPRESSIONS AND AREAS OF POOLING WITHIN DISTURBED AREAS SHALL BE FILLED AND MADE TO DRAIN. ELEVATIONS SHOWN ARE FINISHED GRADES.

6. EROSION CONTROL BLANKET SHALL BE USED ON ALL SLOPES OF 3:1 OR GREATER

7. STREAM THALWEG SHALL BE A CHANNEL 1-FT. WIDE AND SET 6-INCHES BELOW ADJACENT GRADES.

8. J-HOOK AND CROSS VANES SHALL BE CONSTRUCTED FROM THE CENTER OF THE STREAM OUT TOWARD THE BANKS. THE CENTER STONES SHALL BE SET 4" ABOVE THE STREAM BED.

LANDSCAPE NOTES

1. CONTRACTOR TO STAKE LOCATIONS OF ALL TREES, SHRUBS, AND SEED MIX AREAS FOR APPROVAL BY LANDSCAPE ARCHITECT PRIOR TO PLANTING ACTIVITIES.

2. ALL TREES SHALL BE UNIFORM AND WELL BRANCHED SPECIMENS. CONTRACTOR TO NOTIFY LANDSCAPE ARCHITECT A MINIMUM OF TEN DAYS PRIOR TO THE DELIVERY OF PLANT MATERIALS. LANDSCAPE ARCHITECT MAY REJECT ANY PLANT MATERIAL THAT IS DAMAGED OR DEEMED UNSATISFACTORY.

3. ALL PLANTS SHALL CONFORM TO THE GUIDELINES ESTABLISHED BY THE AMERICAN STANDARDS FOR NURSERY STOCK, LATEST EDITION.

4. ALL PLANTING BEDS AND SAUCERS SHALL HAVE 3-IN DEPTH OF SHREDDED BARK MULCH AS SPECIFIED.

5. CONTRACTOR IS RESPONSIBLE FOR WATERING AND MAINTAINING PLANT HEALTH UNTIL FINAL ACCEPTANCE BY THE OWNER. PLANT MATERIAL THAT IS DEEMED DEAD OR DYING BY THE LANDSCAPE ARCHITECT PRIOR TO FINAL ACCEPTANCE SHALL BE REPLACED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER.

6. CONTRACTOR MAY REUSE EXISTING EXCAVATED MATERIAL AS TOPSOIL PROVIDED IT MEETS THE SPECIFICATION FOR TOPSOIL. CONTRACTOR SHALL PROVIDE EVIDENCE THAT THE SOILS MEET SPECIFICATION.

7. ANY ROCK OR BOULDER DISCOVERED DURING EXCAVATION MAY BE USED IN THE STREAM CHANNEL WHERE ROCK IS CALLED FOR ON THE PLANS PROVIDED IT IS NOT BROKEN, CRACKED, OR HAVE MAJOR SCRATCHES FROM EXCAVATION ACTIVITIES. ROCKS AND BOULDERS TO BE USED MUST FIRST BE INSPECTED AND APPROVED BY THE LANDSCAPE ARCHITECT.

PROGRESS PRINT-NOT FOR CONSTRUCTION

NUMBER	DATE	MADE BY	CHECKED BY	DESCRIPTION
				REVISIONS

SSV ENGINEERING INC.

JCLA
JOSEPH CLARK LANDSCAPE ARCHITECTURE
STURBRIDGE MA (413) 668-5553

Proj. Mgr: SB
Designed : JC
Drawn : JC
Checked :
Scale : AS NOTED
Date : NOV 2019

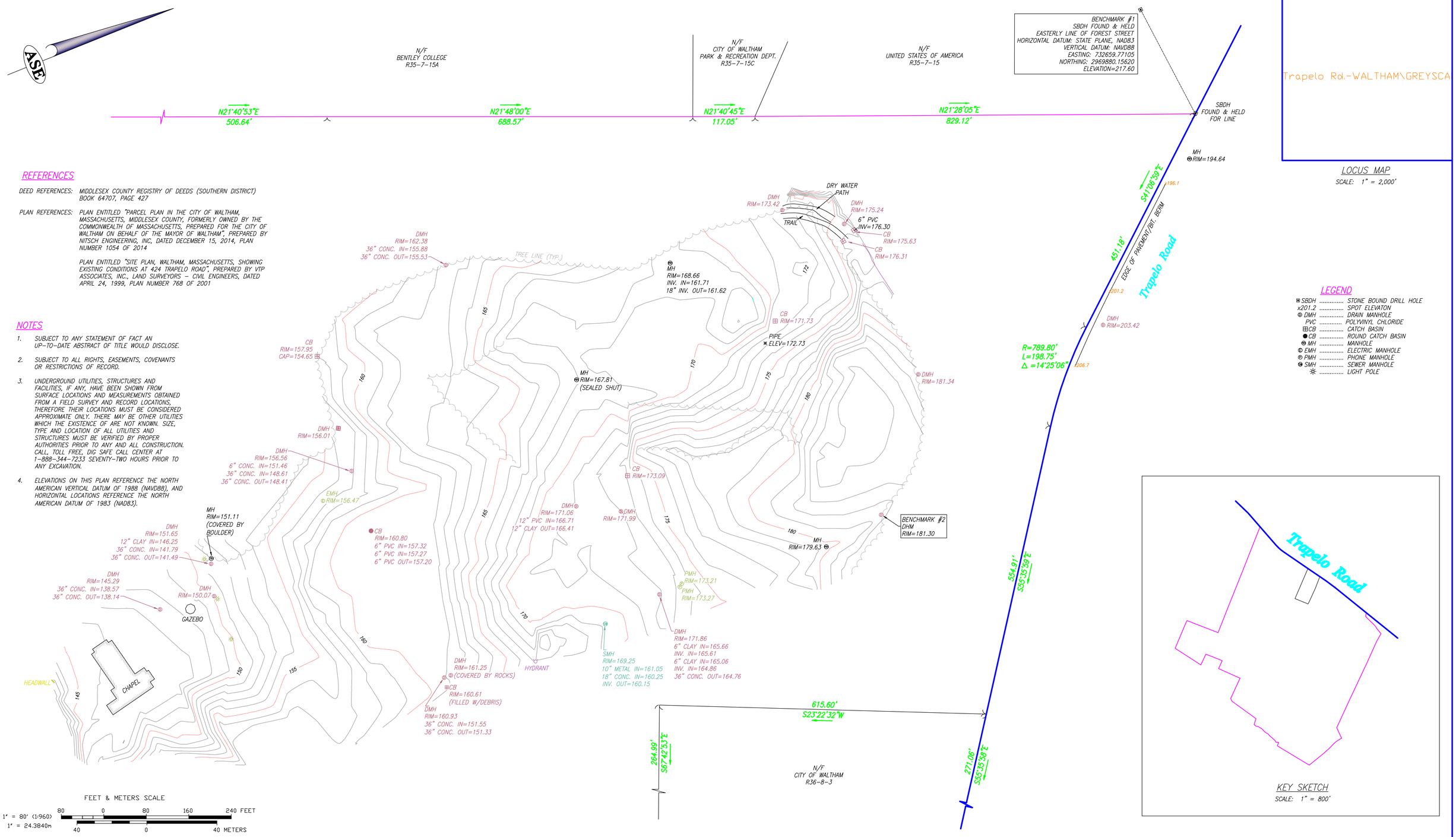
GENERAL NOTES

FERNALD SCHOOL
WALTHAM MA

Proj. No.

Dwg. No.

GN-1



REFERENCES

DEED REFERENCES: MIDDLESEX COUNTY REGISTRY OF DEEDS (SOUTHERN DISTRICT) BOOK 64707, PAGE 427

PLAN REFERENCES: PLAN ENTITLED "PARCEL PLAN IN THE CITY OF WALTHAM, MASSACHUSETTS, MIDDLESEX COUNTY, FORMERLY OWNED BY THE COMMONWEALTH OF MASSACHUSETTS, PREPARED FOR THE CITY OF WALTHAM ON BEHALF OF THE MAYOR OF WALTHAM", PREPARED BY NITSCH ENGINEERING, INC, DATED DECEMBER 15, 2014, PLAN NUMBER 1054 OF 2014

PLAN ENTITLED "SITE PLAN, WALTHAM, MASSACHUSETTS, SHOWING EXISTING CONDITIONS AT 424 TRAPELO ROAD", PREPARED BY VTP ASSOCIATES, INC., LAND SURVEYORS – CIVIL ENGINEERS, DATED APRIL 24, 1999, PLAN NUMBER 768 OF 2001

NOTES

1. SUBJECT TO ANY STATEMENT OF FACT AN UP-TO-DATE ABSTRACT OF TITLE WOULD DISCLOSE.
2. SUBJECT TO ALL RIGHTS, EASEMENTS, COVENANTS OR RESTRICTIONS OF RECORD.
3. UNDERGROUND UTILITIES, STRUCTURES AND FACILITIES, IF ANY, HAVE BEEN SHOWN FROM SURFACE LOCATIONS AND MEASUREMENTS OBTAINED FROM A FIELD SURVEY AND RECORD LOCATIONS, THEREFORE THEIR LOCATIONS MUST BE CONSIDERED APPROXIMATE ONLY. THERE MAY BE OTHER UTILITIES WHICH THE EXISTENCE OF ARE NOT KNOWN. SIZE, TYPE AND LOCATION OF ALL UTILITIES AND STRUCTURES MUST BE VERIFIED BY PROPER AUTHORITIES PRIOR TO ANY AND ALL CONSTRUCTION. CALL, TOLL FREE, DIG SAFE CALL CENTER AT 1-888-344-7233 SEVENTY-TWO HOURS PRIOR TO ANY EXCAVATION.
4. ELEVATIONS ON THIS PLAN REFERENCE THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), AND HORIZONTAL LOCATIONS REFERENCE THE NORTH AMERICAN DATUM OF 1983 (NAD83).

FEET & METERS SCALE

1" = 80' (1:960)
1" = 24.3840m

80 0 80 160 240 FEET
40 0 40 METERS

Trapelo Rd.-WALTHAM\GREYSCA

LOCUS MAP

SCALE: 1" = 2,000'

LEGEND

- ⊞SBDH ..... STONE BOUND DRILL HOLE
- x201.2 ..... SPOT ELEVATON
- ◎DMH ..... DRAIN MANHOLE
- PVC ..... POLYVINYL CHLORIDE
- ⊞CB ..... CATCH BASIN
- ●CB ..... ROUND CATCH BASIN
- ⊜MH ..... MANHOLE
- ©EMH ..... ELECTRIC MANHOLE
- ℗PMH ..... PHONE MANHOLE
- ⊛SMH ..... SEWER MANHOLE
- ☼ ..... LIGHT POLE

KEY SKETCH

SCALE: 1" = 800'

ZONING DESIGNATION:

CITY OF WALTHAM ZONING DISTRICT
BUSINESS A (BA)

ASSESSOR'S REFERENCE:

MAP R36, BLOCK 8, LOT 1

I CERTIFY THAT THIS PLAN IS BASED ON AN ACTUAL FIELD SURVEY PERFORMED ON THE GROUND ON JULY 2, 2019, AND THE LATEST PLANS AND DEEDS OF RECORD.

I CERTIFY THAT THE SUBJECT DWELLING SHOWN LIES IN ZONE "X", SHOWN ON MAP NUMBER 25017C0414E, HAVING AN EFFECTIVE DATE OF JUNE 4, 2010.

REVISIONS

DATE	DESCRIPTION
07/29/19	UTILITY INFO
08/09/19	ADD'L TOPO

FIELD: MRI/BMD
CALCS: EJP/SMI
DRAWN BY: SMI
FIELD EDIT: N/A
CHECKED: EJP
APPROVED:
JOB #: 191730

PROFESSIONAL LAND SURVEYOR DATE

A.S. Elliott & Associates
Professional Land Surveyors
P.O. BOX 85 ~ HOPEDALE, MA 01747
(508) 634-0256
www.aselliott.com

Topographic Plan Of Land

TRAPELO ROAD
WALTHAM, MASSACHUSETTS
PREPARED FOR: THE CITY OF WALTHAM
SCALE: 1"= 80' DATE: JULY 2, 2019

LEGEND

- LIMIT OF WORK (LOCATION OF EROSION AND SEDIMENT CONTROL) — 1 / D-1
- 100' WETLAND BUFFER
- BORDERING VEGETATED WETLAND
- PERENNIAL STREAM BANK
- 1' CONTOUR
- 5' CONTOUR
- PARCEL BOUNDARY
- ROAD
- 32 EL 100.00 — BORING LOCATION
- WETLAND FLAG
- INVASIVE SPECIES COMMUNITY TO BE REMOVED
- EXISTING TREE TO BE PROTECTED — 2 / D-1
- EXISTING UTILITY TO BE REMOVED. SEE SPECIFICATIONS.

PLUG AND ABANDON EXISTING CATCHBASINS, MANHOLES, AND PIPES LOCATED ALONG FORMER COTTAGE STREET

REMOVE EXISTING CATCHBASIN AND PIPE TO ELEVATION 158.00. PLUG AND ABANDON HORIZONTAL DRAIN LINES

EXISTING UTILITY TO BE DEMOLISHED AND REMOVED WITHIN THE LIMITS OF WORK (TYP.) SEE SPECIFICATIONS.

EXCESS FILL GENERATED FROM THE PROJECT TO BE PLACED AND GRADED INTO THE HILLSIDE AS DIRECTED BY THE ENGINEER.

BENCHMARK #2
OHM
EL=181.30

N21°40'45"E 117.05'

S67°42'53"E 264.99'

S25°22'32"W 615.60'

S55°35'39"E 554.91'

1" = 60'
30 0 60

PROGRESS PRINT–NOT FOR CONSTRUCTION

REVISIONS

WALTHAM 1738 1884 INCORPORATED A CITY

SSV ENGINEERING INC.

JCLA
JOSEPH CORR LANDSCAPE ARCHITECTURE
STURBRIDGE MA | (413) 668-5553

Proj. Mgr: SB
Designed : JC
Drawn : JC
Checked :
Scale : AS NOTED
Date : NOV 2019

EXISTING CONDITIONS AND DEMOLITION PLAN

FERNALD SCHOOL
WALTHAM MA

Proj. No.

Dwg. No.

EX-1

LEGEND

- 10" COIR FASCINE — 6 / D-2
- LIVE FASCINE WITH BRUSH LAYER — 3 / D-1, 4 / D-1
- J HOOK STREAM VANE — 4 / D-2

LIMIT OF WORK

EDGE OF BANK

STONE SPILLWAY 2 / D-3

STONE SPILLWAY 2 / D-3

PEDESTRIAN BRIDGE

J HOOK STREAM VANE (TYP.) 4 / D-2

TYPICAL STREAM CROSS SECTION 6 / D-2

3 / D-2 STONE WEIR

EL 169.10

PLACED BOULDERS (TYP.)

STREAM CENTERLINE

STREAM THALWEG

BP: 0+00.00
N: 2969380.64
E: 734411.24

0+00

PI: 0+21.28

PI: 0+67.92

1+00

PI: 0+83.89

PI: 1+16.47

2+00

PI: 2+08.20

PI: 1+79.00

6+00

PI: 5+74.59

5+00

PI: 4+80.74

4+00

PI: 4+43.40

3+00

PI: 3+88.77

PI: 3+24.04

PI: 2+82.33

EDGE OF BANK

PLACED BOULDERS (TYP.)

ELECTRIC

ELECTRIC

170

175

180

172

MATCHLINE SEE SHEET L-2

1" = 20'
10 0 20

PROGRESS PRINT–NOT FOR CONSTRUCTION

REVISIONS

WALTHAM — INCORPORATED A TOWN 1738 — INCORPORATED A CITY 1884

SSV ENGINEERING INC.

JCLA
JOSEPH CLARK, LANDSCAPE ARCHITECTURE
STURBRIDGE MA | 413 668 4553

Proj. Mgr.: SB
Designed : JC
Drawn : JC
Checked :
Scale : AS NOTED
Date : NOV 2019

LAYOUT AND MATERIALS PLAN I

FERNALD SCHOOL
WALTHAM MA

Proj. No.

Dwg. No.

L-1

MATCHLINE SEE SHEET L-3

MATCHLINE SEE SHEET L-1

N

TYPICAL STREAM CROSS SECTION 6 D-2

PI: 12+88.99

13+00

PI: 13+41.46

14+00

PI: 13+88.53

PI: 14+17.25

14+49.71

PLACED BOULDERS (TYP.)

PI: 12+05.65

12+00

PI: 11+30.51

11+00

STREAM CENTERLINE

STREAM THALWEG

PI: 10+00.25

10+00

PI: 9+39.02

TYPICAL STREAM CROSS SECTION 6 D-2

STREAM CROSS VANE (TYP.) 5 D-2

J HOOK STREAM VANE (TYP.) 4 D-2

PI: 8+66.29

9+00

PI: 9+11.30

PI: 8+11.62

8+00

PI: 7+87.23

PI: 7+34.82

7+00

EDGE OF BANK

LIMIT OF WORK

EMH R/M=156.47

MANHOLE PLUGGED (MARKUP)

ELECTRIC

HOLE GGED KUP)

LEGEND

- 10" COIR FASCINE — 6 D-2
- LIVE FASCINE WITH BRUSH LAYER — 3 D-1 / 4 D-1
- J HOOK STREAM VANE — 4 D-2
- STREAM CROSS VANE — 5 D-2

1" = 20'

10 0 20

PROGRESS PRINT–NOT FOR CONSTRUCTION

REVISIONS

MALTHAM INCORPORATED A TOWN 1738 INCORPORATED A CITY 1884

SSV ENGINEERING INC.

JCLA JOSEPH CLARK LANDSCAPE ARCHITECTURE STURBRIDGE MA (413) 668-5553

Proj. Mgr.: SB
Designed : JC
Drawn : JC
Checked :
Scale : AS NOTED
Date : NOV 2019

LAYOUT AND MATERIALS PLAN II

FERNALD SCHOOL
WALTHAM MA

Proj. No.

Dwg. No.

L-2

LEGEND

- 10" COIR FASCINE — 6 / D-2
- LIVE FASCINE WITH BRUSH LAYER — 3 / D-1, 4 / D-1
- J HOOK STREAM VANE — 4 / D-2
- STREAM CROSS VANE — 5 / D-2

N

MATCHLINE SEE SHEET L-2

PROTECT EXISTING GAZEBO TO REMAIN

EXISTING RCP DRAIN. CLEAN AND TELEVISE

STREAM CENTERLINE

STREAM THALWEG

LIMIT OF WORK

EDGE OF BANK

PLACED BOULDERS (TYP.)

18" RCP CONNECT TO EXISTING DMH

CONCRETE HEADWALL — 1 / D-3

PEDESTRIAN BRIDGE

STONE SPILLWAY — 2 / D-3

J HOOK STREAM VANE (TYP.) — 4 / D-2

TYPICAL STREAM CROSS SECTION — 6 / D-2

EP: 17+42.26

PI: 17+35.57

PI: 16+53.05

PI: 16+79.25

PI: 16+03.75

PI: 15+89.71

PI: 15+35.43

PI: 14+85.10

17+00

16+00

15+90

PROP. 238' 8" PVC

HEADWALL

137.88

CHAPEL

WATER

R&R W... 8"

PHA... REPLACE...

PHASE... REPLACE... PLUG... (MARKI...

1" = 20'

10 0 20

PROGRESS PRINT–NOT FOR CONSTRUCTION

REVISIONS

MALTHAM INCORPORATED A TOWN 1738 INCORPORATED A CITY 1884

SSV ENGINEERING INC.

JCLA JOSEPH CLARK LANDSCAPE ARCHITECTURE 37 THIRDBRIDGE MA (413) 458-9553

Proj. Mgr: SB
Designed : JC
Drawn : JC
Checked :
Scale : AS NOTED
Date : NOV 2019

LAYOUT AND MATERIALS PLAN III

FERNALD SCHOOL
WALTHAM MA

Proj. No.

Dwg. No.

L-3

MATCHLINE SEE SHEET G-2

MH
RIM=168.66
INV. IN=161.71
18" INV. OUT=161.62

MH
RIM=167.81
INV. OUT=161.72

STONE WEIR INVERT
ELEV. 169.20

STONE WEIR INVERT
ELEV. 167.85

EL 169.10

SEE STREAM CL PROFILE
SHEET P-1

SECTION LINE. SEE
SHEETS S-1, S-2

SPILLWAY ELEVATION
175.90

BP: 0+00.00

CB
RIM=171.72

CB
RIM=176.3

DMH
RIM=175.24

6" PVC
INV=176.30

CB
RIM=173.09

DMH
RIM=181.34

PIPE
ELEV=172

TRAIL

PATH

ELECTRIC

Pt: 0+21.38
Pt: 0+67.92
Pt: 0+83.89
Pt: 1+16.47
Pt: 1+79.00
Pt: 2+08.20
Pt: 2+82.33
Pt: 3+24.04
Pt: 3+88.77
Pt: 4+42.40
Pt: 4+90.74
Pt: 5+74.59

LEGEND

- LIMIT OF WORK
- PROPOSED SECTION (SEE SHEETS S-1, S-2)
- EDGE OF WETLAND
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR

1" = 20'
10 0 20

PROGRESS PRINT-NOT FOR CONSTRUCTION

REVISIONS

WALTHAM
INCORPORATED A TOWN 1738
INCORPORATED A CITY 1884

SSV ENGINEERING INC.

JCLA
JOSEPH CLOAH LANDSCAPE ARCHITECTURE
STURBRIDGE MA | 413.668.4555

Proj. Mgr: SB
Designed : JC
Drawn : JC
Checked :
Scale : AS NOTED
Date : NOV 2019

GRADING PLAN I

FERNALD SCHOOL
WALTHAM MA

Proj. No.

Dwg. No.

G-1

LEGEND

- LIMIT OF WORK
- PROPOSED SECTION (SEE SHEETS S-1, S-2)
- EDGE OF WETLAND
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PROPOSED MAJOR CONTOUR (175)
- PROPOSED MINOR CONTOUR (177)

MATCHLINE SEE SHEET G-3

MATCHLINE SEE SHEET G-1

SEE STREAM CL PROFILE SHEET P-1

SECTION LINE. SEE SHEETS S-1, S-2

PI: 12+88.99

PI: 13+41.46

PI: 14+17.25

PI: 14+49.71

PI: 12+55.69

PI: 11+30.51

PI: 10+00.25

PI: 10+49.02

PI: 9+11.30

PI: 8+06.29

PI: 8+41.62

PI: 7+34.82

PI: 7+87.23

ELECTRIC

MANHOLE PLUGGED (MARKUP)

1" = 20'

PROGRESS PRINT—NOT FOR CONSTRUCTION

REVISIONS

SSV ENGINEERING INC.

JCLA
JOSEPH CLARA, LANDSCAPE ARCHITECTURE
37 TEMPLE PLACE BOSTON MA | 617.338.6553

Proj. Mgr: SB
Designed : JC
Drawn : JC
Checked :
Scale : AS NOTED
Date : NOV 2019

GRADING PLAN II

FERNALD SCHOOL
WALTHAM MA

Proj. No.

Dwg. No.

G-2

LEGEND

- LIMIT OF WORK
- PROPOSED SECTION (SEE SHEETS S-1, S-2)
- EDGE OF WETLAND
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PROPOSED MAJOR CONTOUR (175)
- PROPOSED MINOR CONTOUR (177)

N

MATCHLINE SEE SHEET G-2

REPLACE EXISTING DMH. SEE SPECIFICATIONS

INVERT ELEVATION AT THE CONNECTION TO THE DMH TO BE DETERMINED IN THE FIELD

18" RCP INVERT ELEVATION 143.75

HEADWALL TOP OF WALL ELEVATION 147.75

SPILLWAY ELEVATION 146.50

SPILLWAY ELEVATION 147.90

SECTION LINE. SEE SHEETS S-1, S-2

PROP. 239' 8" PVC

HEADWALL

12" CLAY IN=146.25
36" CONC. IN=141.79
36" CONC. OUT=141.49

DMH RIM=151.65

MH RIM=151.11 (COVERED BY BOULDER)

36" CONC. IN=138.57
36" CONC. -OUT=138.14

DMH RIM=145.29

DMH RIM=150.07

EP: 17+42.26

PI: 17+35.57

PI: 16+53.05

PI: 16+79.25

PI: 16+03.75

PI: 15+89.71

PI: 15+35.43

PI: 14+85.10

CHAPEL

GAZEBO

WATER

PHASE 2 REPLACEMENT PLUG (MARKI

R&R W 8"

137.98

145

155

1" = 20'
10 0 20

PROGRESS PRINT—NOT FOR CONSTRUCTION

REVISIONS

SSV ENGINEERING INC.

JCLA
JOSEPH CLARK LANDSCAPE ARCHITECTURE
371 MEMORIAL WAY, MA | 413) 658-5553

Proj. Mgr: SB
Designed : JC
Drawn : JC
Checked :
Scale : AS NOTED
Date : NOV 2019

GRADING PLAN III

FERNALD SCHOOL
WALTHAM MA

Proj. No.

Dwg. No.

G-3

PROGRESS PRINT-NOT FOR CONSTRUCTION

LA-1	PLANTING PLAN I	Proj. Mgr.: SB Designed : JC Drawn : JC Checked : Scale : AS NOTED Date : NOV 2019	JCLA JOSEPH CORIN LANDSCAPE ARCHITECTURE STURBRIDGE MA (413) 668-4553	SSV ENGINEERING INC.

Proj. No.

Dwg No.

FERNALD SCHOOL
WALTHAM MA

INCORPORATED A TOWN 1738 WALTHAM INCORPORATED A CITY 1884

REVISIONS

PROGRESS PRINT–NOT FOR CONSTRUCTION

1" = 20'
10 0 20

LA-2

Dwg No.

Proj. No.

PLANTING PLAN II

FERNALD SCHOOL
WALTHAM MA

Proj. Mgr.: SB
Designed : JC
Drawn : JC
Checked :
Scale : AS NOTED
Date : NOV 2019

JCLA
JOSEPH CORIN LANDSCAPE ARCHITECTURE
STURBRIDGE MA (413) 668-4553

SSV ENGINEERING INC.

INCORPORATED A TOWN 1738
WALTHAM
INCORPORATED A CITY 1884

REVISIONS

PROGRESS PRINT–NOT FOR CONSTRUCTION

Dwg No. LA-3	Proj. No.	PLANTING PLAN III FERNALD SCHOOL WALTHAM MA	Proj. Mgr.: SB Designed : JC Drawn : JC Checked : Scale : AS NOTED Date : NOV 2019	JCLA JOSEPH COAN LANDSCAPE ARCHITECTURE STURBRIDGE MA (413) 668-4553 SSV ENGINEERING INC. INCORPORATED A TOWN 1738 WALTHAM INCORPORATED A CITY 1884

REVISIONS

LANDSCAPE NOTES

1. UNLESS OTHERWISE NOTED, ALL EXISTING TREES AND OTHER PLANT MATERIAL TO BE PROTECTED FOR THE DURATION OF THE PROJECT.
2. PRIOR TO THE PRE-CONSTRUCTION MEETING, CONTRACTOR SHALL CALL "DIG-SAFE" TO HAVE EXISTING UTILITIES MARKED. CONTRACTOR SHALL MAINTAIN MARKINGS FOR THE DURATION OF THE PROJECT.
3. REFER TO ENGINEERING PLANS FOR ALL GRADING, DRAINAGE, AND ADDITIONAL MATERIALS AND LAYOUT INFORMATION.
4. THE CONTRACTOR SHALL SUPPLY ALL PLANT MATERIAL IN QUANTITIES SUFFICIENT TO COMPLETE THE PLANTING PLAN AS SHOWN ON THE PLANS.
5. ALL PLANT MATERIAL TO CONFORM TO THE GUIDELINES ESTABLISHED BY "THE AMERICAN STANDARD FOR NURSERY STOCK" PUBLISHED BY THE AMERICAN ASSOCIATION OF NURSERYMEN, INC. ANSI Z60.1 -LATEST EDITION.
6. ALL PLANT MATERIAL TO BE APPROVED BY THE LANDSCAPE ARCHITECT. SUBSTITUTIONS ARE NOT ALLOWED WITHOUT WRITTEN APPROVAL FROM LANDSCAPE ARCHITECT.
7. SEED MIXES SHALL BE "NEW ENGLAND WETMIX" , "NEW ENGLAND EROSION CONTROL/RESTORATION MIX", AND "NEW ENGLAND SHOWY WILDFLOWER MIX" AS SOLD BY NEW ENGLAND WETLAND PLANTS, INC. 802 WEST STREET, AMHERST MA 01002. OR APPROVED EQUAL. SEED MIXES SHALL BE SOWN AT THE RATE INDICATED BY THE MANUFACTURER.
8. STAKE LOCATIONS OF PLANT MATERIAL FOR APPROVAL BY LANDSCAPE ARCHITECT PRIOR TO COMMENCEMENT OF WORK. LANDSCAPE ARCHITECT MAY ADJUST PLANT LOCATIONS IN THE FIELD PRIOR TO PLANTING.
9. ALL MULCH BEDS SHALL CONSIST OF A 6" LAYER SCREENED LOAM, AND A 3" LAYER SHREDDED PINE BARK MULCH.
10. EDGE OF MULCH BEDS TO BE MECHANICALLY EDGED.
11. ALL DISTURBED AREAS NOT SHOWN AS A SPECIFIED MATERIAL SHALL RECEIVE A MINIMUM 4" LAYER OF LOAM AND NEW ENGLAND RESTORATION SEED MIX.
12. LANDSCAPE CONTRACTOR TO GUARANTEE ALL PLANT MATERIAL FOR ONE FULL YEAR FROM DATE OF ACCEPTANCE.
13. CONTRACTOR SHALL REPAIR OR REPLACE ANY MATERIALS DAMAGED DURING CONSTRUCTION PRIOR TO FINAL ACCEPTANCE.
14. CONTRACTOR TO SUBMIT A WATERING SCHEDULE FOR THE SIXTY DAY MAINTENANCE PERIOD FOR REVIEW BY THE LANDSCAPE ARCHITECT AND OWNER FOR ALL PROPOSED PLANT MATERIAL.
15. SEE LANDSCAPE DETAILS FOR PLANTING INFORMATION.
16. IN THE EVENT OF A DISCREPANCY BETWEEN THE PLANT QUANTITIES SHOWN ON THE PLAN AND IN THE PLANT SCHEDULE, THE QUANTITY SHOWN ON THE PLAN SHALL TAKE PRECEDENCE. CONTRACTOR TO NOTIFY LANDSCAPE ARCHITECT IF ANY DISCREPANCY OCCURS.

TREE PLANTING 1/D-2

SHRUB PLANTING 2/D-2

SYM	QTY.	BOTANICAL NAME	COMMON NAME	SIZE	ROOT	NOTES
TREES						
TC	3	TSUGA CANADENSIS	CANADIAN HEMLOCK	7-8 FT.	BB	
PS	3	PINUS STROBUS 'FASTIGIATA'	UPRIGHT WHITE PINE	7-8 FT.	BB	
JV	3	JUNIPERUS VIRGINIANA 'EMERALD SENTINEL'	EASTERN RED CEDAR	7-8 FT.	BB	
LT	2	LIRIODENDRON TULIPIFERA	TULIPTREE	3" CAL	BB	
AR	2	ACER RUBRUM 'RED SUNSET'	RED SUNSET RED MAPLE	3" CAL	BB	
NS	2	NYSSA SYLVATICA	BLACK GUM	3" CAL	BB	50% MALE
FS	3	FAGUS SYLVATICA 'RED OBELISK'	EUROPEAN BEECH	3" CAL	BB	
AC	2	AMELANCHIER CANADENSIS	SERVICEBERRY	8-10 FT.	BB	MULTI-STEM
QR	1	QUERCUS RUBRA	RED OAK	3" CAL	BB	
CC	3	CERCIS CANADENSIS	EASTERN REDBUD	3" CAL	BB	
SA	1	SALIX ALBA 'TRISTIS'	GOLDEN WEEPING WILLOW	2" CAL	BB	
CP	1	CARPINUS CAROLINIANA	AMERICAN HORNBEAM	2" CAL	BB	
BN	3	BETULA NIGRA	RIVER BIRCH	1.5" CAL	BB	
CO	1	CARYA OVATA	SHAGBARK HICKORY	2" CAL	BB	
GT	3	GLEDITSIA TRICANTHOS INERMIS 'SHADEMASTER'	SHADEMASTER HONEY LOCUST	2" CAL	BB	
SHRUBS						
IV	6	ILEX VERTICILLATA	COMMON WINTERBERRY	2-2.5 FT.	BB	
JH	6	JUNIPERUS HORIZONTALIS 'MONBER'	MONBER CREEPING JUNIPER	#5 POT	BB	
BB	6	CEPHALANTHUS OCCIDENTALIS	BUTTONBUSH	2-2.5 FT.	BB	
VC	21	VACCINIUM CORYMBOSUM	HIGHBUSH BLUEBERRY	2-2.5 FT.	BB	
KL	10	KALMIA LATIFOLIA	MOUNTAIN LAUREL	2-2.5 FT.	BB	
NB	8	VIBURNUM LENTAGO	NANNYBERRY	2-2.5 FT.	BB	
VA	8	VACCINIUM ANGUSTIFOLIUM	LOWBUSH BLUEBERRY	#4 POT		
MP	6	MORELLA PENSYLVANICA	NORTHERN BAYBERRY	#4 POT		25% MALE
CA	6	CLETHRA ALNIFOLIA	SUMMERSWEET	2-2.5 FT.	BB	
SS	9	SWIDA SERICEA	REDOSIER DOGWOOD	2-2.5 FT.	BB	
PERENNIALS AND GROUND COVERS						
WSM	5240 SF	WETLAND SEED MIX				
FSM	14050 SF	WILDFLOWER SEED MIX				

PROGRESS PRINT-NOT FOR CONSTRUCTION

REVISIONS

SSV ENGINEERING INC.

JCLA
JOSEPH CUOMO LANDSCAPE ARCHITECTURE
CUMBERLAND, RI (401) 658-4555

Proj. Mgr: SB
Designed : JC
Drawn : JC
Checked :
Scale : AS NOTED
Date : NOV 2019

PLANTING SCHEDULE

FERNALD SCHOOL
WALTHAM MA

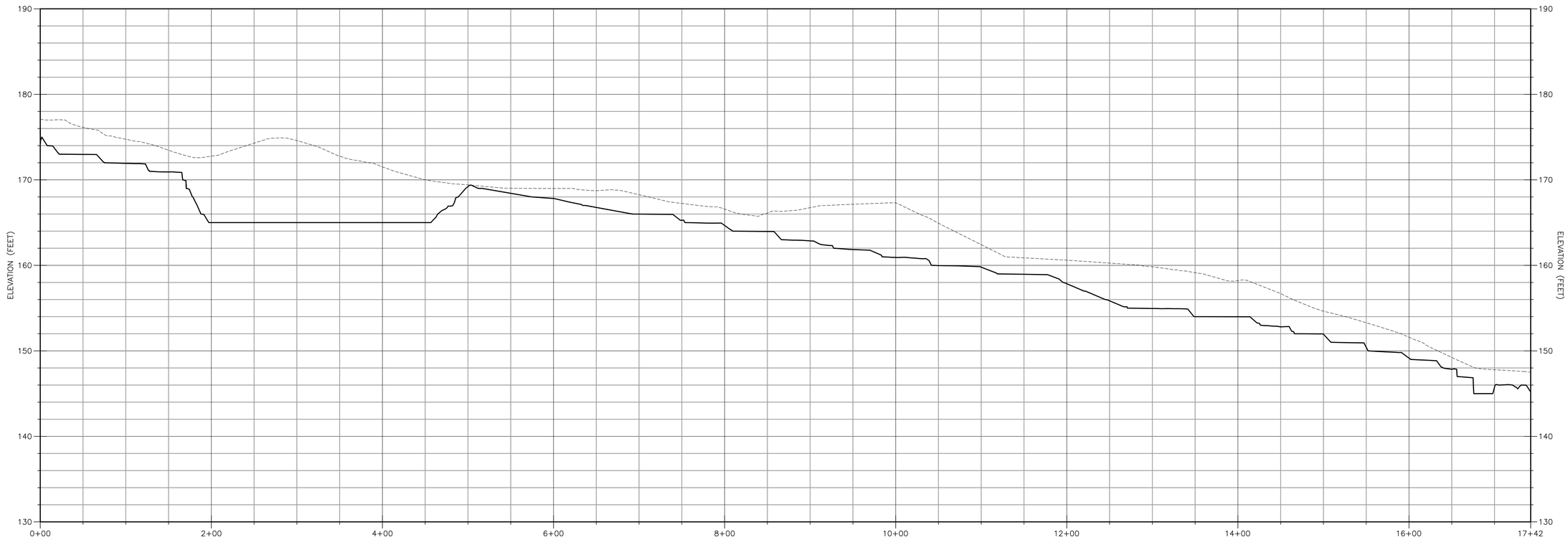
Proj. No.

Dwg. No.

LA-4

LEGEND

EXISTING GROUND SURFACE
PROPOSED STREAM CHANNEL



VERTICAL SCALE 1" = 6'
3 0 6

HORIZONTAL SCALE 1" = 60'
30 0 60

PROGRESS PRINT–NOT FOR CONSTRUCTION

REVISIONS

SSV ENGINEERING INC.

JCLA
JOSEPH C. LOMAN LANDSCAPE ARCHITECTURE
STURBRIDGE MA | 413 | 436 4353

Proj. Mgr.: SB
Designed : JC
Drawn : JC
Checked :
Scale : AS NOTED
Date : NOV 2019

STREAM PROFILE

FERNALD SCHOOL
WALTHAM MA

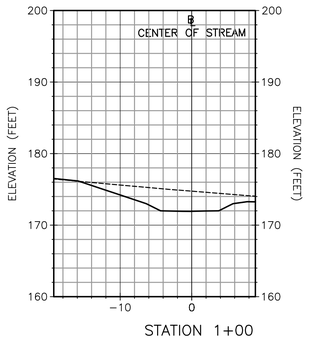
Proj. No.

Dwg. No.

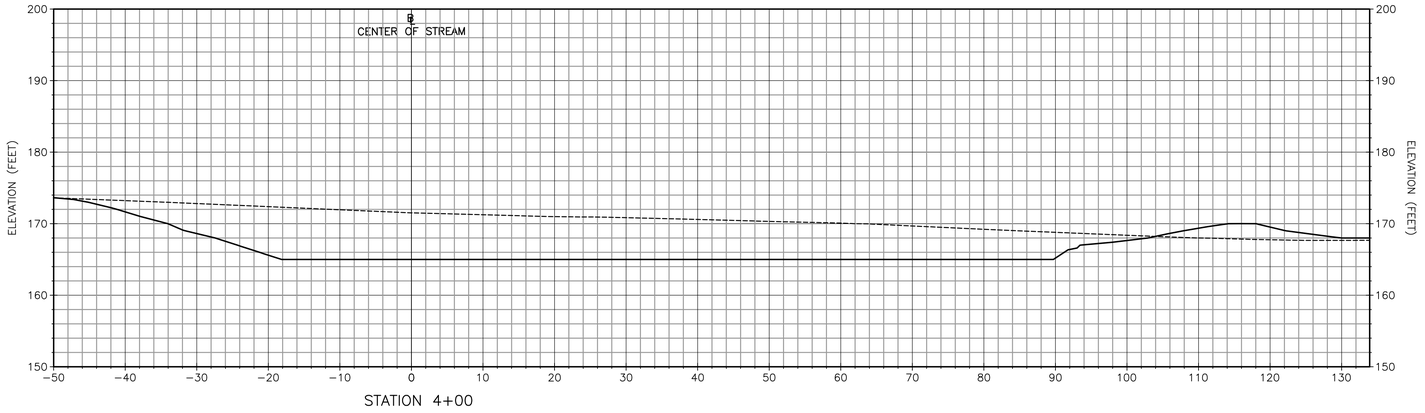
P-1

LEGEND

EXISTING GROUND SURFACE
PROPOSED STREAM CHANNEL



STATION 1+00



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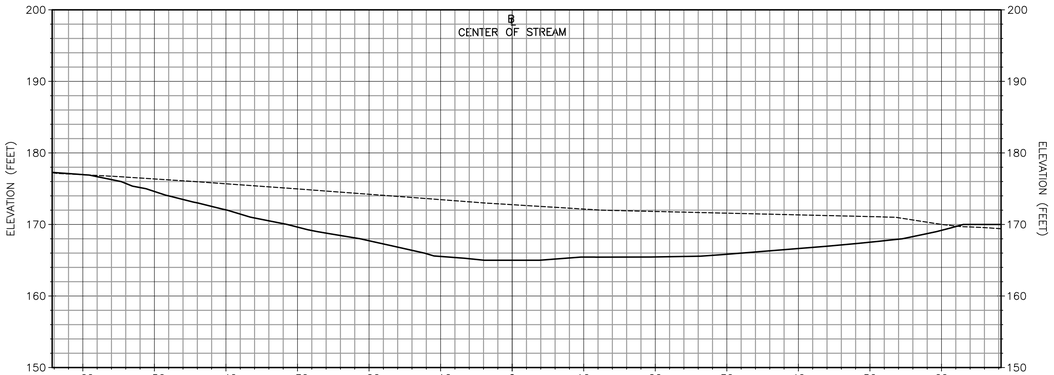

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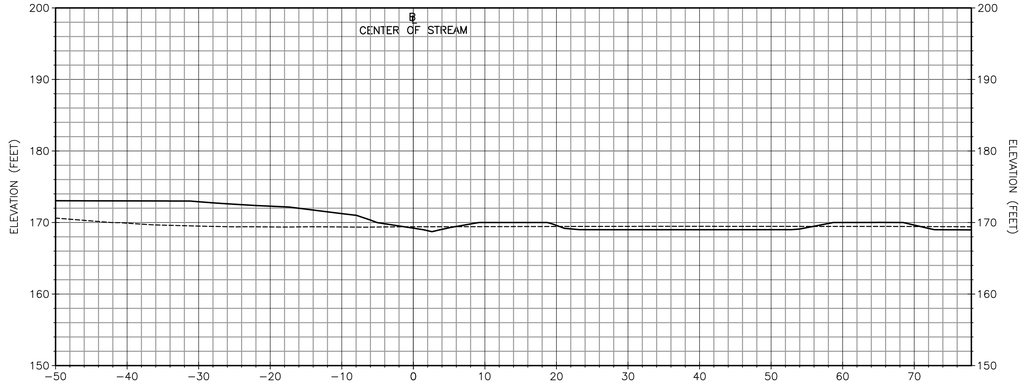

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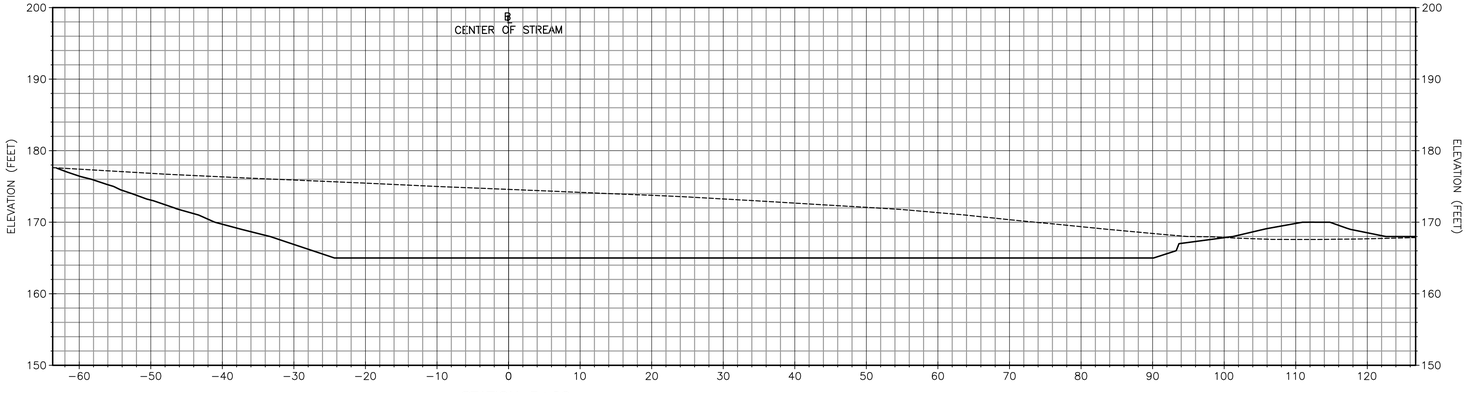

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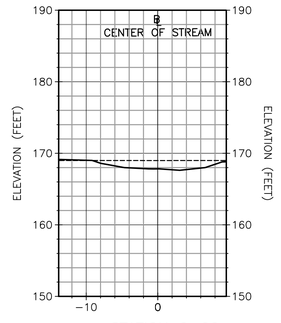

STATION 6+00

1" = 10'
5 0 10

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REVISIONS

SSV ENGINEERING INC.

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JOSEPH CLARK ASSOCIATE ARCHITECTS INC.
STUBBRIDGE MA | 413.668.6553

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Designed : JC
Drawn : JC
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Date : NOV 2019

CROSS SECTIONS I

FERNALD SCHOOL
WALTHAM MA

Proj. No.

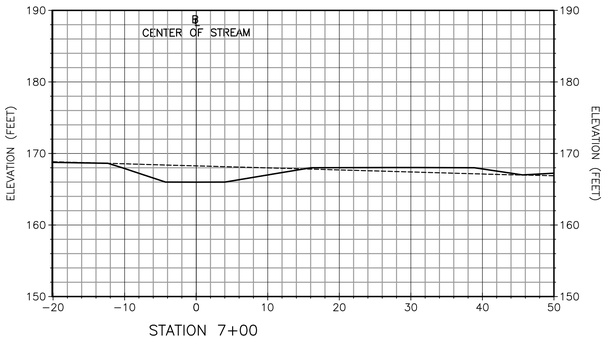
Dwg. No.

S-1

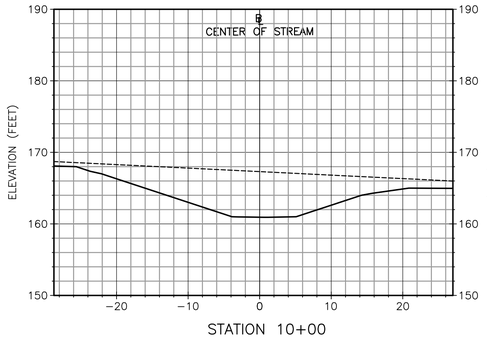
LEGEND

EXISTING GROUND SURFACE

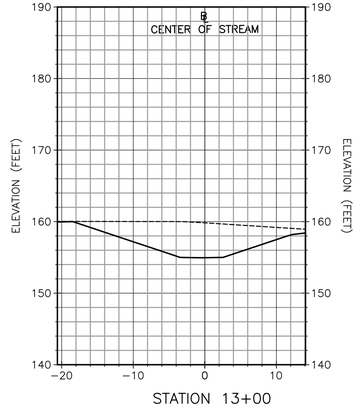
PROPOSED STREAM CHANNEL



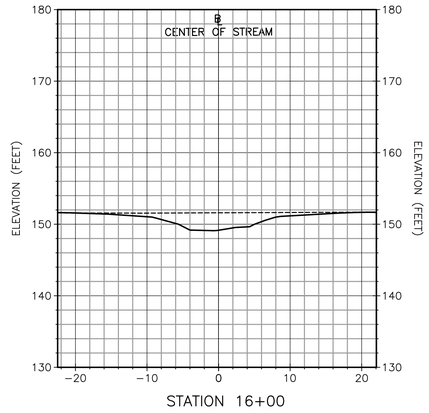
STATION 7+00



STATION 10+00



STATION 13+00



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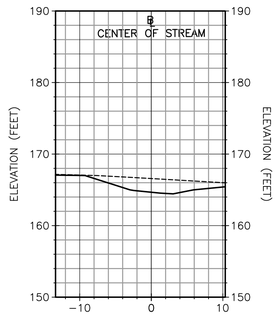

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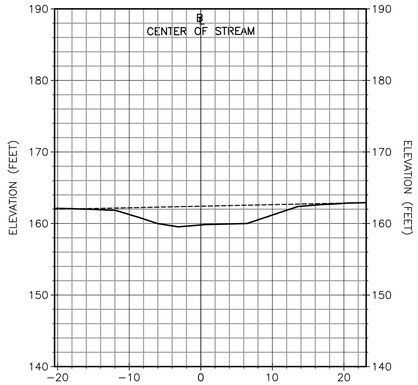

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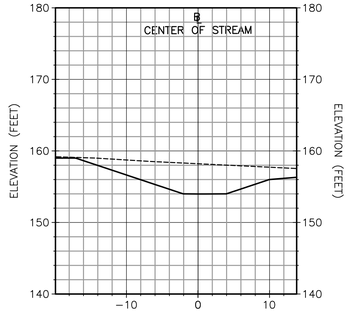

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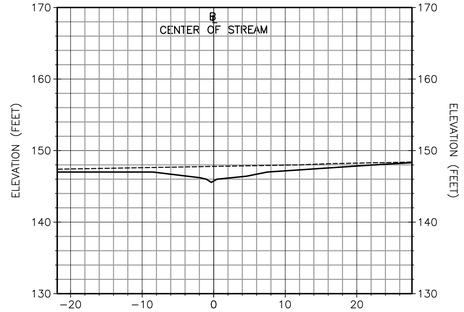

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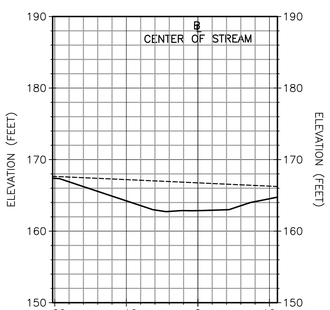

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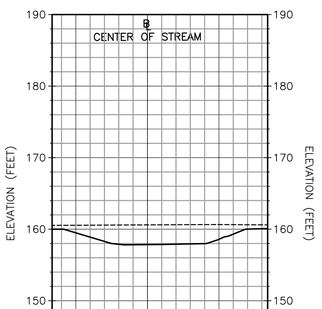

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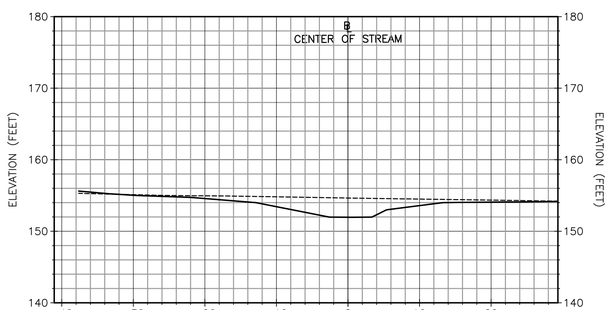

STATION 15+00

1" = 10'

5 0 10

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SSV ENGINEERING INC.

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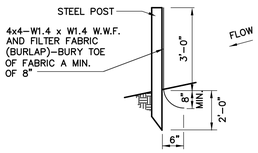
CROSS SECTIONS II

FERNALD SCHOOL
WALTHAM MA

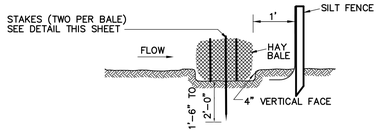
Proj. No.

Dwg. No.

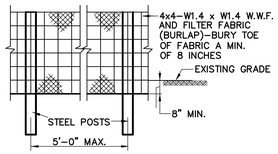
S-2



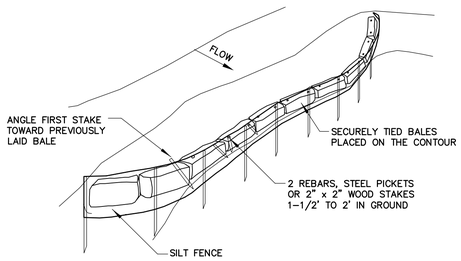
SILT FENCE
EMBEDDING DETAIL



HAYBALE
EMBEDDING DETAIL



SILT FENCE
DETAIL

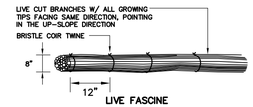


PLACEMENT AND ANCHORING DETAIL
HAYBALE SEDIMENT BARRIERS AND SILT FENCE

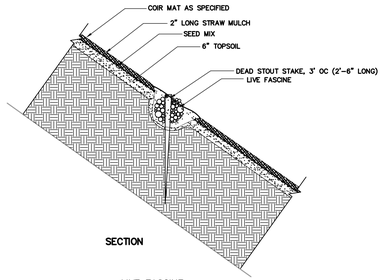
ANCHORING FOR HAYBALES AND SILT FENCE
DETAIL 1 / D–1
N.T.S.

NOTES:
1. FENCING SHALL BE INSTALLED AROUND PERIMETER OF EXISTING TREE TO BE PROTECTED AS APPROVED BY OWNER.
2. FENCING MAY BE REMOVED TEMPORARILY, ONLY AS REQUIRED TO PERFORM THE WORK SHOWN ON THE DRAWINGS.
3. FENCING SHALL REMAIN IN PLACE & BE MAINTAINED THROUGHOUT CONSTRUCTION AND THEN REMOVED COMPLETELY AS DIRECTED BY OWNER TO COMPLETE LOAMING AND SEEDING ACTIVITIES.

TREE PROTECTION
DETAIL 2 / D–1
NOT TO SCALE

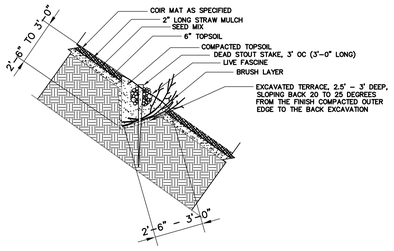


LIVE FASCINE

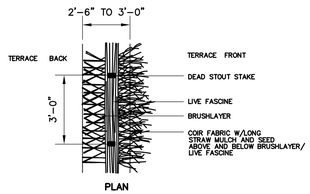


SECTION

LIVE FASCINE
DETAIL 3 / D–1
NOT TO SCALE

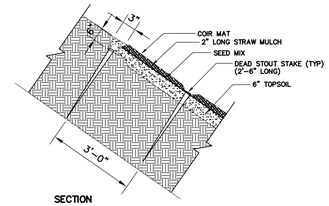


SECTION



PLAN

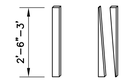
BRUSHLAYER/LIVE FASCINE
DETAIL 4 / D–1
NOT TO SCALE



SECTION

NOTE: STAKE COIR TO THE FINISH SURFACE 3'–0" OC OVER THE ENTIRE AREA.

COIR MAT WITH LONG STRAW MULCH AND SEED
DETAIL 5 / D–1
NOT TO SCALE



2x4 TIMBER — SAW 2x4 TIMBER DIAGONALLY TO PRODUCE 2 DEAD STOUT STAKES

DEAD STOUT STAKE
DETAIL 6 / D–1
NOT TO SCALE

REVISIONS

SSV ENGINEERING INC.

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STURBRIDGE MA | 413.668.4553

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Checked :
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Date : NOV 2019

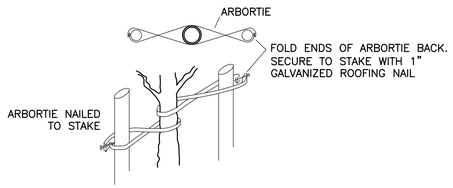
DETAILS I

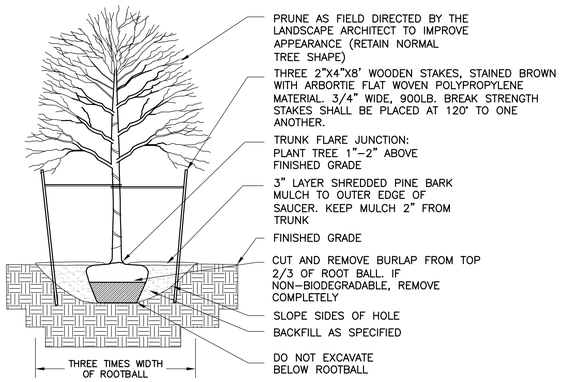
FERNALD SCHOOL
WALTHAM MA

Proj. No.

Dwg. No.
D-1

PROGRESS PRINT–NOT FOR CONSTRUCTION

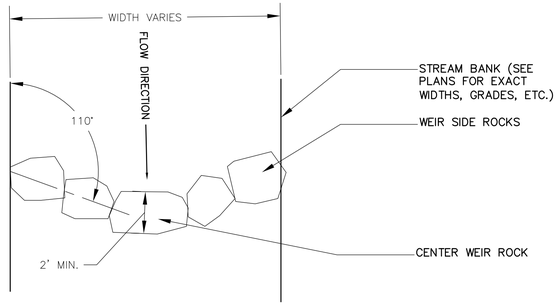




DECIDUOUS TREE PLANTING

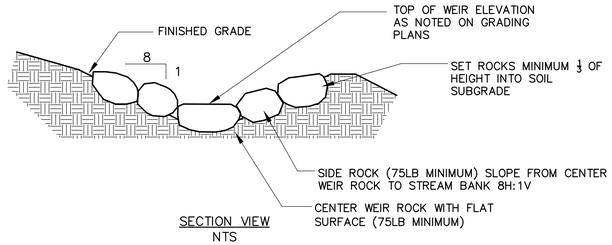
DETAIL 1 / D–2

NOT TO SCALE



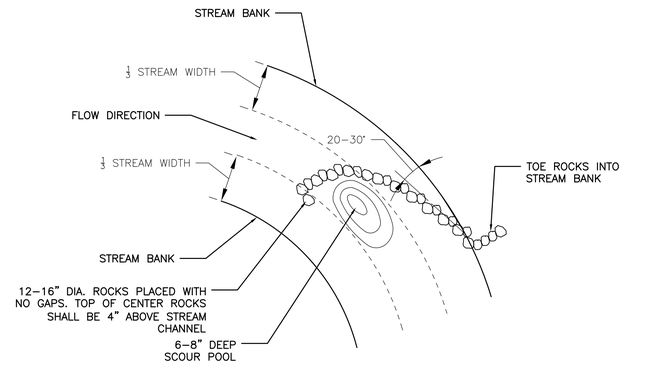
PLAN VIEW

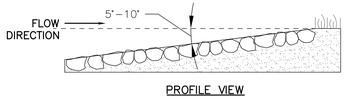
NTS



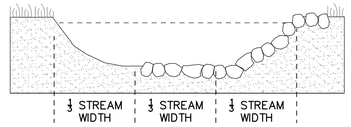
SECTION VIEW

NTS





PROFILE VIEW



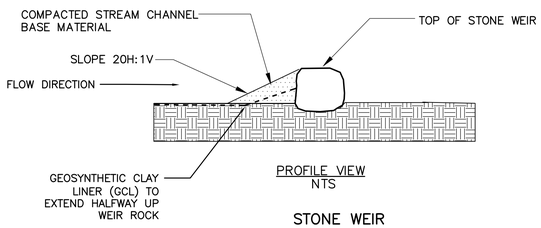
SECTION VIEW

J HOOK STREAM VANE

DETAIL 4 / D–2

NOT TO SCALE

NOTE:
FINAL LOCATION IN THE FIELD MAY BE ADJUSTED BY THE RESIDENT ENGINEER OR OWNERS REPRESENTATIVE BASED ON SITE CONDITIONS.



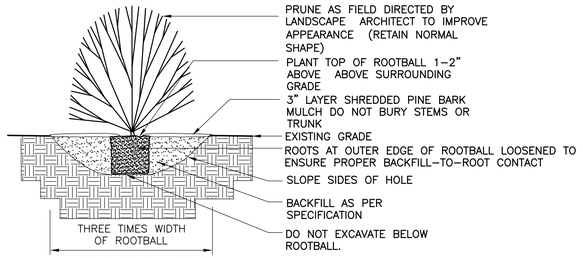
PROFILE VIEW

NTS

STONE WEIR

DETAIL 3 / D–2

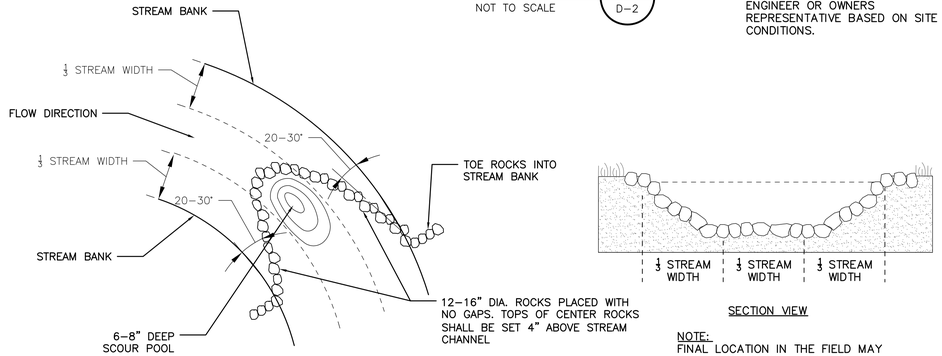
NOT TO SCALE



SHRUB PLANTING

DETAIL 2 / D–2

NOT TO SCALE



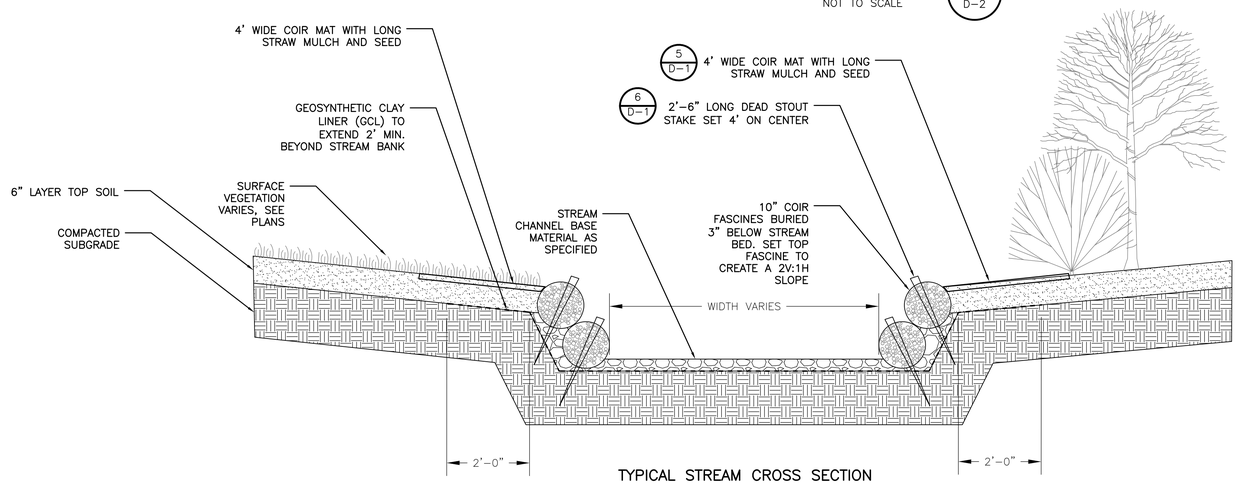
SECTION VIEW

NOTE:
FINAL LOCATION IN THE FIELD MAY BE ADJUSTED BY THE RESIDENT ENGINEER OR OWNERS REPRESENTATIVE BASED ON SITE CONDITIONS.

STREAM CROSS VANE

DETAIL 5 / D–2

NOT TO SCALE



TYPICAL STREAM CROSS SECTION

DETAIL 6 / D–2

NOT TO SCALE

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REVISIONS

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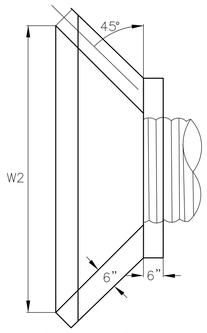
DETAILS II

FERNALD SCHOOL
WALTHAM MA

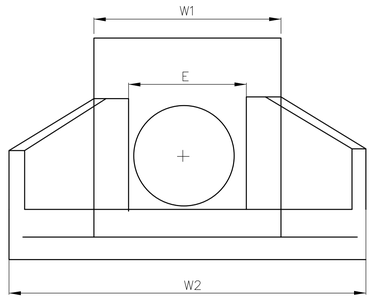
Proj. No.

Dwg. No.

D–2



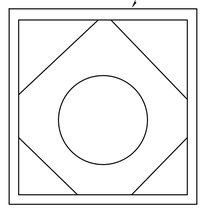
PLAN VIEW



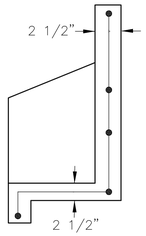
FRONT ELEVATION

INLET HEADWALL

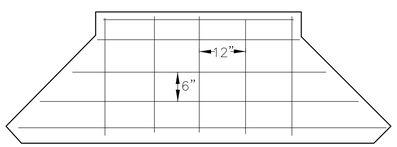
NOTE: HEADWALLS OVER 30" TO HAVE STEEL ON 6" CENTERS EACHWAY (2" CLEARANCE TYP.)



WALL SECTION



BASE & WALL SECTION



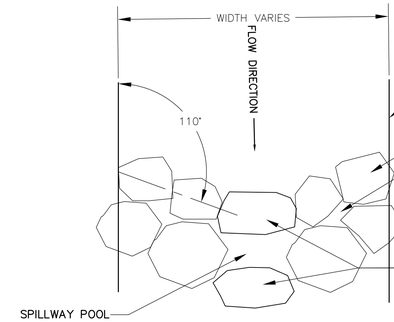
BASE SECTION
N.T.S.

TABLE I

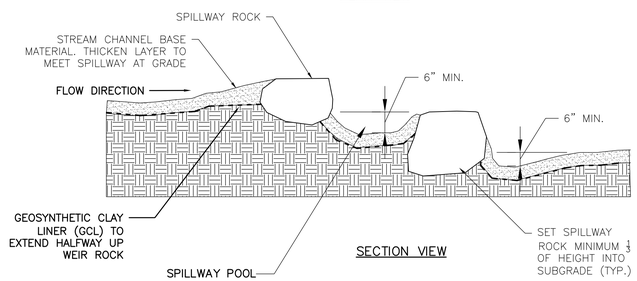
HEADWALL DIMENSION FOR METAL PIPE*

INSIDE DIA. OF PIPE	W1	W2	H1	H2	D	E	WT.	SQ. FT. IN BASE AREA
18"	3' – 2"	4' – 3"	1' – 3"	3' – 2"	1' – 3"	1' – 9"	1,550	7.34
21", 24"	3" – 8"	5' – 3"	1' – 9"	3' – 8"	1' – 6"	2' – 7"	2,100	9.9
30"	4' – 2"	6' – 5"	2' – 0"	4' – 2"	1' – 10"	2' – 9"	2,850	13.5
36"	4' – 8"	7' – 7"	2' – 4"	4' – 8"	2' – 2"	3' – 3"	3,700	17.65
42", 48"	5' – 8"	10' – 1"	3' – 3"	5' – 8"	2' – 11"	4' – 3"	5,600	28.6
54"	6' – 8"	11' – 11"		6' – 8"	3' – 4"	5' – 3"	7,500	35.6

CONCRETE HEADWALL
DETAIL 1 / D-3
NOT TO SCALE



PLAN VIEW



SECTION VIEW

STONE SPILLWAY
DETAIL 2 / D-3
NOT TO SCALE

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Date : NOV 2019

DETAILS III

FERNALD SCHOOL
WALTHAM MA

Proj. No.

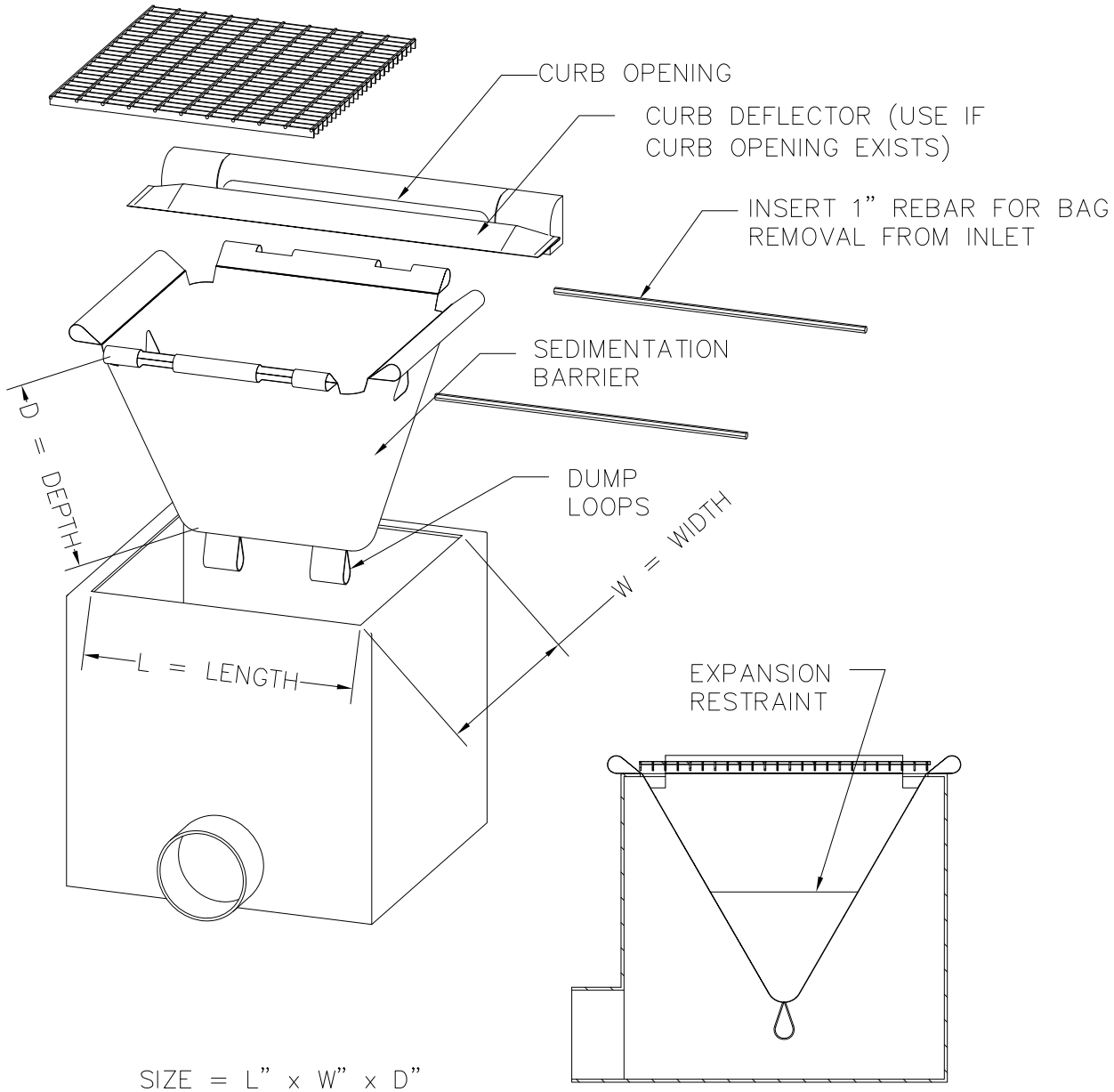
Dwg. No.

D-3

ATTACHMENT B

ATTACHMENT B

Construction Standard Details



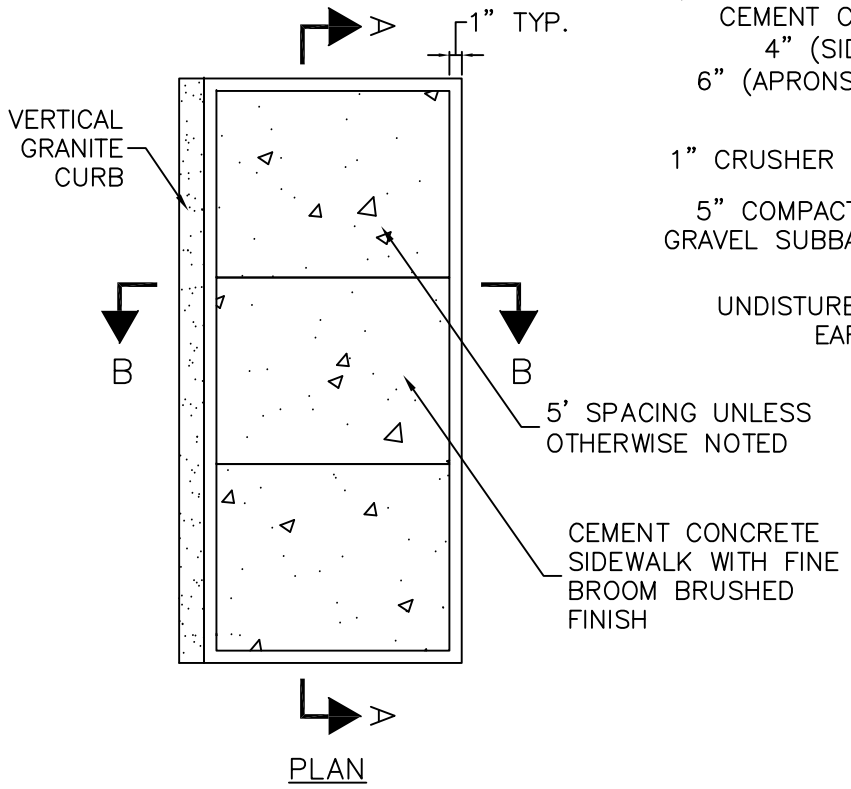
SIZE = L" x W" x D"

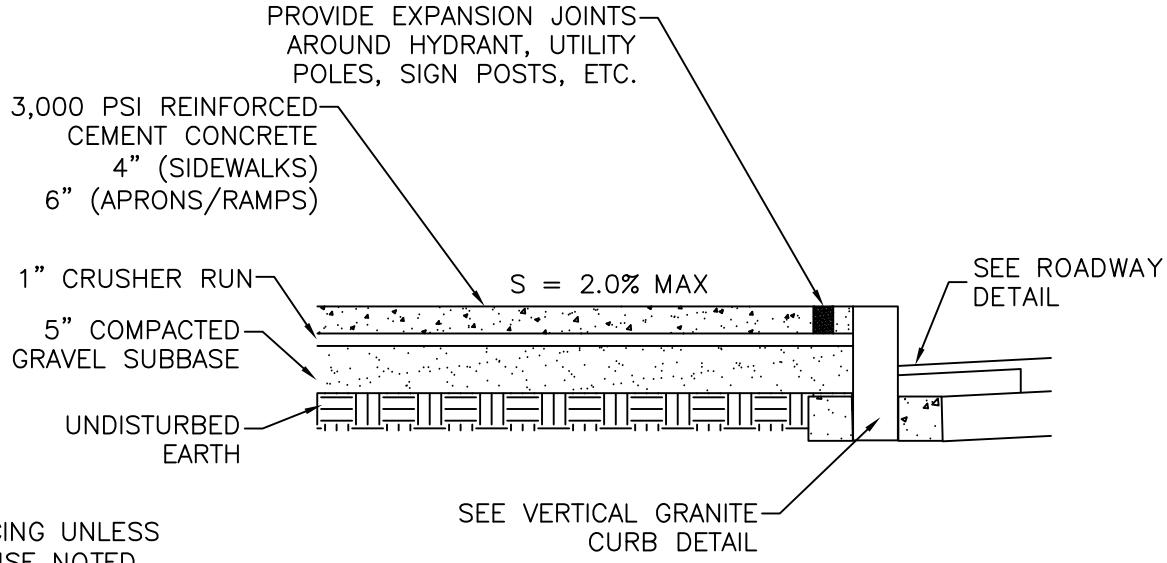
SEDIMENTATION BARRIER SHALL BE MANUFACTURED TO FIT THE OPENING OF THE CATCH BASIN OR DROP INLET. SEDIMENTATION BARRIER SHALL BE MANUFACTURED FROM A WOVEN POLYPROPYLENE GEOTEXTILE WITH AN ALLOWABLE FLOW RATE OF 50 GPM/SF

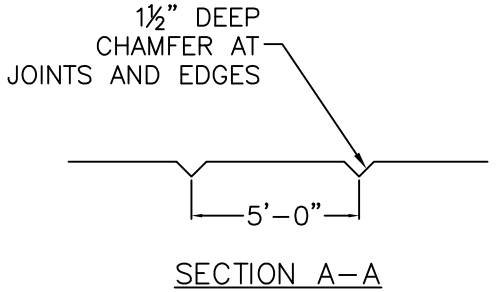
CITY OF WALTHAM, MA.
ENGINEERING DEPARTMENT

STANDARD DETAILS	Sheet No. 110.001
SEDIMENTATION BARRIER	Scale NTS
110.000	

DWG FILE: \\Powervault\nasshare\Scans\CBs\Details\standard detail 2013.dwg



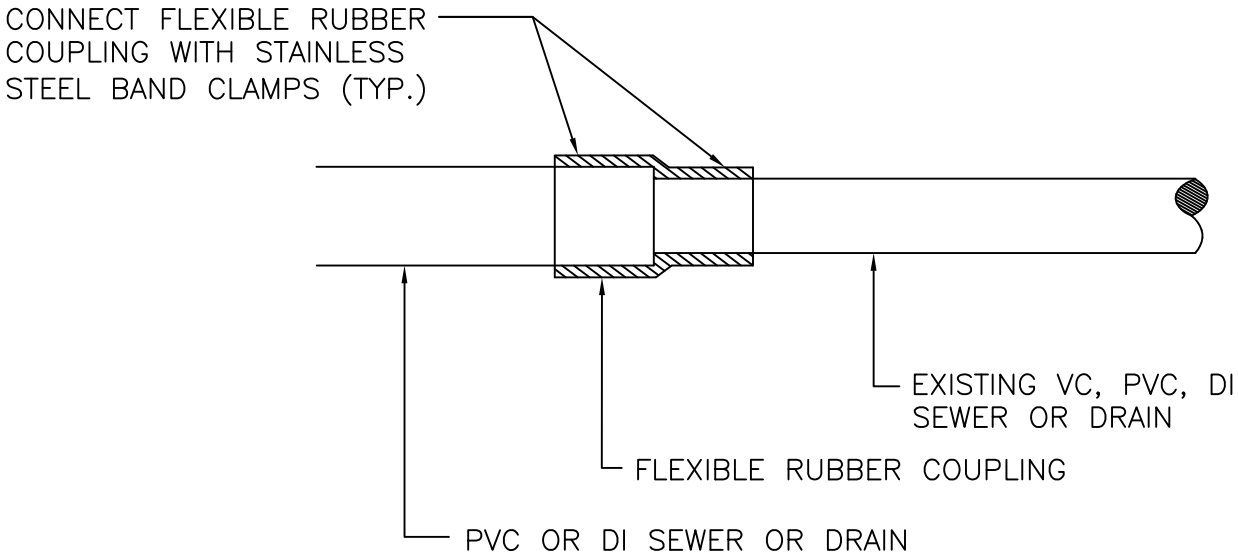




SIDEWALK NOTES:
1. NEW SIDEWALKS SHALL MATCH WIDTH OF EXISTING SIDEWALK UNLESS OTHERWISE NOTED.
2. SIDEWALK MATERIAL TO MATCH EXISTING SIDEWALK. FOR EXISTING ASPHALT SIDEWALK, SUBSTITUTE 4" CONCRETE.
3. SIDEWALKS TO BE BUILT ACCORDING TO ADA AND MA AAB REGULATIONS, 2.0% MAX (0% TOLERANCE) CROSS SLOPE.
4. SEE CONSTRUCTION PLANS AND GRADING PLANS FOR SIDEWALK WIDTHS AND GRADES.

CONCRETE SIDEWALK DETAIL

	FIGURE NAME: 701.000 – 4"&6" CEMENT CONCRETE SIDEWALK	SCALE: NOT TO SCALE
	CITY OF WALTHAM, MA. – ENGINEERING DEPARTMENT STANDARD DETAILS	REV. DATE: 3/30/2011



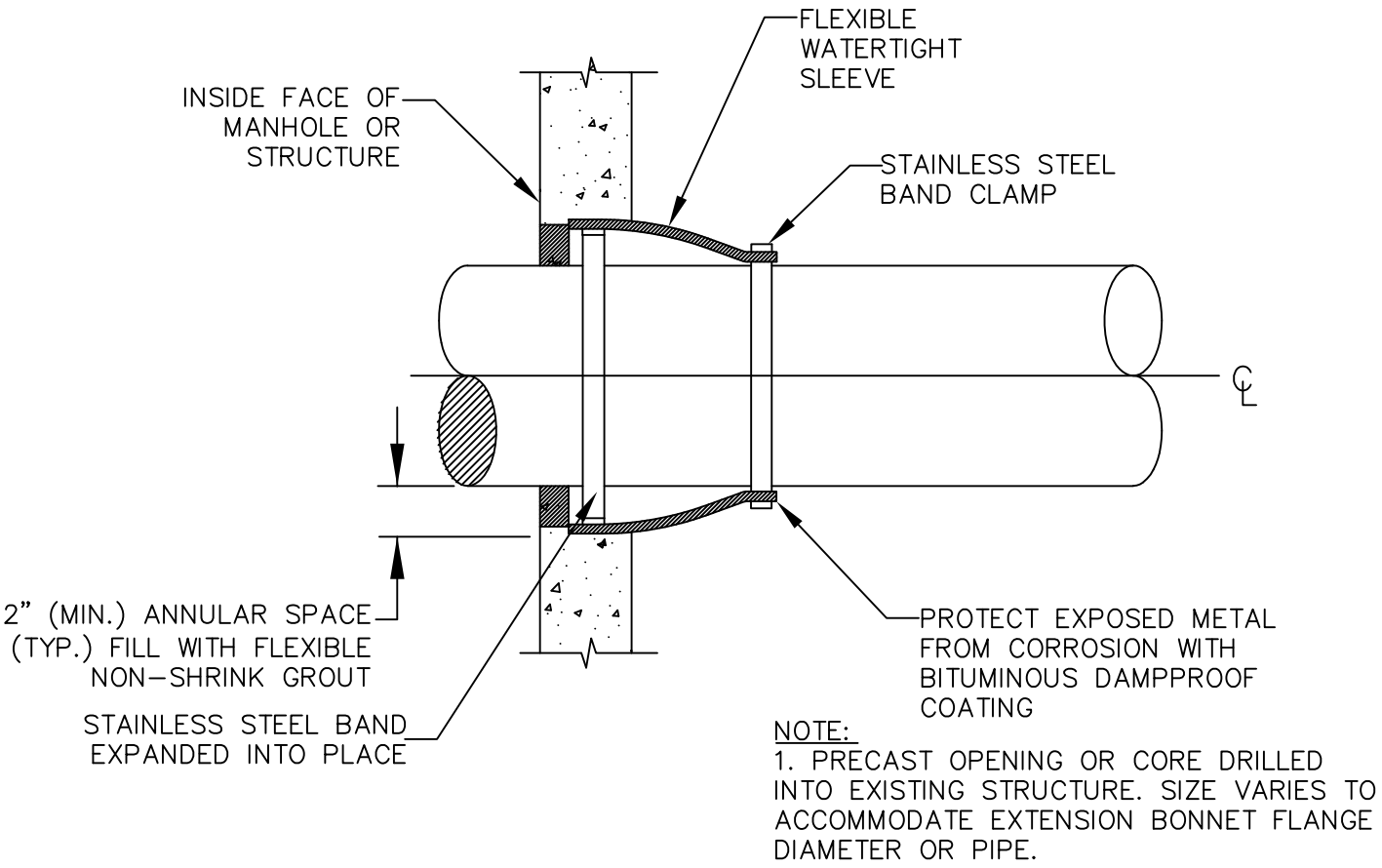
NOTES:

1. GRAVITY LATERAL PIPES (SEWERS OR DRAINS)
2. SEE SPECIFICATIONS FOR MATERIALS AND REQUIREMENTS.

PIPE FIELD CLOSURE (FLEXIBLE RUBBER COUPLING) DETAIL

FOR NON-PRESSURE PIPES OF DIFFERENT MATERIALS OR SIZES

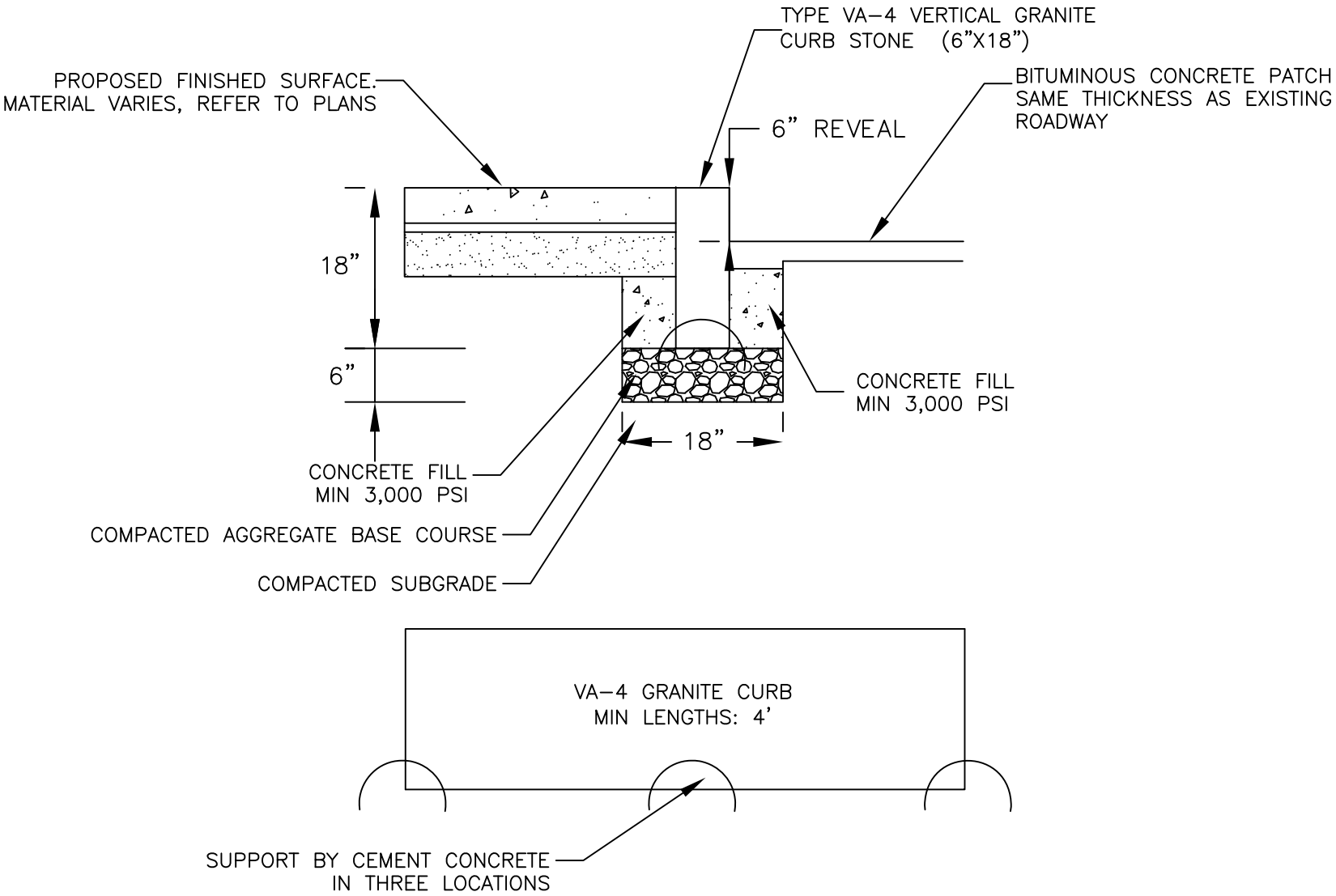
	FIGURE NAME: 999.100 – FERNCO CONNECTION DETAIL	SCALE: NOT TO SCALE
	CITY OF WALTHAM, MA. – ENGINEERING DEPARTMENT STANDARD DETAILS	REV. DATE: 12/8/2010



NOTE:
1. PRECAST OPENING OR CORE DRILLED INTO EXISTING STRUCTURE. SIZE VARIES TO ACCOMMODATE EXTENSION BONNET FLANGE DIAMETER OR PIPE.

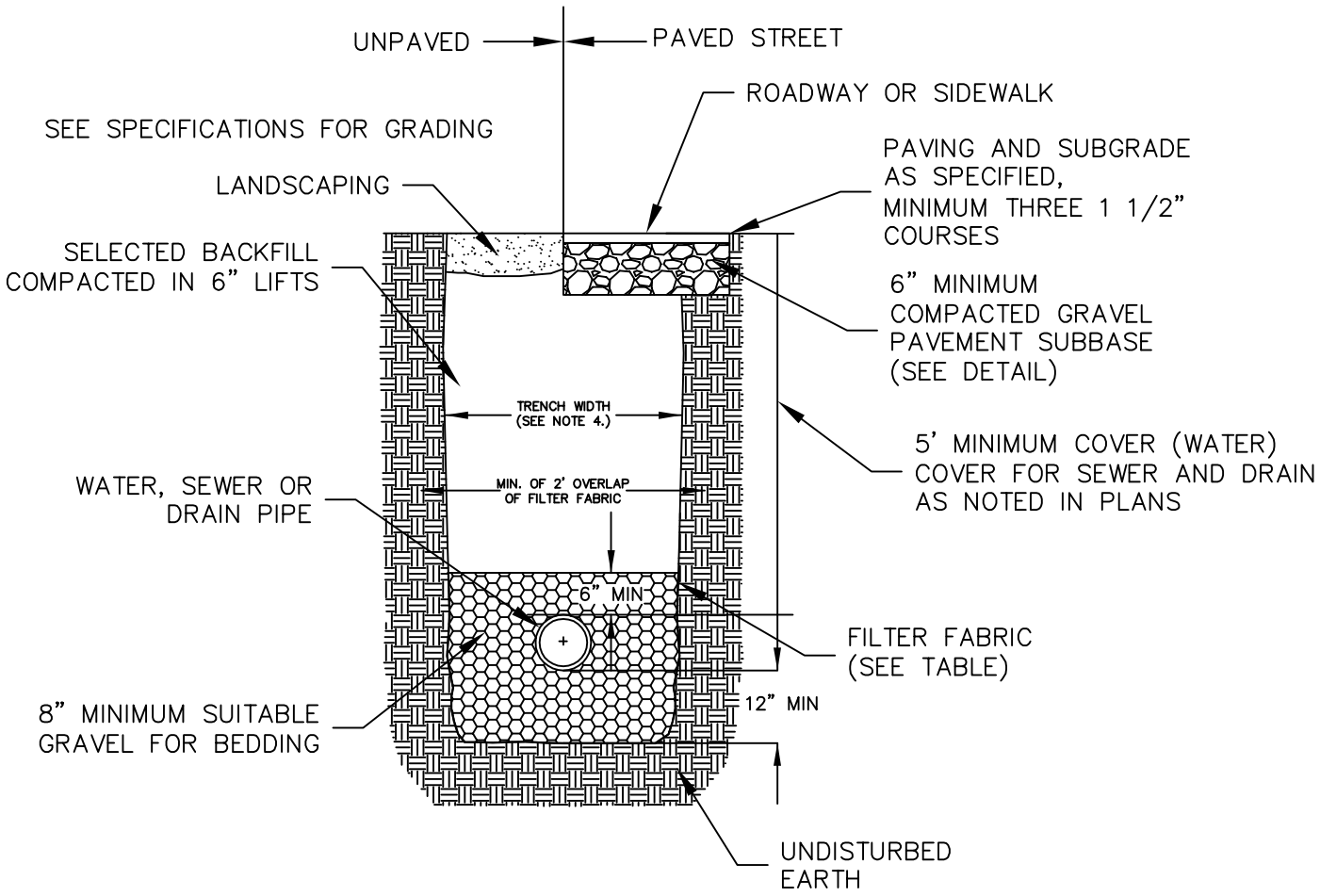
FLEXIBLE SLEEVE CONNECTION DETAIL

	FIGURE NAME: 202.000.A – FLEXIBLE SLEEVE CONNECTION DETAIL	SCALE: NOT TO SCALE
	CITY OF WALTHAM, MA. – ENGINEERING DEPARTMENT STANDARD DETAILS	REV. DATE: 12/8/2010



TYPICAL VERTICAL GRANITE CURB DETAIL

	FIGURE NAME: 504.000 – TYPICAL VERTICAL GRANITE CURB DETAIL	SCALE: NOT TO SCALE
	CITY OF WALTHAM, MA. – ENGINEERING DEPARTMENT STANDARD DETAILS	REV. DATE: 3/30/2011



NOTES:
1. ALL TRENCHES MUST BE JETTED OR PUDDLED AS REQUIRED BY THE ENGINEER.
2. PRIOR TO FINISHING PAVING, CUT SQUARE EDGES AT EXISTING PAVEMENT, AT LEAST 6 INCHES BEYOND OUTERMOST DISTURBED PAVEMENT.
3. NO LEDGE TO BE WITHIN 6" OF PIPE.
4. TRENCH WIDTH:

   LEDGE: OUTSIDE DIAMETER OF PIPE PLUS 2 FEET

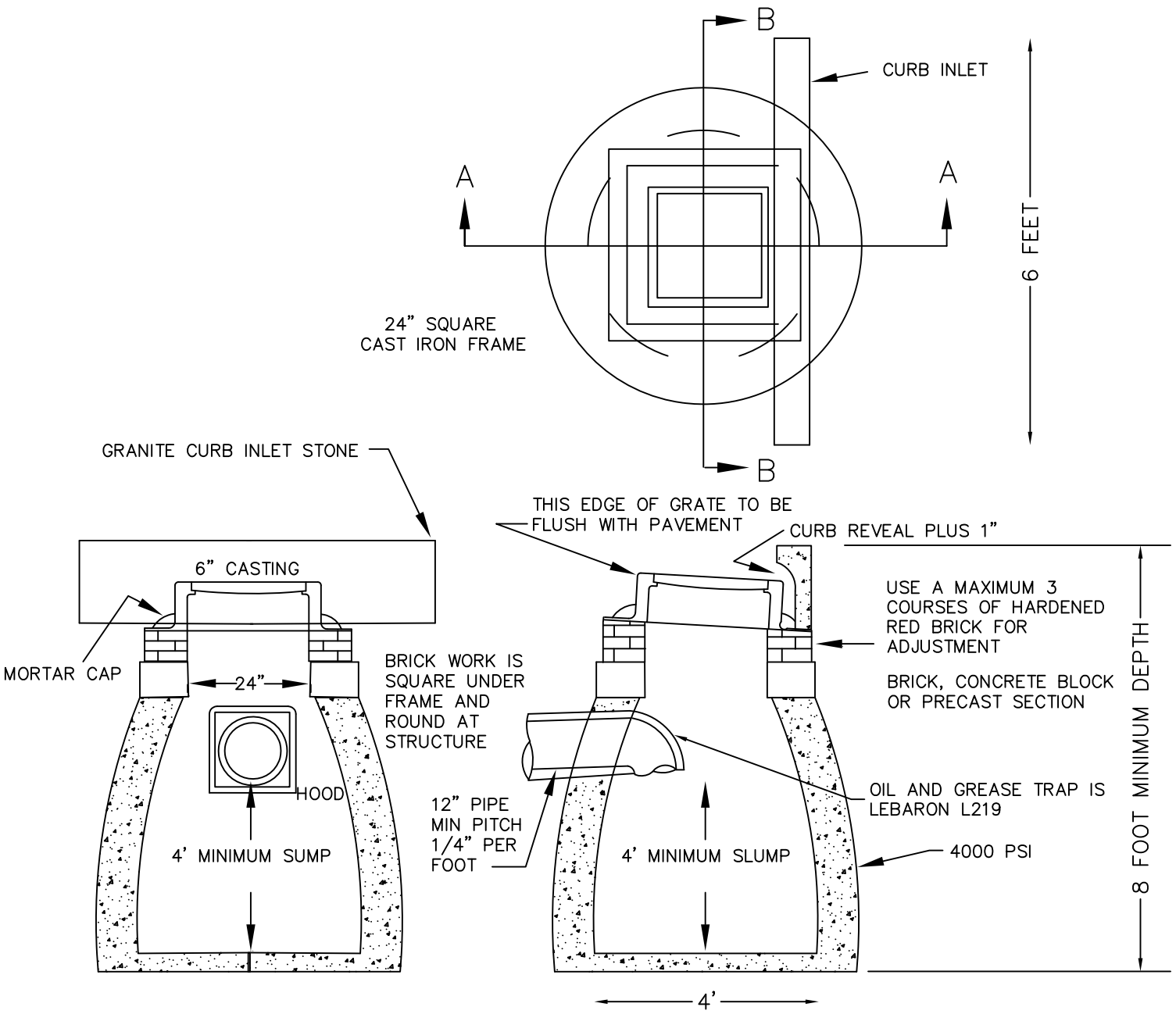
   EARTH: GREATER OF LEDGE VALUE OR 3 FEET (OR AS DETERMINED BY THE ENGINEER)

FILTER FABRIC USE

	SOIL TYPE	
	SILT OR CLAY	GRANULAR SOIL
ABOVE GROUND WATER	FILTER FABRIC NOT REQUIRED	FILTER FABRIC NOT REQUIRED
BELOW GROUND WATER	FILTER FABRIC REQUIRED	FILTER FABRIC NOT REQUIRED

WATER, SEWER, AND DRAIN TRENCH DETAIL

	FIGURE NAME: 141.000.A – TRENCH DETAIL	SCALE: NOT TO SCALE
	CITY OF WALTHAM, MA. – ENGINEERING DEPARTMENT STANDARD DETAILS	REV. DATE: 3/30/2011



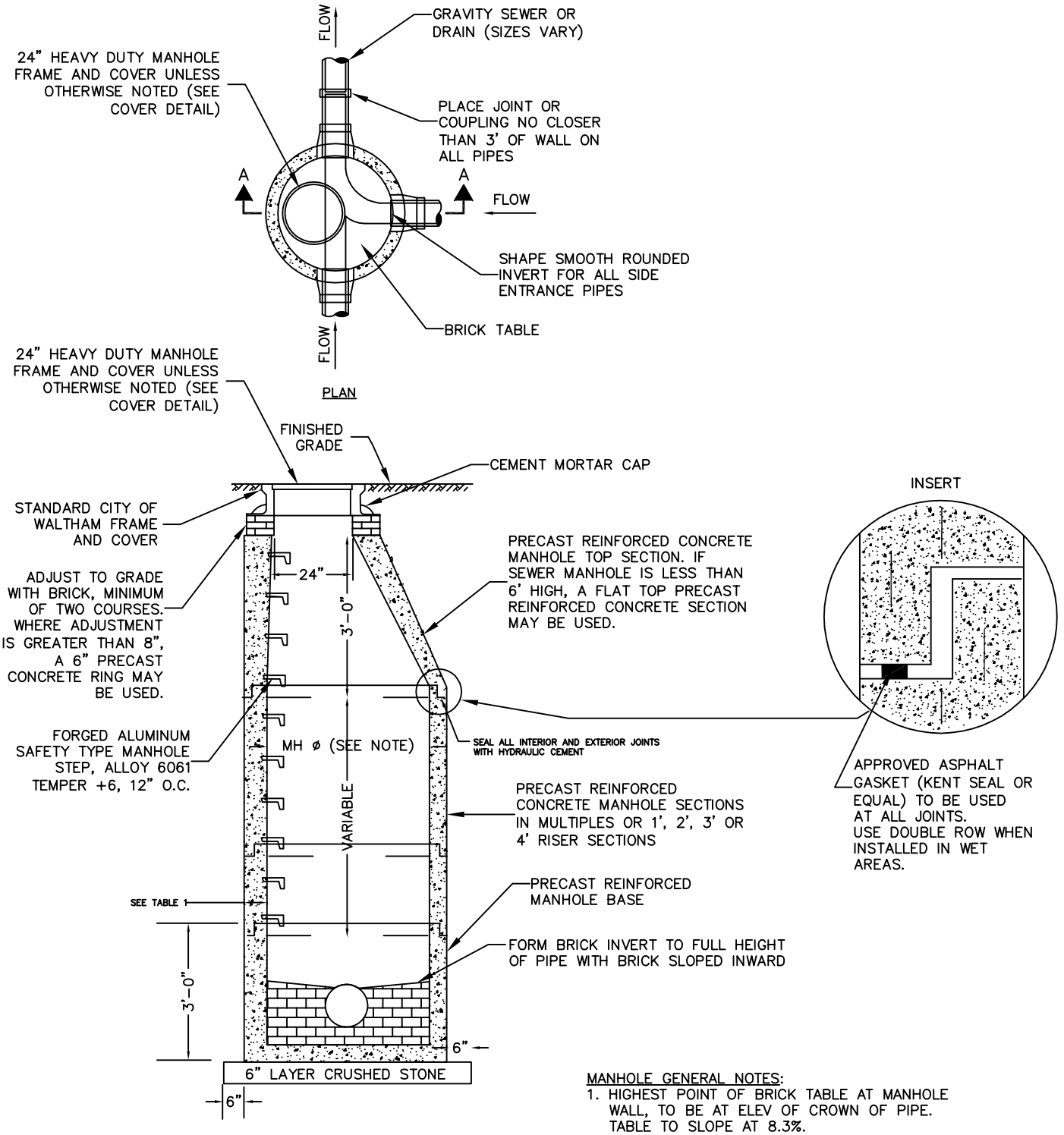
SECTION B–B

SECTION A–A

MAY BE CONSTRUCTED WITH 8" CONCRETE BLOCKS,
A COMPLETE 5" PRECAST STRUCTURE, OR A
COMBINATION OF 5" TO 8" PRECAST BASE SECTION
AND 8" CONCRETE BLOCKS LAID ABOVE.

STANDARD CATCH BASIN

	FIGURE NAME: 201.500.A – STANDARD CATCH BASIN DETAIL	SCALE: NOT TO SCALE
	CITY OF WALTHAM, MA. – ENGINEERING DEPARTMENT STANDARD DETAILS	REV. DATE: 12/8/2010



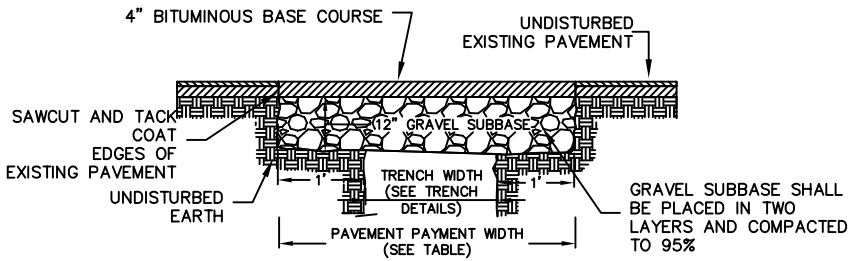
SECTION A–A

STANDARD MUNICIPAL MANHOLE

MANHOLE GENERAL NOTES:

1. HIGHEST POINT OF BRICK TABLE AT MANHOLE WALL, TO BE AT ELEV OF CROWN OF PIPE. TABLE TO SLOPE AT 8.3%.
2. SEWER OR DRAIN MANHOLE DIAMETER SHALL BE 4', 5', 6', 8' OR 10' AS SHOWN ON PLAN/PROFILE VIEWS.
3. DESIGN PRECAST SECTIONS WITH FRAME AND COVER FOR AASHTO H20 LOADINGS. UNLESS OTHERWISE NOTED
4. PRECAST MANHOLES SHALL BE PRE–ORDERED WITH PENETRATIONS AT ELEVATIONS INDICATED ON CONTRACT DRAWINGS.

	FIGURE NAME: 202.000.B – STANDARD MUNICIPAL MANHOLE DETAIL	SCALE: NOT TO SCALE
	CITY OF WALTHAM, MA. – ENGINEERING DEPARTMENT STANDARD DETAILS	REV. DATE: 12/8/2010



TRENCH PAY LIMIT TABLE FOR TEMPORARY PAVEMENT

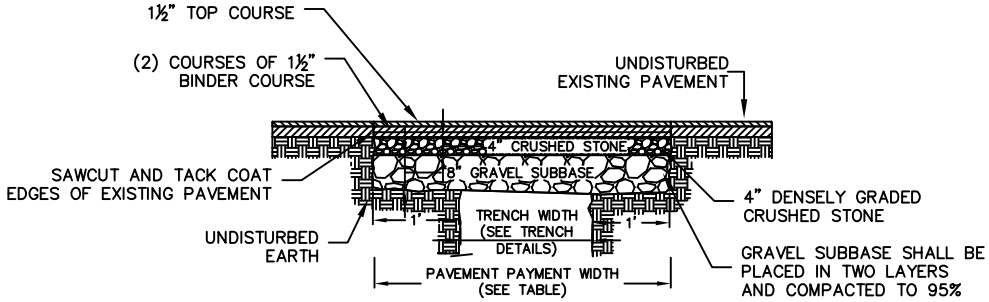
	DEPTH TO PIPE INVERT				
PIPE SIZE (I.D.)	0 – 8'	OVER 8' – 12'	OVER 12' – 16'	OVER 16' – 20'	
0" – 24"	6'–6"	9'–6"	12'–6"	15'–6"	PAY WIDTH
OVER 24"	O.D. + 4'–0"	O.D. + 7'–0"	O.D. + 10'–0"	O.D. + 13'–0"	

I.D. = INSIDE DIMENSION
O.D. = OUTSIDE DIMENSION

FOR EACH ADDITIONAL 4'–0" OF PIPE INVERT DEPTH OVER 20', ADD 3'–0" TO WIDTH LIMITS

TEMPORARY PAVEMENT DEPTH SHALL BE 3–IN.

TEMPORARY TRENCH PAVEMENT DETAIL



TRENCH PAY LIMIT TABLE FOR PERMANENT PAVEMENT

	DEPTH TO PIPE INVERT				
PIPE SIZE (I.D.)	0 – 8'	OVER 8' – 12'	OVER 12' – 16'	OVER 16' – 20'	
0" – 24"	8'–6"	11'–6"	14'–6"	17'–6"	PAY WIDTH
OVER 24"	O.D. + 6'–0"	O.D. + 9'–0"	O.D. + 12'–0"	O.D. + 15'–0"	

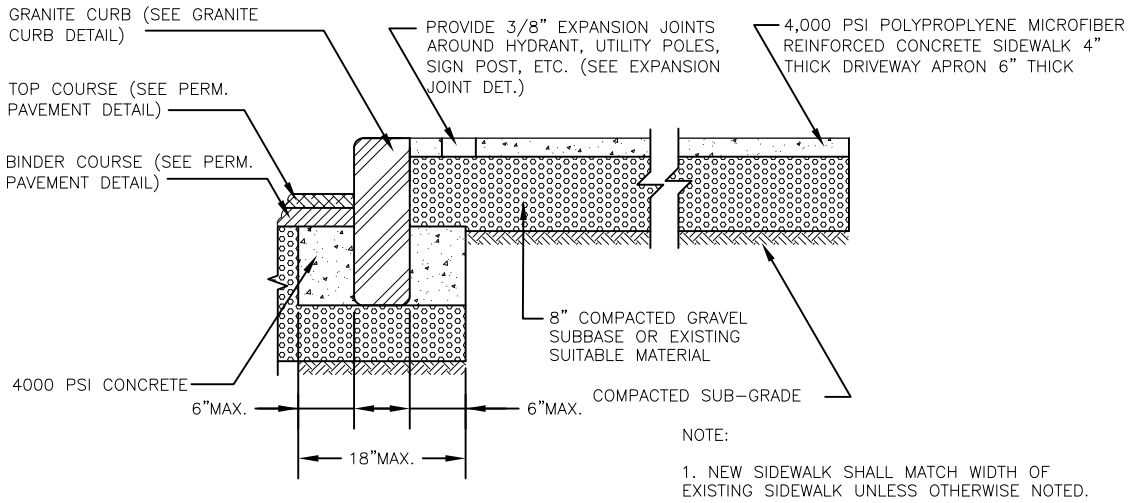
I.D. = INSIDE DIMENSION
O.D. = OUTSIDE DIMENSION

FOR EACH ADDITIONAL 4'–0" OF PIPE INVERT DEPTH OVER 20', ADD 3'–0" TO WIDTH LIMITS

PERMANENT TRENCH PAVEMENT DETAIL

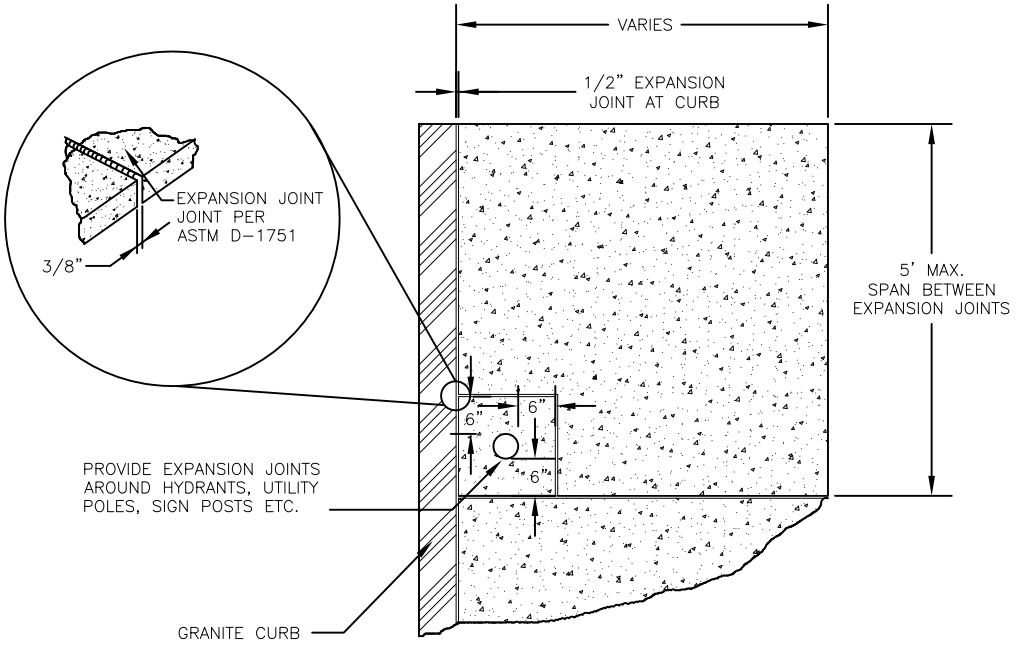
TEMPORARY AND PERMANENT TRENCH PAVEMENT NOTES:
1. PERMANENT TRENCH PAVEMENT PAYMENT WIDTH SHALL BE THE TRENCH PAY LIMIT PLUS 2 FEET
2. TEMPORARY TRENCH PAVEMENT PAYMENT WIDTH SHALL BE EQUAL TO THE TRENCH PAYMENT LIMIT
3. REMOVE AND DISPOSE ALL TEMPORARY PAVEMENT AS REQUIRED. RESTORE AND COMPACT SUBBASE AS REQUIRED PRIOR TO PERMANENT TRENCH PAVEMENT.
4. DEPTH OF PERMANENT TRENCH PAVEMENT SHALL BE THE SAME THICKNESS AS THE EXISTING PAVEMENT.

	FIGURE NAME: 141.000.B – TRENCH PAVEMENT DETAILS	SCALE: NOT TO SCALE
	CITY OF WALTHAM, MA. – ENGINEERING DEPARTMENT STANDARD DETAILS	REV. DATE: 4/13/2011



CONCRETE SIDEWALK DETAIL

NOT TO SCALE



CONCRETE SIDEWALK EXPANSION JOINT DETAIL

NOT TO SCALE

CITY OF WALTHAM, MA.
ENGINEERING DEPARTMENT

STANDARD DETAILS	Sheet No. 701.000.1
CONCRETE SIDEWALK	Scale NTS
701.000.1	

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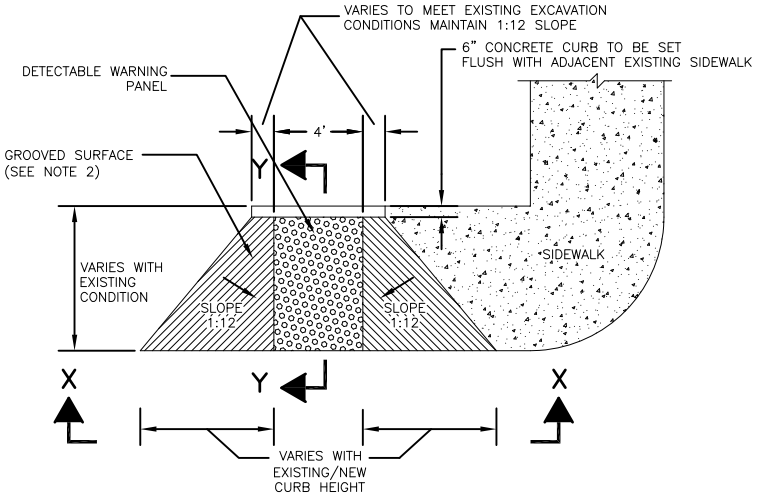
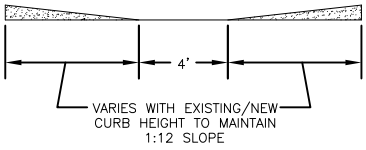
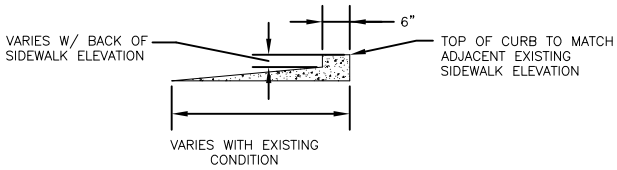


PLAN



SECTION X–X



SECTION Y–Y

HANDICAP RAMP DETAIL

NOT TO SCALE

GENERAL HANDICAP NOTES:

1. REINFORCEMENT FOR HANDICAP RAMP SHALL BE THE SAME AS MICROFIBER REINFORCED CONCRETE FOR SIDE WALK.

2. THE FINISHED SURFACE OF HANDICAP RAMP IS TO BE GROOVED LATERALLY WITH 1/4" WIDE BY 1/4" DEEP GROOVES. SPACED 2–1/4" AND ROUGHENED WITH NO LESS THAN A BROOM FINISH TO PREVENT SLIPPING AND TO DIFFERENTIATE ITS TEXTURE FROM THAT OF STANDARD SIDEWALK.

CITY OF WALTHAM, MA.
ENGINEERING DEPARTMENT

STANDARD DETAILS

CONCRETE WHEELCHAIR RAMP

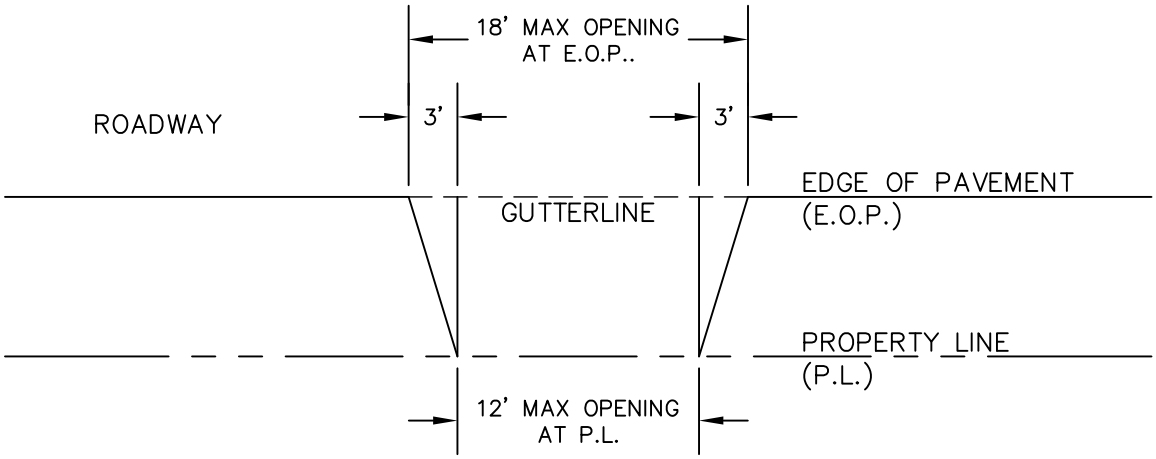
701.000 - 701.101

Sheet No.
701.000.2

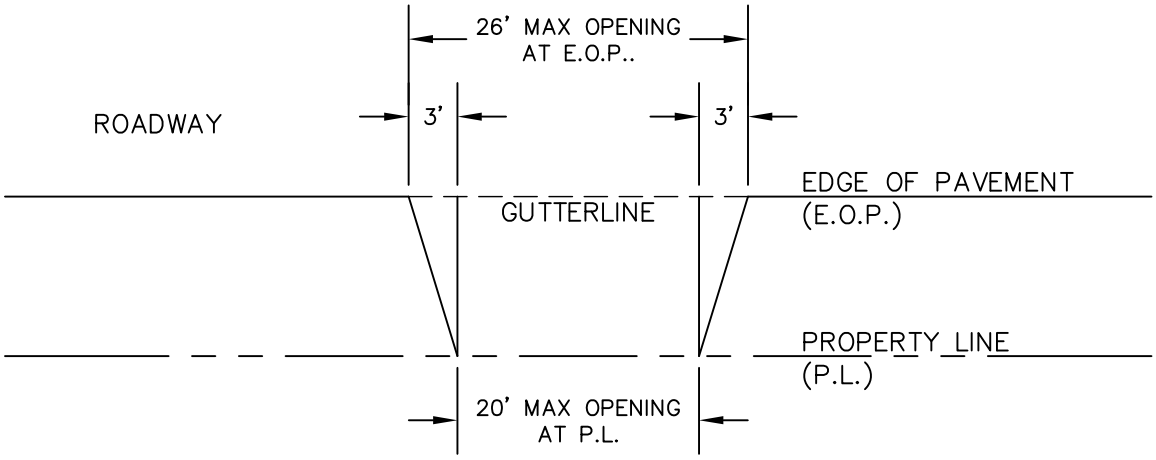
Scale
NTS

DWG FILE: \\Powervault\nasshare\Scans\CBs\Details\standard detail 2013.dwg

12' DRIVEWAY OPENING
WITHOUT CURBING



20' DRIVEWAY OPENING
WITHOUT CURBING



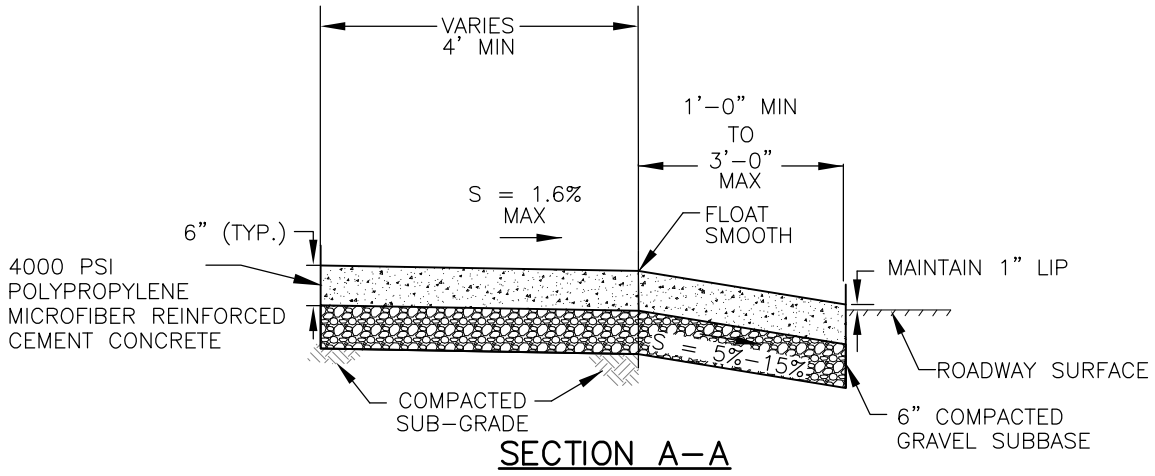
CITY OF WALTHAM, MA.
ENGINEERING DEPARTMENT

STANDARD DETAILS

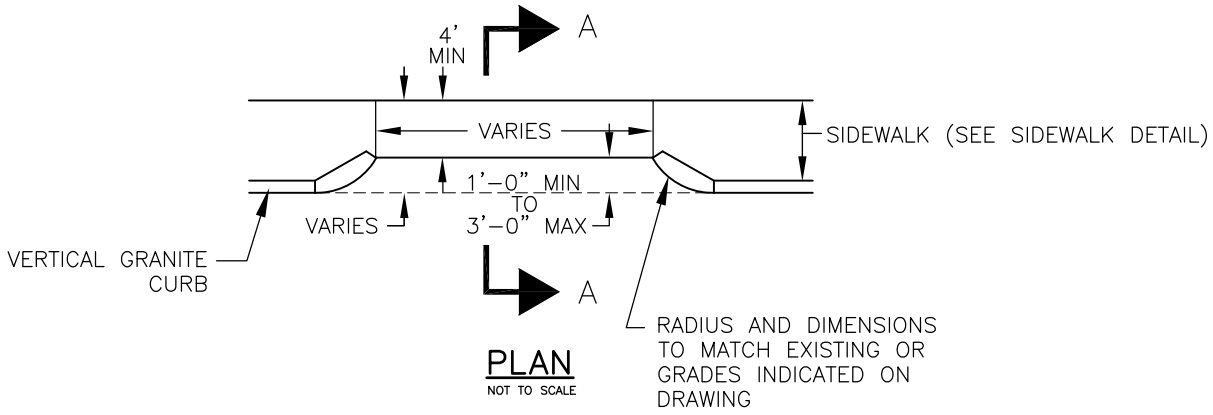
DRIVEWAY OPENINGS
WITHOUT CURBING

Sheet No.

Scale
NTS



SECTION A–A



PLAN
NOT TO SCALE

CEMENT CONCRETE DRIVEWAY APRON
NOT TO SCALE

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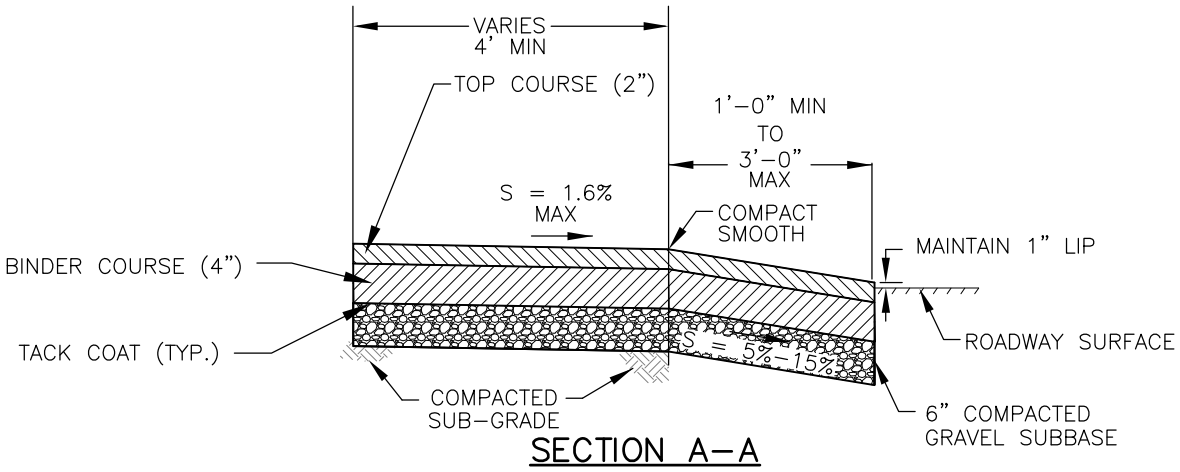
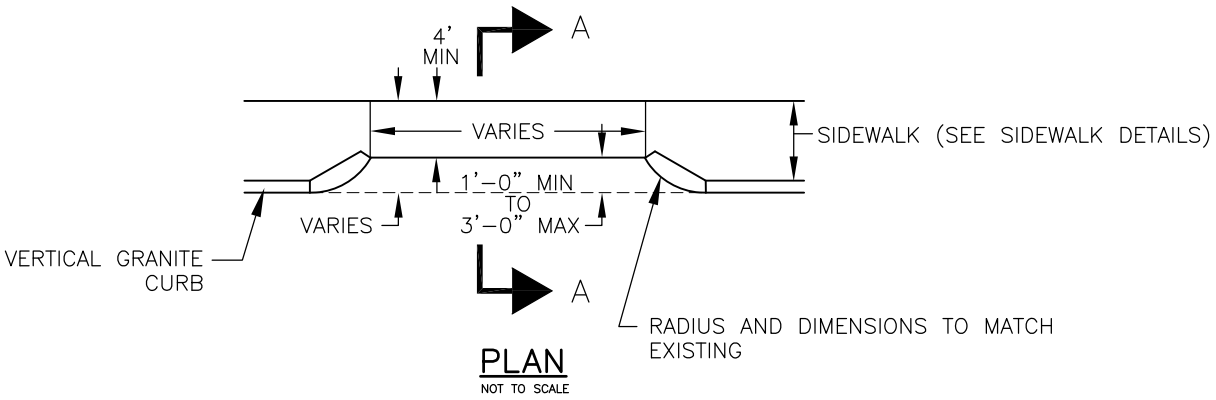
CITY OF WALTHAM, MA.
ENGINEERING DEPARTMENT

STANDARD DETAILS	Sheet No. 701.002
CEMENT CONCRETE DRIVEWAY APRON	Scale NTS
701.002	



SECTION A-A



PLAN
NOT TO SCALE

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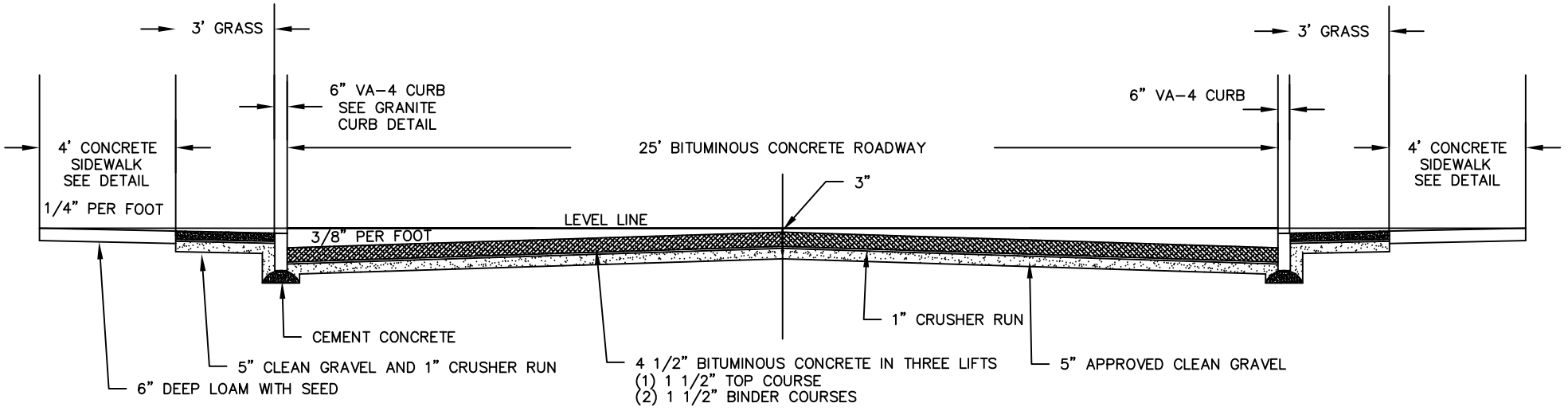
CITY OF WALTHAM, MA.
ENGINEERING DEPARTMENT

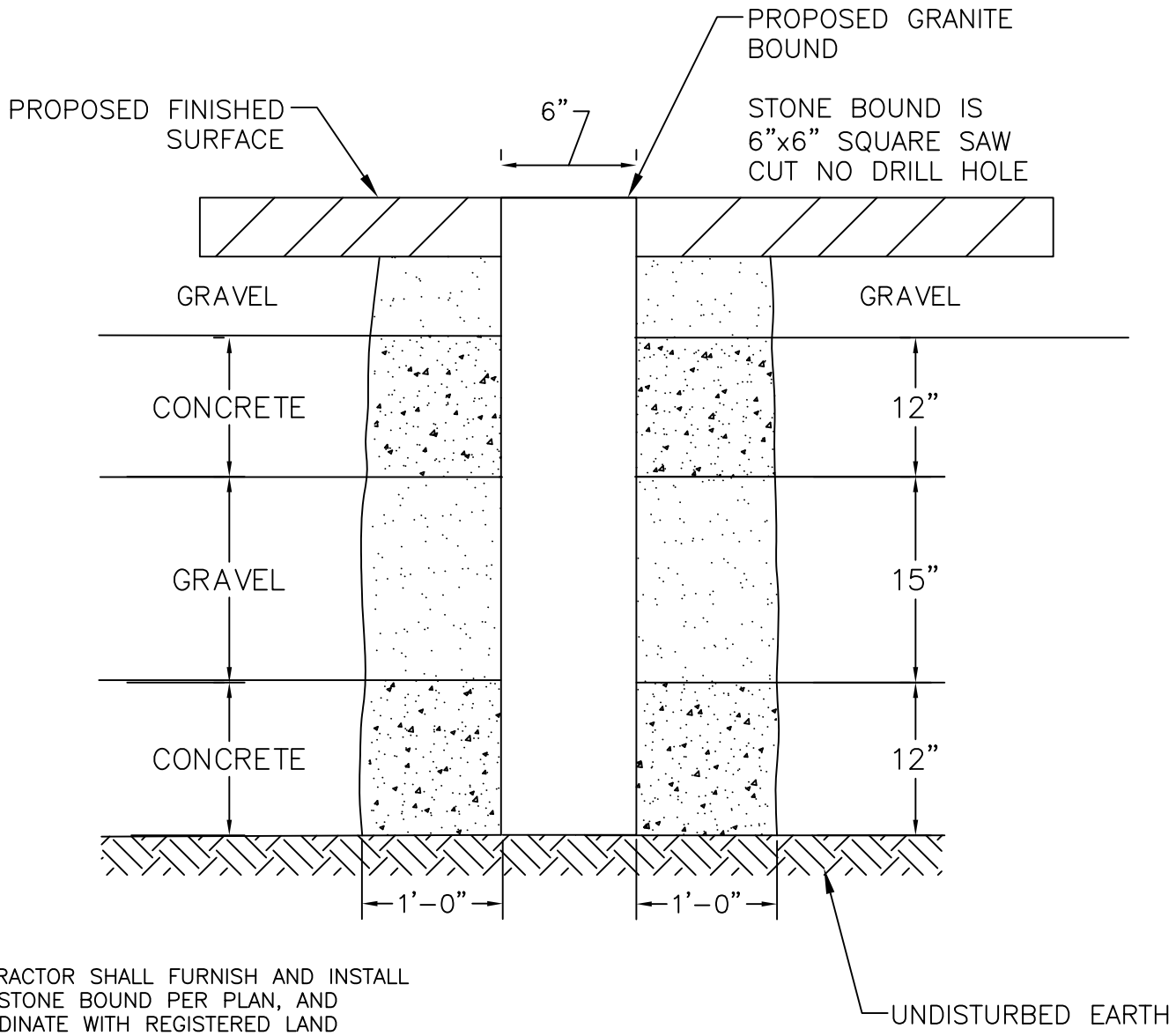
STANDARD DETAILS	Sheet No. 460.001.1
BITUMINOUS CONCRETE APRON	Scale NTS
460.001.1	



TYPICAL CROSS SECTION FOR 40 FOOT LAYOUT

N.T.S.

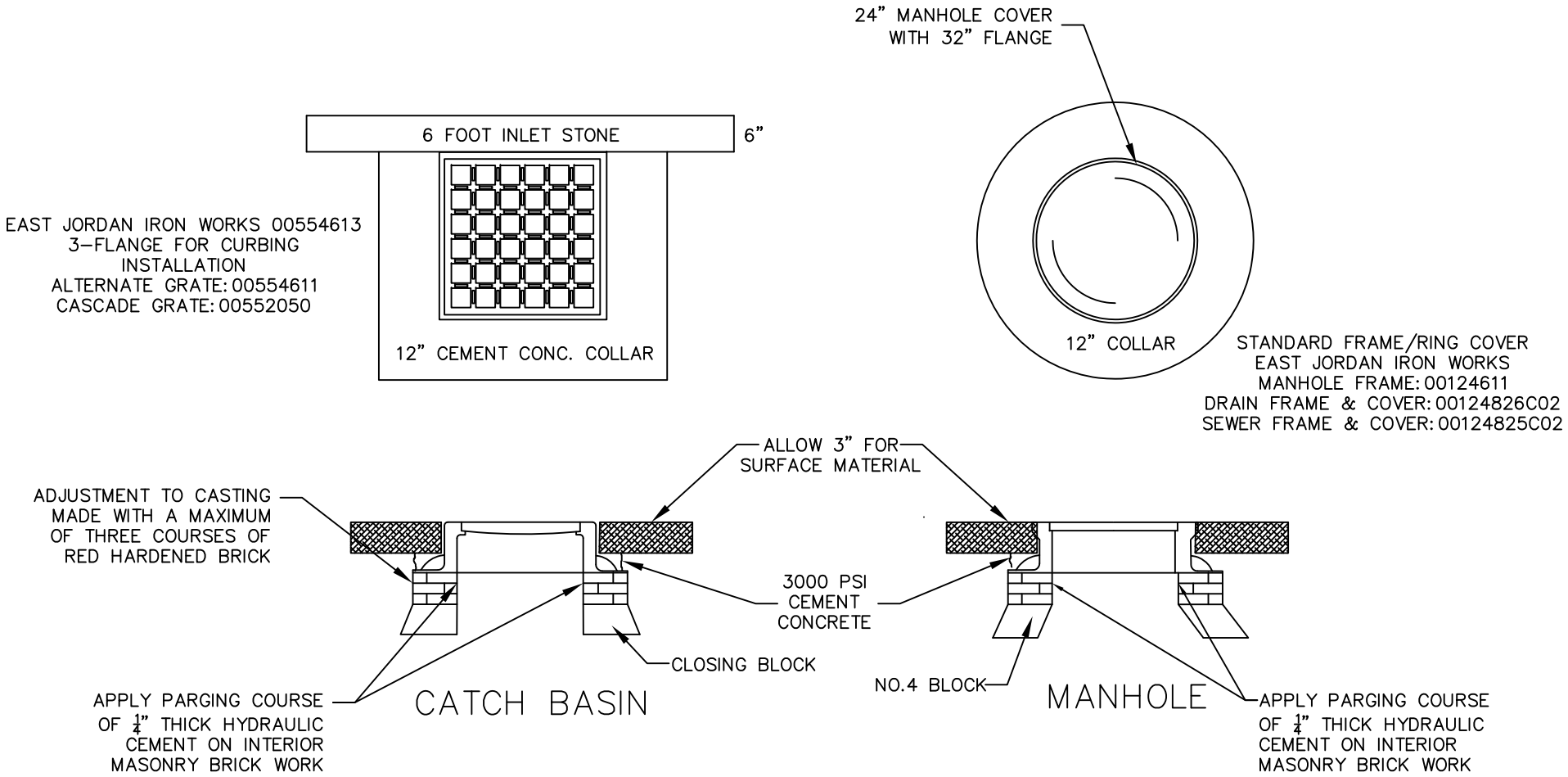
	FIGURE NAME: 460.000.A – TYPICAL 40–FOOT ROAD CROSS SECTION	SCALE: NOT TO SCALE
	CITY OF WALTHAM, MA. – ENGINEERING DEPARTMENT STANDARD DETAILS	REV. DATE: 4/13/2011



NOTES:
1. CONTRACTOR SHALL FURNISH AND INSTALL NEW STONE BOUND PER PLAN, AND COORDINATE WITH REGISTERED LAND SURVEYOR FOR EACH LOCATION.
2. DRILL HOLES SHALL BE SET BY REGISTERED PROFESSIONAL LAND SURVEYOR.

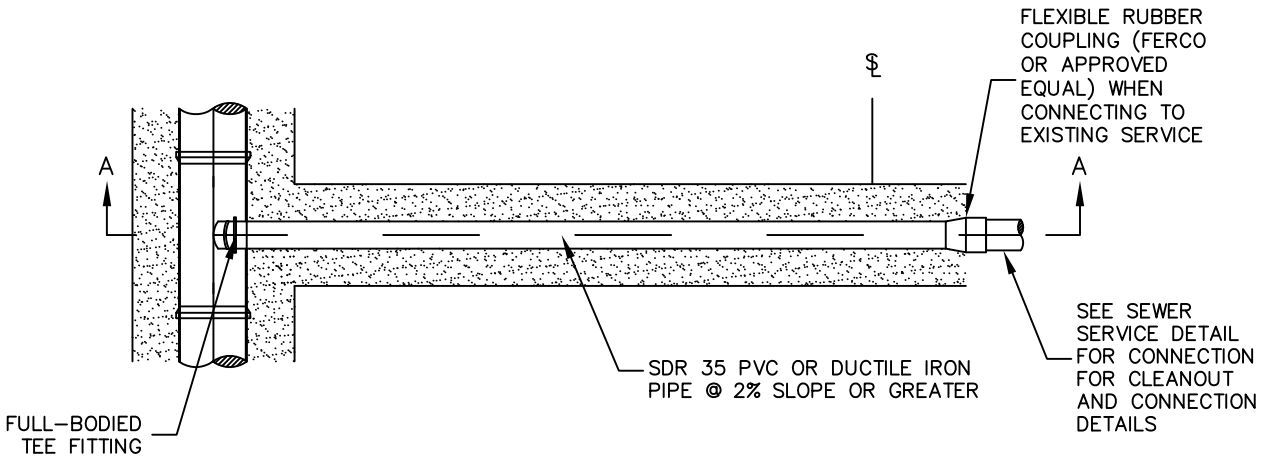
STONE BOUND DETAIL

	FIGURE NAME: 711.100 – STONE BOUND DETAIL	SCALE: NOT TO SCALE
	CITY OF WALTHAM, MA. – ENGINEERING DEPARTMENT STANDARD DETAILS	REV. DATE: 3/30/2011

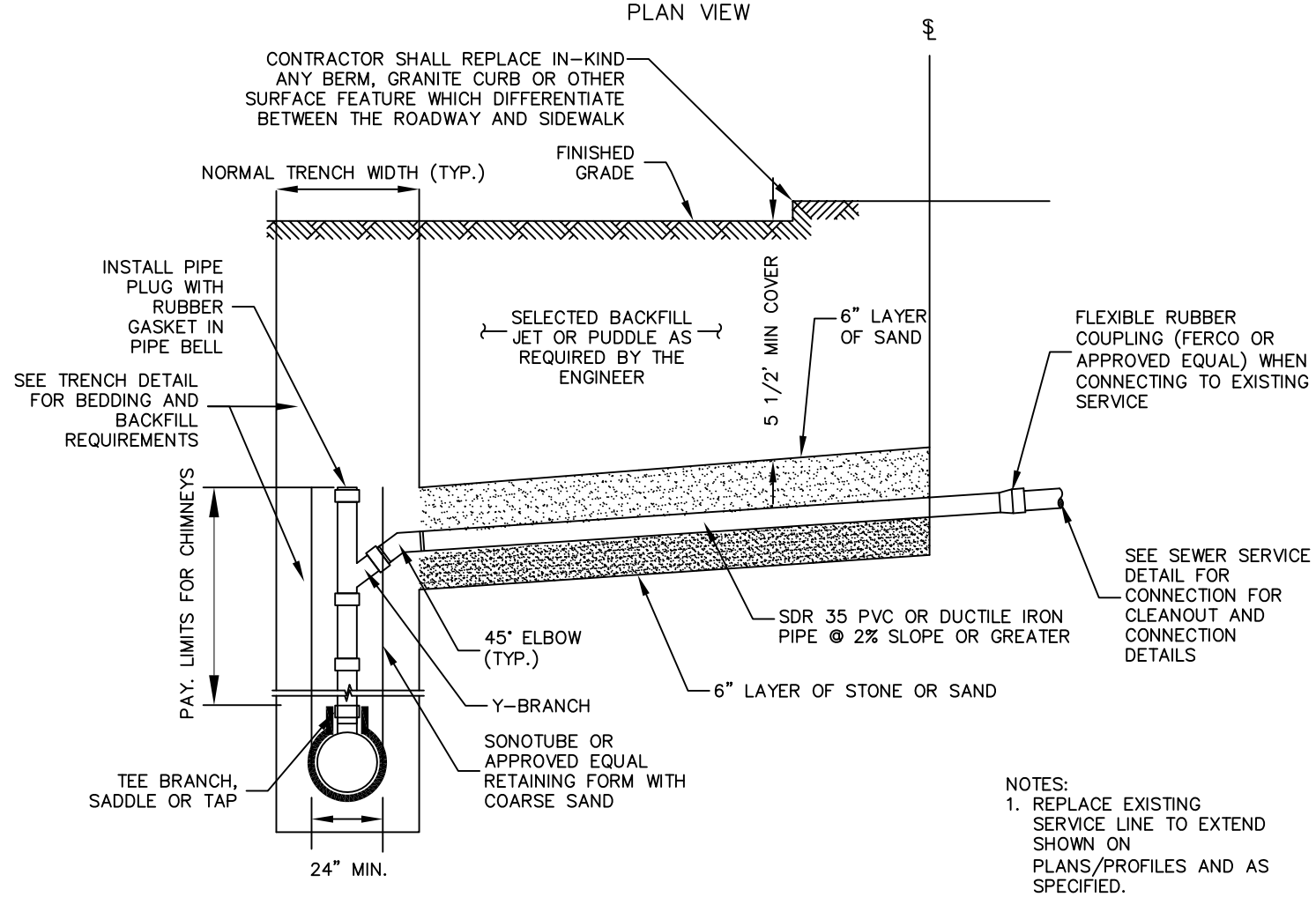


CEMENT CONCRETE COLLARS
FOR MANHOLES AND CATCH BASINS

	FIGURE NAME: 222.010 – FRAMES, GRATES & CONCRETE COLLARS DETAIL	SCALE: NOT TO SCALE
	CITY OF WALTHAM, MA. – ENGINEERING DEPARTMENT STANDARD DETAILS	REV. DATE: 3/30/2011



PLAN VIEW

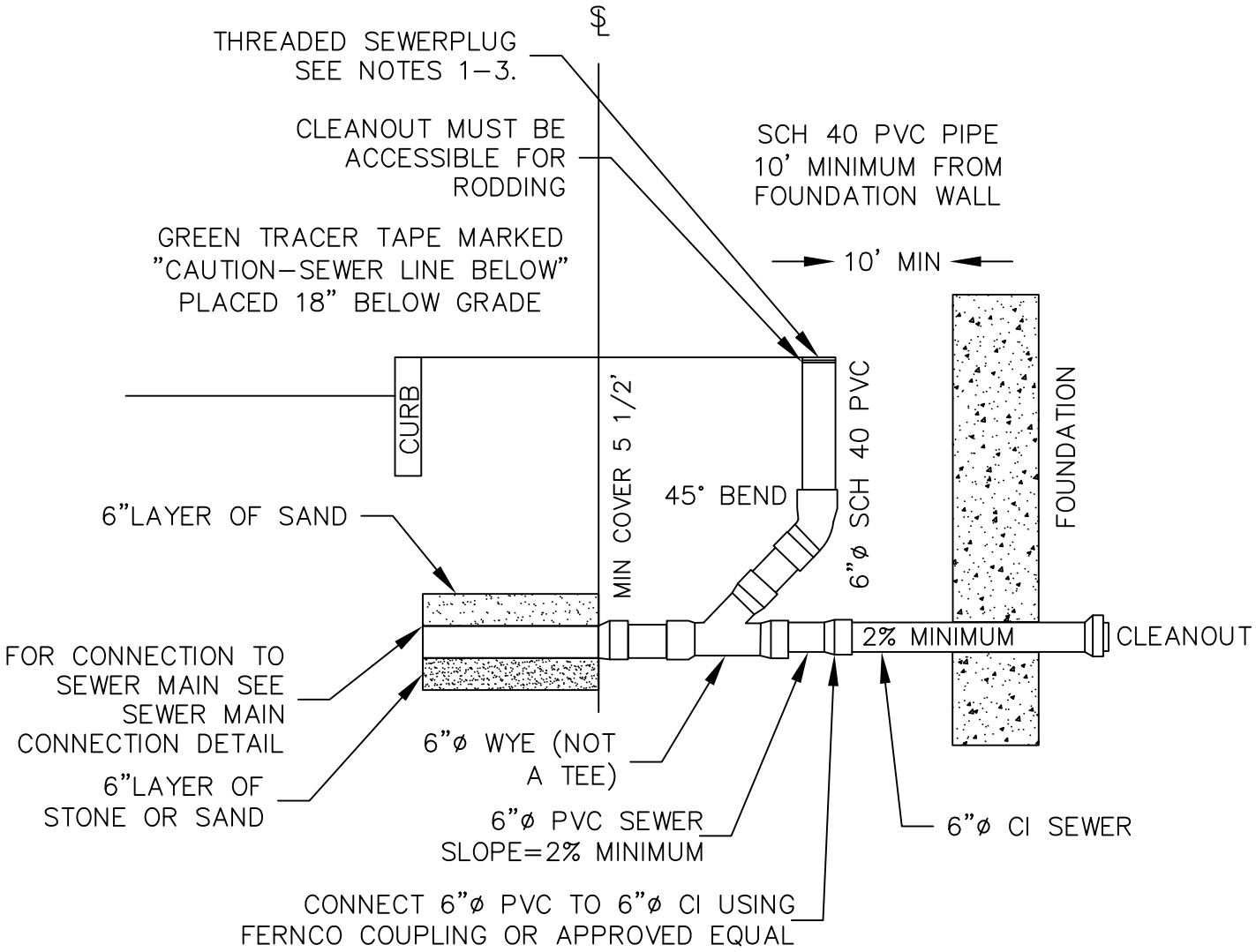


NOTES:
1. REPLACE EXISTING SERVICE LINE TO EXTEND SHOWN ON PLANS/PROFILES AND AS SPECIFIED.
2. EXCAVATE AND REMOVE EXISTING SEWER LATERAL TO ALLOW RECONSTRUCTION.

SECTION A-A

SEWER OR DRAIN
CONNECTION DETAIL WITH CHIMNEY >12' DEEP

	FIGURE NAME: 269.000.B – SEWER OR DRAIN CONNECTION DETAIL CHIMNEY	SCALE: NOT TO SCALE
	CITY OF WALTHAM, MA. – ENGINEERING DEPARTMENT STANDARD DETAILS	REV. DATE: 12/8/2010

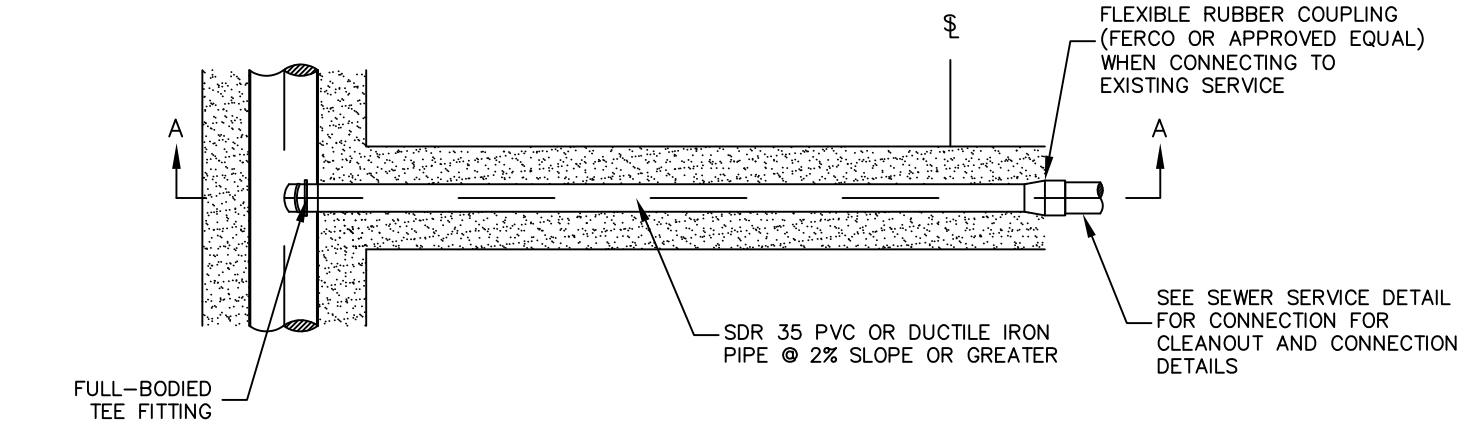


NOTES:

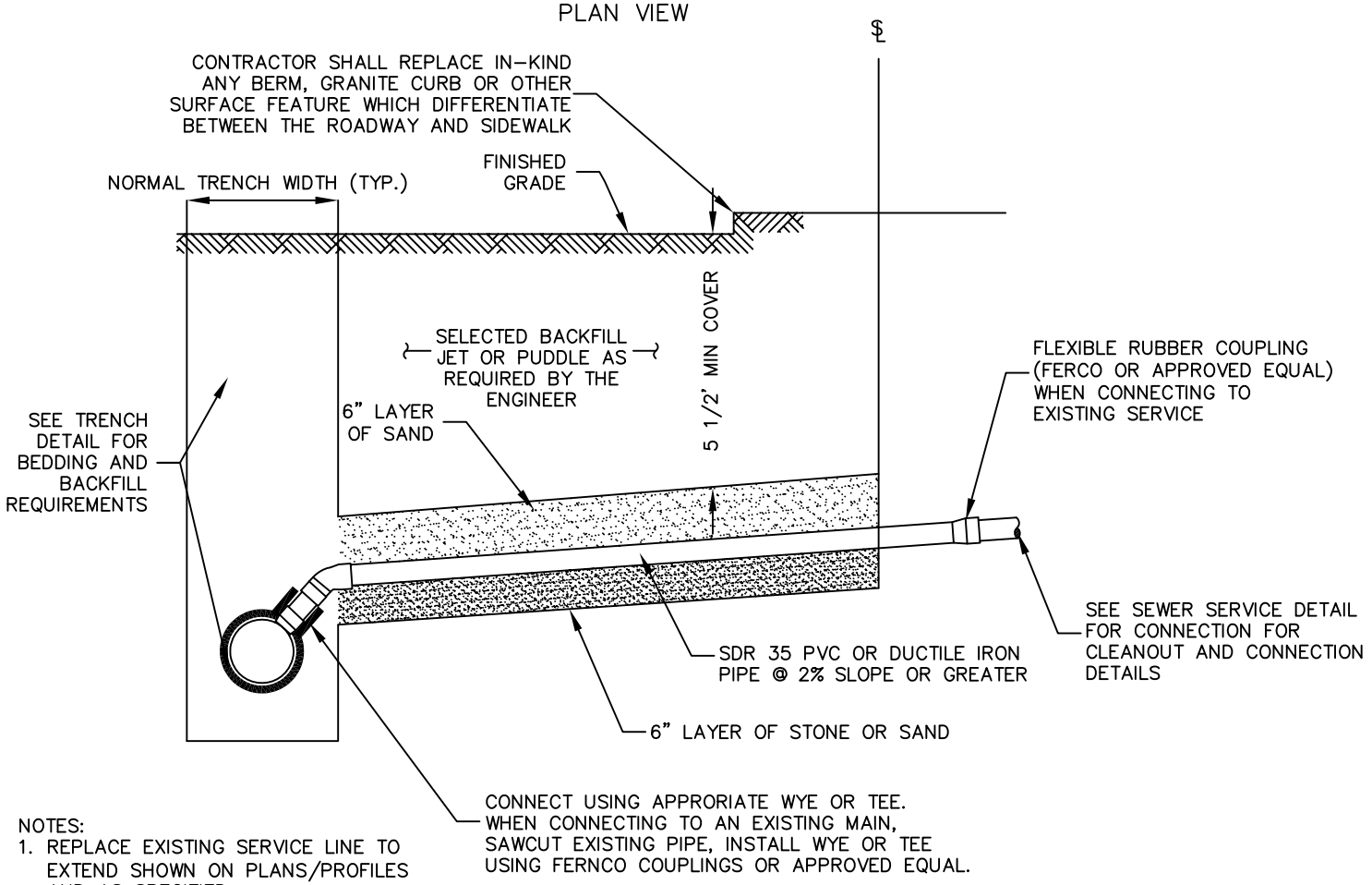
1. CLEANOUT SHALL BE HEAVY DUTY, H20 LOADING IF IN ROADWAY (EJ PRESCOTT PRODUCT NO.45005 600 OR APPROVED EQUAL).
2. CLEANOUTS LOCATED IN DRIVEWAYS SHALL BE (EJ PRESCOTT PRODUCT NO.65004 6S 600 OR APPROVED EQUAL.
3. ALL CLEANOUT SHALL BE LEVEL WITH FINAL GRADE

6"ø SEWER SERVICE CONNECTION WITH CLEANOUT

	FIGURE NAME: 269.000.C – SEWER CONNECTION CLEANOUT	SCALE: NOT TO SCALE
	CITY OF WALTHAM, MA. – ENGINEERING DEPARTMENT STANDARD DETAILS	REV. DATE: 12/8/2010



PLAN VIEW



NOTES:
1. REPLACE EXISTING SERVICE LINE TO EXTEND SHOWN ON PLANS/PROFILES AND AS SPECIFIED.
2. EXCAVATE AND REMOVE EXISTING SEWER LATERAL TO ALLOW RECONSTRUCTION.

SECTION A-A

SEWER OR DRAIN
CONNECTION DETAIL <12' DEEP

	FIGURE NAME: 269.000.A – SEWER OR DRAIN CONNECTION DETAIL <12' DEEP	SCALE: NOT TO SCALE
	CITY OF WALTHAM, MA. – ENGINEERING DEPARTMENT STANDARD DETAILS	REV. DATE: 12/8/2010

ATTACHMENT C

ATTACHMENT C

City of Waltham Conservation Commission – Order of Conditions

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 5 – Order of Conditions

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by MassDEP: 316-0748
MassDEP File #

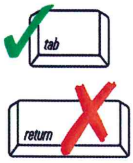
eDEP Transaction #

Waltham
City/Town

A. General Information

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

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



1. From: Waltham
Conservation Commission

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

3. To: Applicant:

Stephen (a. First Name) | Casazza (b. Last Name)

City of Waltham
c. Organization

119 School Street
d. Mailing Address

Waltham (e. City/Town) | MA (f. State) | 02451 (g. Zip Code)

4. Property Owner (if different from applicant):

a. First Name | b. Last Name

c. Organization

d. Mailing Address

e. City/Town | f. State | g. Zip Code

5. Project Location:

338/190 Trapelo Road (a. Street Address) | Waltham (b. City/Town)

R036 and R045 (c. Assessors Map/Plat Number) | 008/0001 and 001/0001 (d. Parcel/Lot Number)

Latitude and Longitude, if known: 42d22m35s (d. Latitude) | 71d14m10s (e. Longitude)

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

Provided by MassDEP:
316-0748
MassDEP File #

eDEP Transaction #

Waltham
City/Town

A. General Information (cont.)

6. Property recorded at the Registry of Deeds for (attach additional information if more than one parcel):

Middlesex South
a. County

b. Certificate Number (if registered land)

64707
c. Book

427
d. Page

7. Dates: 2-28-2019 a. Date Notice of Intent Filed; 3-28-2019 b. Date Public Hearing Closed; 4-11-2019 c. Date of Issuance

8. Final Approved Plans and Other Documents (attach additional plan or document references as needed):

Wetlands Restoration and Stream Daylighting
a. Plan Title

SSV Engineering Inc. and JCLA
b. Prepared By

Sam Bade
c. Signed and Stamped by

2-26-2019
d. Final Revision Date

1"=20'
e. Scale

f. Additional Plan or Document Title

g. Date

B. Findings

1. Findings pursuant to the Massachusetts Wetlands Protection Act:

Following the review of the above-referenced Notice of Intent and based on the information provided in this application and presented at the public hearing, this Commission finds that the areas in which work is proposed is significant to the following interests of the Wetlands Protection Act (the Act). Check all that apply:

a. ☐ Public Water Supply
b. ☐ Land Containing Shellfish
c. ☐ Prevention of Pollution
d. ☐ Private Water Supply
e. ☐ Fisheries
f. ☐ Protection of Wildlife Habitat
g. ☒ Groundwater Supply
h. ☒ Storm Damage Prevention
i. ☒ Flood Control

2. This Commission hereby finds the project, as proposed, is: (check one of the following boxes)

Approved subject to:

a. ☒ the following conditions which are necessary in accordance with the performance standards set forth in the wetlands regulations. This Commission orders that all work shall be performed in accordance with the Notice of Intent referenced above, the following General Conditions, and any other special conditions attached to this Order. To the extent that the following conditions modify or differ from the plans, specifications, or other proposals submitted with the Notice of Intent, these conditions shall control.

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

Provided by MassDEP: 316-0748
MassDEP File #

eDEP Transaction #

Waltham
City/Town

B. Findings (cont.)

Denied because:

b. ☐ the proposed work cannot be conditioned to meet the performance standards set forth in the wetland regulations. Therefore, work on this project may not go forward unless and until a new Notice of Intent is submitted which provides measures which are adequate to protect the interests of the Act, and a final Order of Conditions is issued. **A description of the performance standards which the proposed work cannot meet is attached to this Order.**

c. ☐ the information submitted by the applicant is not sufficient to describe the site, the work, or the effect of the work on the interests identified in the Wetlands Protection Act. Therefore, work on this project may not go forward unless and until a revised Notice of Intent is submitted which provides sufficient information and includes measures which are adequate to protect the Act's interests, and a final Order of Conditions is issued. **A description of the specific information which is lacking and why it is necessary is attached to this Order as per 310 CMR 10.05(6)(c).**

3. ☐ Buffer Zone Impacts: Shortest distance between limit of project disturbance and the wetland resource area specified in 310 CMR 10.02(1)(a) _____ a. linear feet

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

Resource Area	Proposed Alteration	Permitted Alteration	Proposed Replacement	Permitted Replacement
4. ☒ Bank	10 a. linear feet	b. linear feet	c. linear feet	d. linear feet
5. ☐ Bordering Vegetated Wetland	a. square feet	b. square feet	c. square feet	d. square feet
6. ☐ Land Under Waterbodies and Waterways	a. square feet	b. square feet	c. square feet	d. square feet
	e. c/y dredged	f. c/y dredged		
7. ☐ Bordering Land Subject to Flooding	a. square feet	b. square feet	c. square feet	d. square feet
Cubic Feet Flood Storage	e. cubic feet	f. cubic feet	g. cubic feet	h. cubic feet
8. ☐ Isolated Land Subject to Flooding	a. square feet	b. square feet		
Cubic Feet Flood Storage	c. cubic feet	d. cubic feet	e. cubic feet	f. cubic feet
9. ☐ Riverfront Area	a. total sq. feet	b. total sq. feet		
Sq ft within 100 ft	c. square feet	d. square feet	e. square feet	f. square feet
Sq ft between 100-200 ft	g. square feet	h. square feet	i. square feet	j. square feet

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

Provided by MassDEP:
316-0748
MassDEP File #

eDEP Transaction #
Waltham
City/Town

B. Findings (cont.)

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

	Proposed Alteration	Permitted Alteration	Proposed Replacement	Permitted Replacement
10. ☐ Designated Port Areas	Indicate size under Land Under the Ocean, below			
11. ☐ Land Under the Ocean	a. square feet	b. square feet		
	c. c/y dredged	d. c/y dredged		
12. ☐ Barrier Beaches	Indicate size under Coastal Beaches and/or Coastal Dunes below			
13. ☐ Coastal Beaches	a. square feet	b. square feet	c. nourishment (cu yd)	d. nourishment (cu yd)
14. ☐ Coastal Dunes	a. square feet	b. square feet	c. nourishment (cu yd)	d. nourishment (cu yd)
15. ☐ Coastal Banks	a. linear feet	b. linear feet		
16. ☐ Rocky Intertidal Shores	a. square feet	b. square feet		
17. ☐ Salt Marshes	a. square feet	b. square feet	c. square feet	d. square feet
18. ☐ Land Under Salt Ponds	a. square feet	b. square feet		
	c. c/y dredged	d. c/y dredged		
19. ☐ Land Containing Shellfish	a. square feet	b. square feet	c. square feet	d. square feet
20. ☐ Fish Runs	Indicate size under Coastal Banks, Inland Bank, Land Under the Ocean, and/or inland Land Under Waterbodies and Waterways, above			
	a. c/y dredged	b. c/y dredged		
21. ☐ Land Subject to Coastal Storm Flowage	a. square feet	b. square feet		
22. ☐ Riverfront Area	a. total sq. feet	b. total sq. feet		
Sq ft within 100 ft	c. square feet	d. square feet	e. square feet	f. square feet
Sq ft between 100-200 ft	g. square feet	h. square feet	i. square feet	j. square feet

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

Provided by MassDEP:
316-0748
MassDEP File #

eDEP Transaction #
Waltham
City/Town

B. Findings (cont.)

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

23. ☐ Restoration/Enhancement *:

a. square feet of BVW _____ b. square feet of salt marsh _____

24. ☐ Stream Crossing(s):

a. number of new stream crossings _____ b. number of replacement stream crossings _____

C. General Conditions Under Massachusetts Wetlands Protection Act

The following conditions are only applicable to Approved projects.

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

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

Provided by MassDEP:
316-0748
MassDEP File #

eDEP Transaction #

Waltham
City/Town

C. General Conditions Under Massachusetts Wetlands Protection Act

8. This Order is not final until all administrative appeal periods from this Order have elapsed, or if such an appeal has been taken, until all proceedings before the Department have been completed.

9. No work shall be undertaken until the Order has become final and then has been recorded in the Registry of Deeds or the Land Court for the district in which the land is located, within the chain of title of the affected property. In the case of recorded land, the Final Order shall also be noted in the Registry's Grantor Index under the name of the owner of the land upon which the proposed work is to be done. In the case of the registered land, the Final Order shall also be noted on the Land Court Certificate of Title of the owner of the land upon which the proposed work is done. The recording information shall be submitted to the Conservation Commission on the form at the end of this Order, which form must be stamped by the Registry of Deeds, prior to the commencement of work.

10. A sign shall be displayed at the site not less then two square feet or more than three square feet in size bearing the words,

    "Massachusetts Department of Environmental Protection" [or, "MassDEP"]

    "File Number 316-0748 "

11. Where the Department of Environmental Protection is requested to issue a Superseding Order, the Conservation Commission shall be a party to all agency proceedings and hearings before MassDEP.

12. Upon completion of the work described herein, the applicant shall submit a Request for Certificate of Compliance (WPA Form 8A) to the Conservation Commission.

13. The work shall conform to the plans and special conditions referenced in this order.

14. Any change to the plans identified in Condition #13 above shall require the applicant to inquire of the Conservation Commission in writing whether the change is significant enough to require the filing of a new Notice of Intent.

15. The Agent or members of the Conservation Commission and the Department of Environmental Protection shall have the right to enter and inspect the area subject to this Order at reasonable hours to evaluate compliance with the conditions stated in this Order, and may require the submittal of any data deemed necessary by the Conservation Commission or Department for that evaluation.

16. This Order of Conditions shall apply to any successor in interest or successor in control of the property subject to this Order and to any contractor or other person performing work conditioned by this Order.

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

Provided by MassDEP:
316-0748
MassDEP File #

eDEP Transaction #
Waltham
City/Town

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

17. Prior to the start of work, and if the project involves work adjacent to a Bordering Vegetated Wetland, the boundary of the wetland in the vicinity of the proposed work area shall be marked by wooden stakes or flagging. Once in place, the wetland boundary markers shall be maintained until a Certificate of Compliance has been issued by the Conservation Commission.

18. All sedimentation barriers shall be maintained in good repair until all disturbed areas have been fully stabilized with vegetation or other means. At no time shall sediments be deposited in a wetland or water body. During construction, the applicant or his/her designee shall inspect the erosion controls on a daily basis and shall remove accumulated sediments as needed. The applicant shall immediately control any erosion problems that occur at the site and shall also immediately notify the Conservation Commission, which reserves the right to require additional erosion and/or damage prevention controls it may deem necessary. Sedimentation barriers shall serve as the limit of work unless another limit of work line has been approved by this Order.

19. The work associated with this Order (the "Project")
    (1) ☒ is subject to the Massachusetts Stormwater Standards
    (2) ☐ is NOT subject to the Massachusetts Stormwater Standards

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

    a) All work, including site preparation, land disturbance, construction and redevelopment, shall be implemented in accordance with the construction period pollution prevention and erosion and sedimentation control plan and, if applicable, the Stormwater Pollution Prevention Plan required by the National Pollution Discharge Elimination System Construction General Permit as required by Stormwater Condition 8. Construction period erosion, sedimentation and pollution control measures and best management practices (BMPs) shall remain in place until the site is fully stabilized.

    b) No stormwater runoff may be discharged to the post-construction stormwater BMPs unless and until a Registered Professional Engineer provides a Certification that:
    i. all construction period BMPs have been removed or will be removed by a date certain specified in the Certification. For any construction period BMPs intended to be converted to post construction operation for stormwater attenuation, recharge, and/or treatment, the conversion is allowed by the MassDEP Stormwater Handbook BMP specifications and that the BMP has been properly cleaned or prepared for post construction operation, including removal of all construction period sediment trapped in inlet and outlet control structures;
    ii. as-built final construction BMP plans are included, signed and stamped by a Registered Professional Engineer, certifying the site is fully stabilized;
    iii. any illicit discharges to the stormwater management system have been removed, as per the requirements of Stormwater Standard 10;

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

iv. all post-construction stormwater BMPs are installed in accordance with the plans (including all planting plans) approved by the issuing authority, and have been inspected to ensure that they are not damaged and that they are in proper working condition;

v. any vegetation associated with post-construction BMPs is suitably established to withstand erosion.

c) The landowner is responsible for BMP maintenance until the issuing authority is notified that another party has legally assumed responsibility for BMP maintenance. Prior to requesting a Certificate of Compliance, or Partial Certificate of Compliance, the responsible party (defined in General Condition 18(e)) shall execute and submit to the issuing authority an Operation and Maintenance Compliance Statement ("O&M Statement) for the Stormwater BMPs identifying the party responsible for implementing the stormwater BMP Operation and Maintenance Plan ("O&M Plan") and certifying the following:

i.) the O&M Plan is complete and will be implemented upon receipt of the Certificate of Compliance, and

ii.) the future responsible parties shall be notified in writing of their ongoing legal responsibility to operate and maintain the stormwater management BMPs and implement the Stormwater Pollution Prevention Plan.

d) Post-construction pollution prevention and source control shall be implemented in accordance with the long-term pollution prevention plan section of the approved Stormwater Report and, if applicable, the Stormwater Pollution Prevention Plan required by the National Pollution Discharge Elimination System Multi-Sector General Permit.

e) Unless and until another party accepts responsibility, the landowner, or owner of any drainage easement, assumes responsibility for maintaining each BMP. To overcome this presumption, the landowner of the property must submit to the issuing authority a legally binding agreement of record, acceptable to the issuing authority, evidencing that another entity has accepted responsibility for maintaining the BMP, and that the proposed responsible party shall be treated as a permittee for purposes of implementing the requirements of Conditions 18(f) through 18(k) with respect to that BMP. Any failure of the proposed responsible party to implement the requirements of Conditions 18(f) through 18(k) with respect to that BMP shall be a violation of the Order of Conditions or Certificate of Compliance. In the case of stormwater BMPs that are serving more than one lot, the legally binding agreement shall also identify the lots that will be serviced by the stormwater BMPs. A plan and easement deed that grants the responsible party access to perform the required operation and maintenance must be submitted along with the legally binding agreement.

f) The responsible party shall operate and maintain all stormwater BMPs in accordance with the design plans, the O&M Plan, and the requirements of the Massachusetts Stormwater Handbook.

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

Provided by MassDEP:
316-0748
MassDEP File #

eDEP Transaction #
Waltham
City/Town

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

g) The responsible party shall:
1. Maintain an operation and maintenance log for the last three (3) consecutive calendar years of inspections, repairs, maintenance and/or replacement of the stormwater management system or any part thereof, and disposal (for disposal the log shall indicate the type of material and the disposal location);
2. Make the maintenance log available to MassDEP and the Conservation Commission ("Commission") upon request; and
3. Allow members and agents of the MassDEP and the Commission to enter and inspect the site to evaluate and ensure that the responsible party is in compliance with the requirements for each BMP established in the O&M Plan approved by the issuing authority.

h) All sediment or other contaminants removed from stormwater BMPs shall be disposed of in accordance with all applicable federal, state, and local laws and regulations.

i) Illicit discharges to the stormwater management system as defined in 310 CMR 10.04 are prohibited.

j) The stormwater management system approved in the Order of Conditions shall not be changed without the prior written approval of the issuing authority.

k) Areas designated as qualifying pervious areas for the purpose of the Low Impact Site Design Credit (as defined in the MassDEP Stormwater Handbook, Volume 3, Chapter 1, Low Impact Development Site Design Credits) shall not be altered without the prior written approval of the issuing authority.

l) Access for maintenance, repair, and/or replacement of BMPs shall not be withheld. Any fencing constructed around stormwater BMPs shall include access gates and shall be at least six inches above grade to allow for wildlife passage.

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

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

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

Provided by MassDEP:
316-0748
MassDEP File #

eDEP Transaction #

Waltham
City/Town

D. Findings Under Municipal Wetlands Bylaw or Ordinance

1. Is a municipal wetlands bylaw or ordinance applicable? ☐ Yes ☒ No

2. The _____ hereby finds (check one that applies):
   Conservation Commission

   a. ☐ that the proposed work cannot be conditioned to meet the standards set forth in a municipal ordinance or bylaw, specifically:

   _____ _____
   1. Municipal Ordinance or Bylaw 2. Citation

   Therefore, work on this project may not go forward unless and until a revised Notice of Intent is submitted which provides measures which are adequate to meet these standards, and a final Order of Conditions is issued.

   b. ☐ that the following additional conditions are necessary to comply with a municipal ordinance or bylaw:

   _____ _____
   1. Municipal Ordinance or Bylaw 2. Citation

3. The Commission orders that all work shall be performed in accordance with the following conditions and with the Notice of Intent referenced above. To the extent that the following conditions modify or differ from the plans, specifications, or other proposals submitted with the Notice of Intent, the conditions shall control.
   The special conditions relating to municipal ordinance or bylaw are as follows (if you need more space for additional conditions, attach a text document):

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

Provided by MassDEP:
316-0748
MassDEP File #

eDEP Transaction #

Waltham
City/Town

E. Signatures

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

4-11-2019
1. Date of Issuance

Please indicate the number of members who will sign this form.
This Order must be signed by a majority of the Conservation Commission.

6
2. Number of Signers

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

Signatures:

☒ by hand delivery on

4-11-2019
Date

☐ by certified mail, return receipt requested, on

Date

F. Appeals

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

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

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

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

Provided by MassDEP:
316-0748
MassDEP File #

eDEP Transaction #

Waltham
City/Town

G. Recording Information

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

Waltham
Conservation Commission

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

To:

Waltham
Conservation Commission

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

338/190 Trapelo Road — Project Location
316-0748 — MassDEP File Number

Has been recorded at the Registry of Deeds of:

County | Book | Page

for: Property Owner

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

Book | Page

In accordance with the Order of Conditions issued on:

Date

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

Instrument Number

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

Document Number

Signature of Applicant

Waltham Conservation Commission
119 School Street
Waltham, MA 02451-4596

SPECIAL ORDER OF CONDITIONS (v1.2)
AS ISSUED BY THE WALTHAM CONSERVATION COMMISSION

DEP File Number: 316-0748
Applicant: City of Waltham
Location: 338/190 Trapelo Road
Date of Issuance: 4-11-2019

Finding of Facts:

The Massachusetts Department of Environmental Protection ("MassDEP"), Massachusetts Wetlands Protection Regulations, 310 CMR 10.00, identifies restoration projects that can be permitted as "Ecological Restoration Projects"; see 310 CMR 10.53 (4) for inland ecological restoration projects. In this case, advancing ecological restorations that yield a net ecological benefit can be authorized as a Limited Project and the strict thresholds, e.g. no alteration of Bordering Vegetated Wetland ("BVW") greater than 5,000 square feet, can be waived and authorized by a Conservation Commission. 310 CMR 10.54 (4)(e.) identifies the following activities as eligible inland ecological restoration projects:

- Dam Removal Projects,
- Freshwater Stream Crossing Repair and Replacement Projects,
- Stream Daylighting Projects,
- Tidal Restoration Projects, and
- Other Restoration Projects.

The Waltham Conservation Commission has determined that this project meets the MassDEP's requirements to be categorized as an Ecological Restoration Project as it meets several of the classifications above, most notably Stream Daylighting. The project as designed and submitted does not require relief from the regulations and the project was not filed as a Limited Project, however the Waltham Conservation Commission finds that the project as designed and permitted, meets the classification of Ecological Restoration and issues this Order of Conditions as an Ecological Restoration Project.

Violation of any condition stated herein may result in Enforcement Action.

21. RECORDING AND ADMINISTRATION

A. Prior to any work on the site, or within six (6) weeks of the date of this Order, whichever comes first, this Order of Conditions shall be recorded at the Middlesex Registry of Deeds or Land Court, and notice filed with the Commission, pursuant to General Condition 9. Failure to do so shall be deemed cause to revoke this Order.

B. In advance of any work on this project, the applicant shall notify the Commission, and at the request of the Commission, shall arrange an on-site conference among the Commission, the contractor, and the applicant to ensure that all of the conditions of this Order are understood.

C. This Order shall be made a part of all contracts and subcontracts dealing with the work proposed, and shall supersede all other conflicting contract requirements. Except where modified by the following Conditions, all work shall be performed in accordance with the plans and the Notice of Intent. Where a conflict exists between the referenced plans and these Conditions, the Conditions will govern.

D. This Order shall apply to and be binding upon the applicant, its employees, and all successors and assigns in interest or control.

E. Prior to any work being done on the project site, the applicant shall inform the Waltham Conservation Commission in writing of the names, email and mailing addresses, and business and mobile phone numbers of both the project supervisor who will be responsible for ensuring on-site compliance with this order and his/her alternate. The applicant shall also notify the Commission in writing of any changes in this information.

F. Any errors found in the plans or information submitted by the applicant shall be considered as changes, and the procedures outlined in General Condition 14 shall be followed.

G. In conjunction with the sale of any portion of the site covered by this Order of Conditions, the applicant shall submit to the Commission a signed statement by the buyer that he/she is aware of outstanding Orders of Conditions.

H. The Commission may authorize its designated agent to act on its behalf in determining compliance.

I. Special Conditions 25A through 25J shall apply in perpetuity and shall not expire with the issuance of a Certificate of Compliance for this project.

22. PRIOR TO COMMENCEMENT OF WORK

The following conditions, in addition to 21A, 21B, 21C, and 21E, are requirements prior to the commencement of work:

A. Prior to any work on site, the wetland resource area delineation, limit of work delineation, tree protection measures, and erosion controls shall all be in place. The applicant shall notify the Conservation Commission when all of these controls are in place, and, if requested by the Commission, shall arrange an on-site conference among the Commission, the contractor, and the applicant to review same.

B. The wetland resource areas and proposed limit of work shall be clearly marked with stakes, flags or fencing. Such markers will be maintained until all construction on the site's perimeter is complete. All workers shall be informed that no construction activity is to occur beyond this line at any time.

C. The applicant shall preserve and protect all sizeable (DBH of 6 in. or greater) trees, including root systems, that are located in whole or in part within resource areas, 100 ft. buffer zones, or 200 ft. riparian zones, during the demolition and construction phases of this project, except where one or both of the following exceptions are met:

i. Explicit permission has been granted by the Conversation Commission to remove such trees.

ii. The entire tree including root systems is outside the limit of work and therefore already protected by the limit-of-work stakes, flags, or fencing.

At sizeable trees that are to be preserved and protected, strap boards around the trunk from ground level to a height of at least 8 feet. Install fencing below the perimeter of the crown of the tree, or a distance of at least 18 in. from the trunk for each inch of trunk diameter, whichever is greater, to prevent damage to the roots or compaction of soil around the roots. Such measures shall be maintained until all construction, earthwork, and grading is complete, and then shall be removed and legally disposed of off-site. Trees that are scheduled and approved for removal shall be cut off near ground level; no removal of stumps or roots shall occur without written approval of the Conservation Commission.

D. Erosion controls as shown on the approved plans and described herein shall be installed.

i. Perimeter protection consisting of an erosion control barrier of a filter fabric fence backed by a row of double-staked straw bales (not hay), straw wattles, filter socks, or other approved perimeter protection described in the NOI and shown in the referenced plans, shall be placed between all construction activities and wetland areas or rivers, in accordance with Erosion and Sedimentation Guidelines for Urban and Suburban Areas, Mass. DEP, March 1997 or current version. Silt fencing (if proposed) shall be entrenched 4 in. into the ground and double staked.

ii. Stormwater catch basins located adjacent to the site that may receive stormwater runoff from the site shall be protected. These protections shall be installed in accordance with the plans approved by this Order and/or per the direction of the Waltham Conservation Commission. Silt sacks (not filter fabric) installed and properly maintained generally meet this requirement. Silt sacks, if required for the project, shall be emptied at least once every two weeks and whenever silt and debris have collected to a level that is affecting the functionality of the silt sack and/or catch basins. Silt sacks shall be maintained in good working order and must be repaired or replaced when damaged.

iii. The applicant shall regularly clean the closest catch basins in every direction of the construction site, and regularly clean the city streets between the site and said catch basins, for the duration of construction.

iv. Upon completion of the project, the applicant shall remove and legally dispose of off-site all temporary erosion controls and other materials determined to be detrimental to the resource areas if left in place permanently.

E. The applicant shall have on hand at the start of any soil disturbance, removal or stockpiling, a minimum of 20% additional straw bales, straw wattles, filter socks, silt fencing, or other approved perimeter protection

system, in good condition, and sufficient stakes for installation. Said items shall be used only for the control of emergency erosion problems and shall not be used for the normal control of erosion described in Condition "D".

23. DURING WORK

A. Accepted engineering and construction standards and procedures for protection of the resource area shall be followed in the completion of this project.

B. A copy of this Order of Conditions, all construction plans, and wetland replication plans if applicable, shall be maintained on site for the duration of any site work and made available to any person doing work on the site.

C. Site grading and construction shall be scheduled to avoid periods of high water. Once begun, grading and construction shall move uninterrupted to completion to avoid erosion and sedimentation of wetlands.

D. Any dewatering or drawdown activities on the project shall not directly discharge into a resource area or as surface flow. All discharges, including those to a storm drainage system, shall make use of a sedimentation tank or similar device to remove sediment before the water is released.

E. As soon as possible during construction, all disturbed areas in the resource area, 100 ft. buffer zone, or 200 ft. riparian zone shall be brought to final finished grade and stabilized permanently against erosion. This shall be done either by sodding, or by loaming, seeding, and mulching according to Natural Resources Conservation Service (formerly USDA) Soil Conservation Service Guidelines. If the latter course is chosen, stabilization will be considered completed once the surface shows complete vegetative cover. Bare, graded ground that cannot be permanently stabilized within thirty (30) days shall be stabilized by temporary measures. Stockpiled ground shall be stabilized as described in Condition 23.G below.

F. No earthen embankment in the resource area, 100 ft. buffer zone, or 200 ft. riparian zone shall have a post-construction slope steeper than 2:1 unless engineered slope stabilization is provided.

G. There shall be no stockpiling of soil, sand, or similar unconsolidated material within the resource area, 100 ft. buffer zone, or 200 ft. riparian zone, unless otherwise authorized by these Conditions or by the Waltham Conservation Commission. Any stockpile of soil, sand, or similar materials that is permitted within said areas must be enclosed within a line of entrenched and staked erosion control socks or silt fence in addition to the perimeter erosion controls for the site. In the event that all earthwork ceases for more than 15 days or if inclement weather is imminent, all exposed stockpiled soils must be stabilized with a temporary vegetative cover, tarp, or other erosion control acceptable to the Waltham Conservation Commission.

H. There shall be no discharge or spillage of fuel, oil, or other pollutants (including but not limited to: paint stripper, soap, detergent, other cleaning chemicals, industrial solvents, strong acids and bases, etc.) into any resource area, 100 ft. buffer zone, or 200 ft. riparian zone. The applicant shall take all reasonable precautions to prevent the release of pollutants by ignorance, accident, or vandalism. No fueling or maintenance of vehicles shall be allowed within a resource area, 100 ft. buffer zone, or 200 ft. riparian zone, unless otherwise authorized by the Conditions or the Waltham Conservation Commission.

I. No plants, shrubs, or trees listed on the latest Massachusetts Department of Agricultural Resources Prohibited Plant List (invasive species) may be brought onto or planted anywhere on the property. (Plant List is available at http://www.mass.gov/eea/agencies/agr/farm-products/plants/massachusetts-prohibited-plant-list.html).

J. Planting within the resource area, 100 ft. buffer zone, and 200 ft. riparian zone shall be limited to species that are native to Massachusetts.

24. POST CONSTRUCTION

Upon completion of construction and final soil stabilization, the Applicant shall submit the following to the Waltham Conservation Commission to request a Certificate of Compliance (COC):

A. A completed Request for Certificate of Compliance – WPA Form 8A;

B. In the case of commercial and multi-family residential projects, and all projects that involve re-grading inside a flood zone or flood plain: an as-built plan (including grading) and a signed letter from a licensed professional certifying that the work has been completed in substantial compliance with the approved plans and the Order of Conditions.

25. UPON COMPLETION OF WORK - CONDITIONS IN PERPETUITY

The following Conditions are ongoing and do not expire with the expiration of the Order of Conditions or the issuance or a Certificate of Compliance.

A. No underground storage of fuel oil or other petroleum products shall be allowed within the resource area, 100 ft. buffer zone, or 200 ft. riparian zone. There shall be no storage of petroleum products within the resource area, 100 ft. buffer zone, or 200 ft. riparian zone on the site at any time, except to the extent reasonably necessary for the ordinary uses of the occupants and maintenance staff of the property (e.g., re-fueling landscaping and snow removal equipment for use on the property, and the fuel and oil contained within vehicles). For single family homes, this restriction limits quantities to those commensurate with maintaining a single family home.

B. Fertilizer, pesticides, and herbicides shall not be used within a resource area, 100 ft. buffer zone, or 200 ft. riparian zone, except where herbicides or pesticides are used in a limited application to target invasive species where specifically approved by the Conservation Commission. For the duration of each landscaping season, signs of a minimum of two square feet that are reasonably legible and that state such restriction, shall be posted and maintained at all landscaper access points to all landscaped areas that occur in the above-mentioned areas, on all except single-family residential properties.

C. Salt and other chemical de-icing shall not be used within a resource area or within a resource area, 100 ft. buffer zone, or 200 ft. riparian zone. For the duration of each snow removal season, signs of a minimum of two square feet that are reasonably legible and that state such restriction shall be posted and maintained at all vehicle entrances to the above mentioned area on all except single-family residential properties.

D. Sand used for winter traction in paved areas shall be removed periodically during the winter and by May 1st of each year. Records of cleaning shall be maintained on site.

E. There shall be no discharge or spillage of fuel, oil, or other pollutants (including but not limited to: paint stripper, soap or detergent, other cleaning chemicals, industrial solvents, strong acids and bases, etc.) into any resource area, 100 ft. buffer zone, or 200 ft. riparian zone. The applicant shall take all reasonable precautions to prevent the release of pollutants by ignorance, accident, or vandalism. No fueling or maintenance of vehicles

shall be allowed within a resource area, 100 ft. buffer zone, or 200 ft. riparian zone unless otherwise authorized by the Conditions or the Waltham Conservation Commission.

F. The storm drainage system shall be equipped with gas and oil traps. Catch basins shall be inspected by the applicant every 6 months, and cleaned and maintained as needed based on the inspection. Records of said inspection and cleaning shall be maintained on site.

G. Following the completion of construction and grading, all exposed soils within the resource area(s), 100 ft. buffer zone, and 200 ft. riparian zone must be adequately stabilized. Gradients of 3 units horizontal to 1 unit vertical or steeper must be stabilized with a permanent vegetative cover, unless engineered slope stabilization is provided. Bark mulch or wood mulch may in appropriate circumstances be used to provide adequate stabilization on slopes with a gradient less than 3:1.

H. Stormwater infiltration devices must be maintained per manufacturer specifications and the approved Operations and Maintenance plan, if any.

I. Any fencing within a resource area shall have a continuous gap, interrupted only at main support posts, between the bottom of the fence and the ground. The bottom edge shall be free of sharp edges and sharp protrusions. For single-family residential properties, the gap shall be at least 4 in. For commercial and multi-family residential properties, the gap shall be at least 6 in.

J. Any plantings within a resource area, 100 ft. buffer zones, or 200 ft. riparian zones, or as part of any mitigation plan, shall be maintained and successfully established, and the planting area shall be kept free of invasive plant species. The Commission may require replanting in case of significant failure.

26. SITE-SPECIFIC CONDITIONS

A. This Order of Conditions will expire four years from date of issuance.

B. The applicant shall conduct photo-point monitoring by establishing at least three photo-points for pre- and post-restoration monitoring at the stream daylighting site. One photo-point location shall be chosen to document the upstream end of the site and one photo-point location shall be chosen to document the downstream end of the site. A third photo-point shall be chosen to document conditions in the restored channel. Photos shall be taken during high flow and low (summer) flow of each year during the two years following completion of the project.

C. To promote biodiversity, no more than 2 individuals of any one tree species, and no more than 10 individuals of one shrub species, shall be planted. Two of the trees shall be Waverly Oak.

D. The construction of two foot bridges is permitted in locations to be determined.

E. See Finding of Facts above. This project shall be classified as an "Ecological Restoration Project".

F. At least one of the weirs shall be configured to allow for active control of the flow.

ATTACHMENT D

ATTACHMENT D

Limited Soils and Groundwater Testing

efi global

BOSTON NORTH

November 20, 2018

Mr. oseph Pedulla, MCPPO, CPM
Chief Procurement Officer
City of Waltham
610 Main Street
Waltham, Massachusetts 02452

via email: jpedulla@city.waltham.ma.us

RE: **Limited Subsurface Soil and Groundwater Investigation Report**
Fernald School – Cottage Area
200 Trapelo Road
Waltham, Massachusetts
EFI Project No. 020.00107

Dear Mr. Pedulla,

At your request, in October 2018, EFI Global, Inc. (EFI) completed a Limited Subsurface Soil and Groundwater Investigation of the Cottage Area at the Fernald School, located at 200 Trapelo Road in Waltham, Massachusetts (Site).

The purpose of this limited subsurface soil and groundwater investigation was to evaluate the potential for subsurface impacts from historic uses of the property. Additionally, this investigation was conducted to evaluate for the potential presence of contamination in the subsurface which could be encountered during proposed stream reconstruction activities of a currently culverted stream that transects the Cottage Area from north to south, and flows in a southern direction.

The Cottage Area is shown on the Figure included in Attachment C and is approximately 28 acres. At the time of this investigation, the majority of the area was cleared, undeveloped land. Based on a review of historical documentation (aerial photographs, topographic maps, Sanborn fire insurance maps), the Cottage Area was historically used for residential purposes, with multiple residential cottages and associated buildings (i.e., common area buildings) from the mid-1970s until 2017, when the buildings were demolished. Prior to the mid-1970s, the area was either undeveloped wooded land or was utili ed for agricultural purposes. Historically, the culverted stream was open air, and the original streambed mirrors the approximate location of the noted culvert. The stream was re-routed into the culvert in the mid-1970s and the original streambed filled, in order to accommodate the development of the residential cottage buildings.

SITE INVESTIGATION

Due to the fact that the reconstruction of the culverted stream would require excavation, it was determined that in order to evaluate the soils that would potentially be encountered during excavation, subsurface soil and groundwater samples would be collected to evaluate the area for potential impacts from historical use and/or anthropogenic sources.

Because the exact location of the new streambed has not been determined, subsurface soil sampling was conducted in such a way as to attempt to bracket any proposed location of the new streambed. The current culverted stream was identified and marked with stakes across the Cottage Area. EFI collected east-west transecting subsurface soil samples along either side of the culverted stream at approximately 200 foot intervals, to provide cross-sections of the subsurface conditions along the proposed streambed area.

EFI performed subsurface assessment activities on October 1-3, 2018. The assessment consisted of the advancement of soil borings to collect soil samples field and laboratory analysis. A track-mounted Geoprobe was utili ed to direct push hollow steel barrel samplers with liners to depths up to approximately 15 below the ground surface (bgs). The hollow barrel sampler consisted of a 5' section of narrow diameter threaded steel casing which allows soil to enter the sampling tube (liner). The liner was then retrieved the casing was opened and then relinquished to the on-site EFI representative. EFI collected a total of 24 soil samples from 25 soil boring locations (SB-2001 through SB-1025). Samples were collected from each boring at 5 foot intervals to approximate depths of up to 15' bgs. Samples were identified by interval that were measured in feet (i.e. (0-5'), (5-10'), etc.). It should also be noted, that refusal was encountered at depths between 1-12 feet at some of the boring locations, which may or may not have resulted in several attempts within a relatively close proximity. Please refer to the attached boring logs for additional information.

During the soil boring activities, EFI performed headspace screening of soil utili ing a photoioni ation detector (PID) equipped with a 10.6 electron-volt (eV) lamp calibrated to report total volatile organic compounds (tVOCs) in parts per million (ppm) as ben ene . Only one sample reported a PID reading above the instrument detection limit (sample SB-2019 (5-10' at a concentration of 2.2 ppm.) All other PID readings were not detected (ND).

Representative samples were collected from certain intervals to represent surficial soil and the underlying material, which has the potential to be disturbed during potential, future construction activities. These samples were submitted to a certified laboratory for analysis. Soil samples were placed in laboratory-supplied containers, labeled, and placed in a cooler on ice for shipment. Samples were sent for laboratory analysis under chain of custody protocol to Con-Test Analytical Laboratories (Con-Test) of East Longmeadow, Massachusetts. Samples were submitted to the laboratory for the following analyses:

- polychlorinated biphenyls (PCBs) via USEPA Method 8082 (with 3540 soxhlet extraction)
- semi-volatile organic compounds (SVOCs) via USEPA method 8270 and
- 14 Massachusetts Contingency Plan (MCP) Priority Pollutant Metals via USEPA Methods 7471 (mercury), and 6010 (remaining metals)

Additional soil samples were also collected from the one boring location (SB-2019) that exhibited an elevated PID reading. These samples were submitted for the following additional analyses:

- Volatile organic compounds (VOCs) via USEPA Method 8260
- Extractible petroleum hydrocarbons (EPH) via Massachusetts EPH Method and,
- Volatile petroleum hydrocarbons (VPH) via Massachusetts VPH Method.

Two soil borings (SB-2001 and SB-2018) were completed as permanent groundwater monitoring wells identified as MW-1 and MW-3, respectively. Due to shallow refusal encountered at several locations at, and in the immediate vicinity of, SB-2013, MW-2 was subsequently relocated and installed approximately 100 feet south of SB-2013. Additionally, EFI attempted to install a well at boring location SB-2025 however, groundwater was not encountered. MW-1, MW-2 and MW-3 were completed to an approximate depth of 12, 10 and 14 feet, respectively. Following the completion of the monitoring wells, the wells were allowed to stabili e prior to sampling. October 30th and 31st, 2018, the wells were purged of at least three well volumes or until dry prior to the collection of groundwater samples. Samples were collected utili ing a peristaltic pump and low flow sampling techniques.

Groundwater samples were placed in laboratory supplied containers, labeled, and placed in a cooler on ice for shipment to Con-Test under chain of custody protocol. Samples were submitted to the laboratory for the following analyses:

- VOCs via USEPA method 8260
- SVOCs via USEPA method 8270 and
- Total petroleum hydrocarbons diesel range organics (TPH-DRO) via USEPA method 8015.

For boring and well locations, refer to the Sample Location Plan provided as Attachment A**.**

ANALYTICAL RESULTS

Soil laboratory analytical results are summari ed in Table 1 and compared to their respective reportable concentrations (RCS-1), in accordance with the Massachusetts Department of Environmental Protection (MassDEP) Massachusetts Contingency Plan (MCP) 310 CMR 40.0000.

<u>Soil</u>

- PCB concentrations were reported below laboratory reporting limits in all samples
- Low concentrations of metals were reported in several samples however, none were reported above RCS-1 concentrations and reported values are interpreted to be naturally occurring
- SVOCs were reported above the laboratory reporting limit in three samples. All reported concentration were below RCS-1.

<u>Groundwater</u>

- VOCs were reported above the laboratory reporting limit in the samples collected from MW-1 and MW-3. All reported concentration were below RCS-1.
- SVOCs were reported below the laboratory reporting limit in the three samples collected.
- TPH-DRO was reported above the laboratory reporting limit in the sample collected from MW-1. The reported result is less than the RCGW-2 concentration. TPH was reported below the laboratory reporting limit in the samples collected from wells MW-2 and MW-3.

RECOMMENDATIONS AND CONCLUSIONS

Based on the results of this investigation, no further investigation is recommended.

EFI is pleased to provide environmental consulting services to the City of Waltham. If you have any questions regarding the contents of this report, or are in need of additional information, please do not hesitate to contact either of the undersigned at 800-659-1202. Thank you for the opportunity to serve your environmental needs.

Sincerely,
EFI Global, Inc.

ohn Va
Project Manager

Scott Parker, PG, LSP
Licensed Site Professional

Sean E. Cassidy, CIEC
Branch Manager

Enclosures:

Tables
- Table 1 Summary of Soil Sampling Analytical Results
- Table 2 Summary of Groundwater Sampling Analytical Results

Attachment A Sample Location Plan
Attachment B Boring Logs
Attachment C Laboratory Analytical Reports

TABLES

Table 1 - Soil Results Table
Fernald School Cottage Area Subsurface Sampling
200 Trapelo Road, Waltham, Massachusetts

Parameter	Reportable Concentrations (RCs)		SAMPLING LOCATION				
	RCS-1	RCS-2	2001 0-5'	2001 5-10'	2005 0-5'	2005 5-7'	2009 0-5'
Sampling Date			10/2/2018 9:30:00 AM	10/2/2018 9:30:00 AM	10/2/2018 3:00:00 PM	10/2/2018 3:00:00 PM	10/3/2018 10:30:00 AM
Sample Depth			0-5 Feet	5-10 Feet	0-5 Feet	5-7 Feet	0-5 Feet
MADEP-EPH-04-1.1 (mg/Kg dry)							
C9-C18 ALIPHATICS	1000	3000	NT	NT	NT	NT	NT
C19-C36 ALIPHATICS	3000	5000	NT	NT	NT	NT	NT
UNAD USTED C11-C22 AROMATICS			NT	NT	NT	NT	NT
C11-C22 AROMATICS	1000	3000	NT	NT	NT	NT	NT
ACENAPHTHENE	4	3000	NT	NT	NT	NT	NT
ACENAPHTHYLENE	1	10	NT	NT	NT	NT	NT
ANTHRACENE	1000	3000	NT	NT	NT	NT	NT
BENZO(A)ANTHRACENE	7	40	NT	NT	NT	NT	NT
BENZO(A)PYRENE	2	7	NT	NT	NT	NT	NT
BENZO(B)FLUORANTHENE	7	40	NT	NT	NT	NT	NT
BENZO(G,H,I)PERYLENE	1000	3000	NT	NT	NT	NT	NT
BENZO( )FLUORANTHENE	70	400	NT	NT	NT	NT	NT
CHRYSENE	70	400	NT	NT	NT	NT	NT
DIBENZ(A,H)ANTHRACENE	0.7	4	NT	NT	NT	NT	NT
FLUORANTHENE	1000	3000	NT	NT	NT	NT	NT
FLUORENE	1000	3000	NT	NT	NT	NT	NT
INDENO(1,2,3-CD)PYRENE	7	40	NT	NT	NT	NT	NT
2-METHYLNAPHTHALENE	0.7	80	NT	NT	NT	NT	NT
NAPHTHALENE	4	20	NT	NT	NT	NT	NT
PHENANTHRENE	10	1000	NT	NT	NT	NT	NT
PYRENE	1000	3000	NT	NT	NT	NT	NT
MADEP-VPH-Feb 2018 Rev 2.1 (mg/Kg dry)							
UNAD USTED C5-C8 ALIPHATICS			NT	NT	NT	NT	NT
C5-C8 ALIPHATICS	100	500	NT	NT	NT	NT	NT
UNAD USTED C9-C12 ALIPHATICS			NT	NT	NT	NT	NT
C9-C12 ALIPHATICS	1000	3000	NT	NT	NT	NT	NT
C9-C10 AROMATICS	100	500	NT	NT	NT	NT	NT
BENZENE	2	200	NT	NT	NT	NT	NT
ETHYLBENZENE	40	1000	NT	NT	NT	NT	NT
METHYL TERT-BUTYL ETHER (MTBE)	0.1	100	NT	NT	NT	NT	NT
NAPHTHALENE	4	20	NT	NT	NT	NT	NT
TOLUENE	30	1000	NT	NT	NT	NT	NT
M/P-XYLENE	100	100	NT	NT	NT	NT	NT
O-XYLENE	100	100	NT	NT	NT	NT	NT
SM 2540G (% Wt)							
% Solids			79.9	93.2	86.9	78.4	88.7
SW-846 6010D (mg/Kg dry) Metals Digestion							
ANTIMONY	20	30	ND (2.1)	ND (1.7)	ND (1.9)	ND (2.1)	ND (1.9)
ARSENIC	20	20	ND (2.1)	ND (1.7)	ND (1.9)	ND (2.1)	2.7
BARIUM	1000	3000	49	27	56	65	48
BERYLLIUM	90	200	0.53	0.41	0.35	0.54	0.42
CADMIUM	70	100	ND (0.21)	ND (0.17)	ND (0.19)	ND (0.21)	0.27
CHROMIUM	100	200	16	16	9.6	11	14
LEAD	200	600	34	9.0	5.2	7.2	60
NIC EL	600	1000	8.9	8.6	7.8	7.2	11
SELENIUM	400	700	ND (4.2)	ND (3.5)	ND (3.8)	ND (4.2)	ND (3.7)
SILVER	100	200	ND (0.42)	ND (0.35)	ND (0.38)	ND (0.42)	ND (0.37)
THALLIUM	8	60	ND (2.1)	ND (1.7)	ND (1.9)	ND (2.1)	ND (1.9)
VANADIUM	400	700	35	24	31	65	29
ZINC	1000	3000	30	99	52	84	63
SW-846 7471B (mg/Kg dry) Metals Digestion							
MERCURY	20	30	ND (0.032)	ND (0.026)	ND (0.030)	ND (0.031)	0.14
SW-846 8082A (mg/Kg dry)							
PCB 1016	1	4	ND (0.097)	ND (0.084)	ND (0.089)	ND (0.095)	ND (0.086)
PCB 1221	1	4	ND (0.097)	ND (0.084)	ND (0.089)	ND (0.095)	ND (0.086)
PCB 1232	1	4	ND (0.097)	ND (0.084)	ND (0.089)	ND (0.095)	ND (0.086)
PCB 1242	1	4	ND (0.097)	ND (0.084)	ND (0.089)	ND (0.095)	ND (0.086)
PCB 1248	1	4	ND (0.097)	ND (0.084)	ND (0.089)	ND (0.095)	ND (0.086)
PCB 1254	1	4	ND (0.097)	ND (0.084)	ND (0.089)	ND (0.095)	ND (0.086)
PCB 1260	1	4	ND (0.097)	ND (0.084)	ND (0.089)	ND (0.095)	ND (0.086)
PCB 1262	1	4	ND (0.097)	ND (0.084)	ND (0.089)	ND (0.095)	ND (0.086)
PCB 1268	1	4	ND (0.097)	ND (0.084)	ND (0.089)	ND (0.095)	ND (0.086)

Table 1 - Soil Results Table
Fernald School Cottage Area Subsurface Sampling
200 Trapelo Road, Waltham, Massachusetts

SW-846 8260C (mg/Kg dry)							
ACETONE	6	50	NT	NT	NT	NT	NT
TERT-AMYL METHYL ETHER			NT	NT	NT	NT	NT
BENZENE	2	200	NT	NT	NT	NT	NT
BROMOBENZENE	100	1000	NT	NT	NT	NT	NT
BROMOCHLOROMETHANE			NT	NT	NT	NT	NT
BROMODICHLOROMETHANE	0.1	0.1	NT	NT	NT	NT	NT
BROMOFORM	0.1	1	NT	NT	NT	NT	NT
BROMOMETHANE	0.5	0.5	NT	NT	NT	NT	NT
2-BUTANONE (ME)	4	50	NT	NT	NT	NT	NT
N-BUTYLBENZENE			NT	NT	NT	NT	NT
SEC-BUTYLBENZENE			NT	NT	NT	NT	NT
TERT-BUTYLBENZENE	100	1000	NT	NT	NT	NT	NT
TERT-BUTYLETHYL ETHER			NT	NT	NT	NT	NT
CARBON DISULFIDE	100	1000	NT	NT	NT	NT	NT
CARBON TETRACHLORIDE	5	5	NT	NT	NT	NT	NT
CHLOROBENZENE	1	3	NT	NT	NT	NT	NT
CHLORODIBROMOMETHANE	0.005	0.03	NT	NT	NT	NT	NT
CHLOROETHANE	100	1000	NT	NT	NT	NT	NT
CHLOROFORM	0.2	0.2	NT	NT	NT	NT	NT
CHLOROMETHANE	100	1000	NT	NT	NT	NT	NT
2-CHLOROTOLUENE	100	1000	NT	NT	NT	NT	NT
4-CHLOROTOLUENE	100	1000	NT	NT	NT	NT	NT
1,2-DIBROMO-3-CHLOROPROPANE	10	100	NT	NT	NT	NT	NT
1,2-DIBROMOETHANE (EDB)	0.1	0.1	NT	NT	NT	NT	NT
DIBROMOMETHANE	500	5000	NT	NT	NT	NT	NT
1,2-DICHLOROBENZENE	9	100	NT	NT	NT	NT	NT
1,3-DICHLOROBENZENE	3	200	NT	NT	NT	NT	NT
1,4-DICHLOROBENZENE	0.7	1	NT	NT	NT	NT	NT
DICHLORODIFLUOROMETHANE	1000	10000	NT	NT	NT	NT	NT
1,1-DICHLOROETHANE	0.4	9	NT	NT	NT	NT	NT
1,2-DICHLOROETHANE	0.1	0.1	NT	NT	NT	NT	NT
1,1-DICHLOROETHYLENE	3	40	NT	NT	NT	NT	NT
CIS-1,2-DICHLOROETHYLENE	0.1	0.1	NT	NT	NT	NT	NT
TRANS-1,2-DICHLOROETHYLENE	1	1	NT	NT	NT	NT	NT
1,2-DICHLOROPROPANE	0.1	0.1	NT	NT	NT	NT	NT
1,3-DICHLOROPROPANE	500	5000	NT	NT	NT	NT	NT
2,2-DICHLOROPROPANE	0.1	0.2	NT	NT	NT	NT	NT
1,1-DICHLOROPROPENE	0.01	0.1	NT	NT	NT	NT	NT
CIS-1,3-DICHLOROPROPENE	0.01	0.1	NT	NT	NT	NT	NT
TRANS-1,3-DICHLOROPROPENE	0.01	0.1	NT	NT	NT	NT	NT
DIETHYL ETHER	100	1000	NT	NT	NT	NT	NT
DIISOPROPYL ETHER	100	1000	NT	NT	NT	NT	NT
1,4-DIOXANE	0.2	6	NT	NT	NT	NT	NT
ETHYLBENZENE	40	1000	NT	NT	NT	NT	NT
HEXACHLOROBUTADIENE	30	100	NT	NT	NT	NT	NT
2-HEXANONE	100	1000	NT	NT	NT	NT	NT
ISOPROPYLBENZENE	1000	10000	NT	NT	NT	NT	NT
P-ISOPROPYLTOLUENE	100	1000	NT	NT	NT	NT	NT
METHYL TERT-BUTYL ETHER (MTBE)	0.1	100	NT	NT	NT	NT	NT
METHYLENE CHLORIDE	0.1	20	NT	NT	NT	NT	NT
4-METHYL-2-PENTANONE (MIB)	0.4	50	NT	NT	NT	NT	NT
NAPHTHALENE	4	20	NT	NT	NT	NT	NT
N-PROPYLBENZENE	100	1000	NT	NT	NT	NT	NT
STYRENE	3	4	NT	NT	NT	NT	NT
1,1,1,2-TETRACHLOROETHANE	0.1	0.1	NT	NT	NT	NT	NT
1,1,2,2-TETRACHLOROETHANE	0.005	0.02	NT	NT	NT	NT	NT
TETRACHLOROETHYLENE	1	10	NT	NT	NT	NT	NT
TETRAHYDROFURAN	500	5000	NT	NT	NT	NT	NT
TOLUENE	30	1000	NT	NT	NT	NT	NT
1,2,3-TRICHLOROBENZENE			NT	NT	NT	NT	NT
1,2,4-TRICHLOROBENZENE	2	6	NT	NT	NT	NT	NT
1,1,1-TRICHLOROETHANE	30	600	NT	NT	NT	NT	NT
1,1,2-TRICHLOROETHANE	0.1	2	NT	NT	NT	NT	NT
TRICHLOROETHYLENE	0.3	0.3	NT	NT	NT	NT	NT
TRICHLOROFLUOROMETHANE	1000	10000	NT	NT	NT	NT	NT
1,2,3-TRICHLOROPROPANE	100	1000	NT	NT	NT	NT	NT
1,2,4-TRIMETHYLBENZENE	1000	10000	NT	NT	NT	NT	NT
1,3,5-TRIMETHYLBENZENE	10	100	NT	NT	NT	NT	NT
VINYL CHLORIDE	0.7	0.7	NT	NT	NT	NT	NT
M/P-XYLENE	100	100	NT	NT	NT	NT	NT
O-XYLENE	100	100	NT	NT	NT	NT	NT

Table 1 - Soil Results Table
Fernald School Cottage Area Subsurface Sampling
200 Trapelo Road, Waltham, Massachusetts

SW-846 8270D (mg/Kg dry)							
ACENAPHTHENE	4	3000	ND (0.21)	ND (0.18)	ND (0.78)	ND (0.22)	ND (0.19)
ACENAPHTHYLENE	1	10	ND (0.21)	ND (0.18)	ND (0.78)	ND (0.22)	ND (0.19)
ACETOPHENONE	1000	10000	ND (0.42)	ND (0.36)	ND (1.6)	ND (0.43)	ND (0.38)
ANILINE	1000	10000	ND (0.42)	ND (0.36)	ND (1.6)	ND (0.43)	ND (0.38)
ANTHRACENE	1000	3000	ND (0.21)	ND (0.18)	ND (0.78)	ND (0.22)	ND (0.19)
BENZO(A)ANTHRACENE	7	40	ND (0.21)	ND (0.18)	ND (0.78)	ND (0.22)	0.31
BENZO(A)PYRENE	2	7	ND (0.21)	ND (0.18)	ND (0.78)	ND (0.22)	0.30
BENZO(B)FLUORANTHENE	7	40	ND (0.21)	ND (0.18)	ND (0.78)	ND (0.22)	0.35
BENZO(G,H,I)PERYLENE	1000	3000	ND (0.21)	ND (0.18)	ND (0.78)	ND (0.22)	ND (0.19)
BENZO( )FLUORANTHENE	70	400	ND (0.21)	ND (0.18)	ND (0.78)	ND (0.22)	ND (0.19)
BIS(2-CHLOROETHOXY)METHANE	500	5000	ND (0.42)	ND (0.36)	ND (1.6)	ND (0.43)	ND (0.38)
BIS(2-CHLOROETHYL)ETHER	0.7	0.7	ND (0.42)	ND (0.36)	**ND (1.6) ***	ND (0.43)	ND (0.38)
BIS(2-CHLOROISOPROPYL)ETHER	0.7	0.7	ND (0.42)	ND (0.36)	**ND (1.6) ***	ND (0.43)	ND (0.38)
BIS(2-ETHYLHEXYL)PHTHALATE	90	600	ND (0.42)	ND (0.36)	ND (1.6)	ND (0.43)	ND (0.38)
4-BROMOPHENYL PHENYL ETHER	100	1000	ND (0.42)	ND (0.36)	ND (1.6)	ND (0.43)	ND (0.38)
BUTYLBENZYLPHTHALATE	100	1000	ND (0.42)	ND (0.36)	ND (1.6)	ND (0.43)	ND (0.38)
4-CHLOROANILINE	1	3	ND (0.81)	ND (0.71)	**ND (3.0) ***	ND (0.84)	ND (0.74)
2-CHLORONAPHTHALENE	1000	10000	ND (0.42)	ND (0.36)	ND (1.6)	ND (0.43)	ND (0.38)
2-CHLOROPHENOL	0.7	100	ND (0.42)	ND (0.36)	**ND (1.6) ***	ND (0.43)	ND (0.38)
CHRYSENE	70	400	ND (0.21)	ND (0.18)	ND (0.78)	ND (0.22)	0.30
DIBENZ(A,H)ANTHRACENE	0.7	4	ND (0.21)	ND (0.18)	**ND (0.78) ***	ND (0.22)	ND (0.19)
DIBENZOFURAN	100	1000	ND (0.42)	ND (0.36)	ND (1.6)	ND (0.43)	ND (0.38)
DI-N-BUTYLPHTHALATE	50	500	ND (0.42)	ND (0.36)	ND (1.6)	ND (0.43)	ND (0.38)
1,2-DICHLOROBENZENE	9	100	ND (0.42)	ND (0.36)	ND (1.6)	ND (0.43)	ND (0.38)
1,3-DICHLOROBENZENE	3	200	ND (0.42)	ND (0.36)	ND (1.6)	ND (0.43)	ND (0.38)
1,4-DICHLOROBENZENE	0.7	1	ND (0.42)	ND (0.36)	**ND (1.6) ***	ND (0.43)	ND (0.38)
3,3 -DICHLOROBENZIDINE	3	20	ND (0.21)	ND (0.18)	ND (0.78)	ND (0.22)	ND (0.19)
2,4-DICHLOROPHENOL	0.7	40	ND (0.42)	ND (0.36)	**ND (1.6) ***	ND (0.43)	ND (0.38)
DIETHYLPHTHALATE	10	200	ND (0.42)	ND (0.36)	ND (1.6)	ND (0.43)	ND (0.38)
2,4-DIMETHYLPHENOL	0.7	100	ND (0.42)	ND (0.36)	**ND (1.6) ***	ND (0.43)	ND (0.38)
DIMETHYLPHTHALATE	0.7	50	ND (0.42)	ND (0.36)	**ND (1.6) ***	ND (0.43)	ND (0.38)
2,4-DINITROPHENOL	3	50	ND (0.81)	ND (0.71)	ND (3.0)	ND (0.84)	ND (0.74)
2,4-DINITROTOLUENE	0.7	10	ND (0.42)	ND (0.36)	**ND (1.6) ***	ND (0.43)	ND (0.38)
2,6-DINITROTOLUENE	100	1000	ND (0.42)	ND (0.36)	ND (1.6)	ND (0.43)	ND (0.38)
DI-N-OCTYLPHTHALATE	1000	10000	ND (0.42)	ND (0.36)	ND (1.6)	ND (0.43)	ND (0.38)
1,2-DIPHENYLHYDRAZINE (AZOBENZENE)	50	500	ND (0.42)	ND (0.36)	ND (1.6)	ND (0.43)	ND (0.38)
FLUORANTHENE	1000	3000	ND (0.21)	ND (0.18)	ND (0.78)	ND (0.22)	0.48
FLUORENE	1000	3000	ND (0.21)	ND (0.18)	ND (0.78)	ND (0.22)	ND (0.19)
HEXACHLOROBENZENE	0.7	0.8	ND (0.42)	ND (0.36)	**ND (1.6) ***	ND (0.43)	ND (0.38)
HEXACHLOROBUTADIENE	30	100	ND (0.42)	ND (0.36)	ND (1.6)	ND (0.43)	ND (0.38)
HEXACHLOROETHANE	0.7	3	ND (0.42)	ND (0.36)	**ND (1.6) ***	ND (0.43)	ND (0.38)
INDENO(1,2,3-CD)PYRENE	7	40	ND (0.21)	ND (0.18)	ND (0.78)	ND (0.22)	0.22
ISOPHORONE	100	1000	ND (0.42)	ND (0.36)	ND (1.6)	ND (0.43)	ND (0.38)
2-METHYLNAPHTHALENE	0.7	80	ND (0.21)	ND (0.18)	**ND (0.78) ***	ND (0.22)	ND (0.19)
O-CRESOL	500	5000	ND (0.42)	ND (0.36)	ND (1.6)	ND (0.43)	ND (0.38)
M/P-CRESOL	500	5000	ND (0.42)	ND (0.36)	ND (1.6)	ND (0.43)	ND (0.38)
NAPHTHALENE	4	20	ND (0.21)	ND (0.18)	ND (0.78)	ND (0.22)	ND (0.19)
NITROBENZENE	500	5000	ND (0.42)	ND (0.36)	ND (1.6)	ND (0.43)	ND (0.38)
2-NITROPHENOL	100	1000	ND (0.42)	ND (0.36)	ND (1.6)	ND (0.43)	ND (0.38)
4-NITROPHENOL	100	1000	ND (0.81)	ND (0.71)	ND (3.0)	ND (0.84)	ND (0.74)
PENTACHLOROPHENOL	3	10	ND (0.42)	ND (0.36)	ND (1.6)	ND (0.43)	ND (0.38)
PHENANTHRENE	10	1000	ND (0.21)	ND (0.18)	ND (0.78)	ND (0.22)	0.23
PHENOL	1	20	ND (0.42)	ND (0.36)	**ND (1.6) ***	ND (0.43)	ND (0.38)
PYRENE	1000	3000	ND (0.21)	ND (0.18)	ND (0.78)	ND (0.22)	0.49
1,2,4-TRICHLOROBENZENE	2	6	ND (0.42)	ND (0.36)	ND (1.6)	ND (0.43)	ND (0.38)
2,4,5-TRICHLOROPHENOL	4	600	ND (0.42)	ND (0.36)	ND (1.6)	ND (0.43)	ND (0.38)
2,4,6-TRICHLOROPHENOL	0.7	20	ND (0.42)	ND (0.36)	**ND (1.6) ***	ND (0.43)	ND (0.38)

Table 1 - Soil Results Table
Fernald School Cottage Area Subsurface Sampling
200 Trapelo Road, Waltham, Massachusetts

Parameter	Reportable Concentrations (RCs)		SAMPLING LOCATION				
	RCS-1	RCS-2	2009 5-10'	2010 0-5'	2010 5-10'	2011 0-5'	2011 5-10'
Sampling Date			10/3/2018 10:30:00 AM	10/3/2018 12:00:00 PM	10/3/2018 12:00:00 PM	10/3/2018 1:00:00 PM	10/3/2018 1:00:00 PM
Sample Depth			5-10 Feet	0-5 Feet	5-10 Feet	0-5 Feet	5-10 Feet
MADEP-EPH-04-1.1 (mg/Kg dry)							
C9-C18 ALIPHATICS	1000	3000	NT	NT	NT	NT	NT
C19-C36 ALIPHATICS	3000	5000	NT	NT	NT	NT	NT
UNAD USTED C11-C22 AROMATICS			NT	NT	NT	NT	NT
C11-C22 AROMATICS	1000	3000	NT	NT	NT	NT	NT
ACENAPHTHENE	4	3000	NT	NT	NT	NT	NT
ACENAPHTHYLENE	1	10	NT	NT	NT	NT	NT
ANTHRACENE	1000	3000	NT	NT	NT	NT	NT
BENZO(A)ANTHRACENE	7	40	NT	NT	NT	NT	NT
BENZO(A)PYRENE	2	7	NT	NT	NT	NT	NT
BENZO(B)FLUORANTHENE	7	40	NT	NT	NT	NT	NT
BENZO(G,H,I)PERYLENE	1000	3000	NT	NT	NT	NT	NT
BENZO( )FLUORANTHENE	70	400	NT	NT	NT	NT	NT
CHRYSENE	70	400	NT	NT	NT	NT	NT
DIBENZ(A,H)ANTHRACENE	0.7	4	NT	NT	NT	NT	NT
FLUORANTHENE	1000	3000	NT	NT	NT	NT	NT
FLUORENE	1000	3000	NT	NT	NT	NT	NT
INDENO(1,2,3-CD)PYRENE	7	40	NT	NT	NT	NT	NT
2-METHYLNAPHTHALENE	0.7	80	NT	NT	NT	NT	NT
NAPHTHALENE	4	20	NT	NT	NT	NT	NT
PHENANTHRENE	10	1000	NT	NT	NT	NT	NT
PYRENE	1000	3000	NT	NT	NT	NT	NT
MADEP-VPH-Feb 2018 Rev 2.1 (mg/Kg dry)							
UNAD USTED C5-C8 ALIPHATICS			NT	NT	NT	NT	NT
C5-C8 ALIPHATICS	100	500	NT	NT	NT	NT	NT
UNAD USTED C9-C12 ALIPHATICS			NT	NT	NT	NT	NT
C9-C12 ALIPHATICS	1000	3000	NT	NT	NT	NT	NT
C9-C10 AROMATICS	100	500	NT	NT	NT	NT	NT
BENZENE	2	200	NT	NT	NT	NT	NT
ETHYLBENZENE	40	1000	NT	NT	NT	NT	NT
METHYL TERT-BUTYL ETHER (MTBE)	0.1	100	NT	NT	NT	NT	NT
NAPHTHALENE	4	20	NT	NT	NT	NT	NT
TOLUENE	30	1000	NT	NT	NT	NT	NT
M/P-XYLENE	100	100	NT	NT	NT	NT	NT
O-XYLENE	100	100	NT	NT	NT	NT	NT
SM 2540G (% Wt)							
% Solids			87.9	87.8	87.1	89.4	90.6
SW-846 6010D (mg/Kg dry) Metals Digestion							
ANTIMONY	20	30	ND (1.9)	ND (1.9)	ND (1.9)	ND (1.9)	ND (1.9)
ARSENIC	20	20	ND (1.9)	13	ND (1.9)	ND (1.9)	ND (1.9)
BARIUM	1000	3000	47	41	19	35	43
BERYLLIUM	90	200	0.30	0.33	0.25	0.35	0.36
CADMIUM	70	100	ND (0.19)	0.53	ND (0.19)	ND (0.19)	ND (0.19)
CHROMIUM	100	200	12	14	9.9	10	12
LEAD	200	600	8.1	12	7.3	8.7	9.8
NIC EL	600	1000	8.6	10	8.1	8.2	9.3
SELENIUM	400	700	ND (3.8)	ND (3.8)	ND (3.8)	ND (3.7)	ND (3.7)
SILVER	100	200	ND (0.38)	ND (0.38)	ND (0.38)	ND (0.37)	ND (0.37)
THALLIUM	8	60	ND (1.9)	ND (1.9)	ND (1.9)	ND (1.9)	ND (1.9)
VANADIUM	400	700	29	31	26	36	30
ZINC	1000	3000	35	44	26	35	37
SW-846 7471B (mg/Kg dry) Metals Digestion							
MERCURY	20	30	ND (0.029)	0.035	0.037	0.038	0.034
SW-846 8082A (mg/Kg dry)							
PCB 1016	1	4	ND (0.088)	ND (0.091)	ND (0.091)	ND (0.087)	ND (0.082)
PCB 1221	1	4	ND (0.088)	ND (0.091)	ND (0.091)	ND (0.087)	ND (0.082)
PCB 1232	1	4	ND (0.088)	ND (0.091)	ND (0.091)	ND (0.087)	ND (0.082)
PCB 1242	1	4	ND (0.088)	ND (0.091)	ND (0.091)	ND (0.087)	ND (0.082)
PCB 1248	1	4	ND (0.088)	ND (0.091)	ND (0.091)	ND (0.087)	ND (0.082)
PCB 1254	1	4	ND (0.088)	ND (0.091)	ND (0.091)	ND (0.087)	ND (0.082)
PCB 1260	1	4	ND (0.088)	ND (0.091)	ND (0.091)	ND (0.087)	ND (0.082)
PCB 1262	1	4	ND (0.088)	ND (0.091)	ND (0.091)	ND (0.087)	ND (0.082)
PCB 1268	1	4	ND (0.088)	ND (0.091)	ND (0.091)	ND (0.087)	ND (0.082)

Table 1 - Soil Results Table
Fernald School Cottage Area Subsurface Sampling
200 Trapelo Road, Waltham, Massachusetts

SW-846 8260C (mg/Kg dry)							
ACETONE	6	50	NT	NT	NT	NT	NT
TERT-AMYL METHYL ETHER			NT	NT	NT	NT	NT
BENZENE	2	200	NT	NT	NT	NT	NT
BROMOBENZENE	100	1000	NT	NT	NT	NT	NT
BROMOCHLOROMETHANE			NT	NT	NT	NT	NT
BROMODICHLOROMETHANE	0.1	0.1	NT	NT	NT	NT	NT
BROMOFORM	0.1	1	NT	NT	NT	NT	NT
BROMOMETHANE	0.5	0.5	NT	NT	NT	NT	NT
2-BUTANONE (ME)	4	50	NT	NT	NT	NT	NT
N-BUTYLBENZENE			NT	NT	NT	NT	NT
SEC-BUTYLBENZENE			NT	NT	NT	NT	NT
TERT-BUTYLBENZENE	100	1000	NT	NT	NT	NT	NT
TERT-BUTYLETHYL ETHER			NT	NT	NT	NT	NT
CARBON DISULFIDE	100	1000	NT	NT	NT	NT	NT
CARBON TETRACHLORIDE	5	5	NT	NT	NT	NT	NT
CHLOROBENZENE	1	3	NT	NT	NT	NT	NT
CHLORODIBROMOMETHANE	0.005	0.03	NT	NT	NT	NT	NT
CHLOROETHANE	100	1000	NT	NT	NT	NT	NT
CHLOROFORM	0.2	0.2	NT	NT	NT	NT	NT
CHLOROMETHANE	100	1000	NT	NT	NT	NT	NT
2-CHLOROTOLUENE	100	1000	NT	NT	NT	NT	NT
4-CHLOROTOLUENE	100	1000	NT	NT	NT	NT	NT
1,2-DIBROMO-3-CHLOROPROPANE	10	100	NT	NT	NT	NT	NT
1,2-DIBROMOETHANE (EDB)	0.1	0.1	NT	NT	NT	NT	NT
DIBROMOMETHANE	500	5000	NT	NT	NT	NT	NT
1,2-DICHLOROBENZENE	9	100	NT	NT	NT	NT	NT
1,3-DICHLOROBENZENE	3	200	NT	NT	NT	NT	NT
1,4-DICHLOROBENZENE	0.7	1	NT	NT	NT	NT	NT
DICHLORODIFLUOROMETHANE	1000	10000	NT	NT	NT	NT	NT
1,1-DICHLOROETHANE	0.4	9	NT	NT	NT	NT	NT
1,2-DICHLOROETHANE	0.1	0.1	NT	NT	NT	NT	NT
1,1-DICHLOROETHYLENE	3	40	NT	NT	NT	NT	NT
CIS-1,2-DICHLOROETHYLENE	0.1	0.1	NT	NT	NT	NT	NT
TRANS-1,2-DICHLOROETHYLENE	1	1	NT	NT	NT	NT	NT
1,2-DICHLOROPROPANE	0.1	0.1	NT	NT	NT	NT	NT
1,3-DICHLOROPROPANE	500	5000	NT	NT	NT	NT	NT
2,2-DICHLOROPROPANE	0.1	0.2	NT	NT	NT	NT	NT
1,1-DICHLOROPROPENE	0.01	0.1	NT	NT	NT	NT	NT
CIS-1,3-DICHLOROPROPENE	0.01	0.1	NT	NT	NT	NT	NT
TRANS-1,3-DICHLOROPROPENE	0.01	0.1	NT	NT	NT	NT	NT
DIETHYL ETHER	100	1000	NT	NT	NT	NT	NT
DIISOPROPYL ETHER	100	1000	NT	NT	NT	NT	NT
1,4-DIOXANE	0.2	6	NT	NT	NT	NT	NT
ETHYLBENZENE	40	1000	NT	NT	NT	NT	NT
HEXACHLOROBUTADIENE	30	100	NT	NT	NT	NT	NT
2-HEXANONE	100	1000	NT	NT	NT	NT	NT
ISOPROPYLBENZENE	1000	10000	NT	NT	NT	NT	NT
P-ISOPROPYLTOLUENE	100	1000	NT	NT	NT	NT	NT
METHYL TERT-BUTYL ETHER (MTBE)	0.1	100	NT	NT	NT	NT	NT
METHYLENE CHLORIDE	0.1	20	NT	NT	NT	NT	NT
4-METHYL-2-PENTANONE (MIB)	0.4	50	NT	NT	NT	NT	NT
NAPHTHALENE	4	20	NT	NT	NT	NT	NT
N-PROPYLBENZENE	100	1000	NT	NT	NT	NT	NT
STYRENE	3	4	NT	NT	NT	NT	NT
1,1,1,2-TETRACHLOROETHANE	0.1	0.1	NT	NT	NT	NT	NT
1,1,2,2-TETRACHLOROETHANE	0.005	0.02	NT	NT	NT	NT	NT
TETRACHLOROETHYLENE	1	10	NT	NT	NT	NT	NT
TETRAHYDROFURAN	500	5000	NT	NT	NT	NT	NT
TOLUENE	30	1000	NT	NT	NT	NT	NT
1,2,3-TRICHLOROBENZENE			NT	NT	NT	NT	NT
1,2,4-TRICHLOROBENZENE	2	6	NT	NT	NT	NT	NT
1,1,1-TRICHLOROETHANE	30	600	NT	NT	NT	NT	NT
1,1,2-TRICHLOROETHANE	0.1	2	NT	NT	NT	NT	NT
TRICHLOROETHYLENE	0.3	0.3	NT	NT	NT	NT	NT
TRICHLOROFLUOROMETHANE	1000	10000	NT	NT	NT	NT	NT
1,2,3-TRICHLOROPROPANE	100	1000	NT	NT	NT	NT	NT
1,2,4-TRIMETHYLBENZENE	1000	10000	NT	NT	NT	NT	NT
1,3,5-TRIMETHYLBENZENE	10	100	NT	NT	NT	NT	NT
VINYL CHLORIDE	0.7	0.7	NT	NT	NT	NT	NT
M/P-XYLENE	100	100	NT	NT	NT	NT	NT
O-XYLENE	100	100	NT	NT	NT	NT	NT

Table 1 - Soil Results Table
Fernald School Cottage Area Subsurface Sampling
200 Trapelo Road, Waltham, Massachusetts

SW-846 8270D (mg/Kg dry)							
ACENAPHTHENE	4	3000	ND (0.19)	ND (0.19)	ND (0.20)	ND (0.19)	ND (0.19)
ACENAPHTHYLENE	1	10	ND (0.19)	ND (0.19)	ND (0.20)	ND (0.19)	ND (0.19)
ACETOPHENONE	1000	10000	ND (0.38)	ND (0.39)	ND (0.39)	ND (0.38)	ND (0.37)
ANILINE	1000	10000	ND (0.38)	ND (0.39)	ND (0.39)	ND (0.38)	ND (0.37)
ANTHRACENE	1000	3000	ND (0.19)	ND (0.19)	ND (0.20)	ND (0.19)	ND (0.19)
BENZO(A)ANTHRACENE	7	40	ND (0.19)	ND (0.19)	ND (0.20)	ND (0.19)	ND (0.19)
BENZO(A)PYRENE	2	7	ND (0.19)	ND (0.19)	ND (0.20)	ND (0.19)	ND (0.19)
BENZO(B)FLUORANTHENE	7	40	ND (0.19)	ND (0.19)	ND (0.20)	ND (0.19)	ND (0.19)
BENZO(G,H,I)PERYLENE	1000	3000	ND (0.19)	ND (0.19)	ND (0.20)	ND (0.19)	ND (0.19)
BENZO( )FLUORANTHENE	70	400	ND (0.19)	ND (0.19)	ND (0.20)	ND (0.19)	ND (0.19)
BIS(2-CHLOROETHOXY)METHANE	500	5000	ND (0.38)	ND (0.39)	ND (0.39)	ND (0.38)	ND (0.37)
BIS(2-CHLOROETHYL)ETHER	0.7	0.7	ND (0.38)	ND (0.39)	ND (0.39)	ND (0.38)	ND (0.37)
BIS(2-CHLOROISOPROPYL)ETHER	0.7	0.7	ND (0.38)	ND (0.39)	ND (0.39)	ND (0.38)	ND (0.37)
BIS(2-ETHYLHEXYL)PHTHALATE	90	600	ND (0.38)	ND (0.39)	ND (0.39)	ND (0.38)	ND (0.37)
4-BROMOPHENYL PHENYL ETHER	100	1000	ND (0.38)	ND (0.39)	ND (0.39)	ND (0.38)	ND (0.37)
BUTYLBENZYLPHTHALATE	100	1000	ND (0.38)	ND (0.39)	ND (0.39)	ND (0.38)	ND (0.37)
4-CHLOROANILINE	1	3	ND (0.74)	ND (0.75)	ND (0.76)	ND (0.73)	ND (0.72)
2-CHLORONAPHTHALENE	1000	10000	ND (0.38)	ND (0.39)	ND (0.39)	ND (0.38)	ND (0.37)
2-CHLOROPHENOL	0.7	100	ND (0.38)	ND (0.39)	ND (0.39)	ND (0.38)	ND (0.37)
CHRYSENE	70	400	ND (0.19)	ND (0.19)	ND (0.20)	ND (0.19)	ND (0.19)
DIBENZ(A,H)ANTHRACENE	0.7	4	ND (0.19)	ND (0.19)	ND (0.20)	ND (0.19)	ND (0.19)
DIBENZOFURAN	100	1000	ND (0.38)	ND (0.39)	ND (0.39)	ND (0.38)	ND (0.37)
DI-N-BUTYLPHTHALATE	50	500	ND (0.38)	ND (0.39)	ND (0.39)	ND (0.38)	ND (0.37)
1,2-DICHLOROBENZENE	9	100	ND (0.38)	ND (0.39)	ND (0.39)	ND (0.38)	ND (0.37)
1,3-DICHLOROBENZENE	3	200	ND (0.38)	ND (0.39)	ND (0.39)	ND (0.38)	ND (0.37)
1,4-DICHLOROBENZENE	0.7	1	ND (0.38)	ND (0.39)	ND (0.39)	ND (0.38)	ND (0.37)
3,3 -DICHLOROBENZIDINE	3	20	ND (0.19)	ND (0.19)	ND (0.20)	ND (0.19)	ND (0.19)
2,4-DICHLOROPHENOL	0.7	40	ND (0.38)	ND (0.39)	ND (0.39)	ND (0.38)	ND (0.37)
DIETHYLPHTHALATE	10	200	ND (0.38)	ND (0.39)	ND (0.39)	ND (0.38)	ND (0.37)
2,4-DIMETHYLPHENOL	0.7	100	ND (0.38)	ND (0.39)	ND (0.39)	ND (0.38)	ND (0.37)
DIMETHYLPHTHALATE	0.7	50	ND (0.38)	ND (0.39)	ND (0.39)	ND (0.38)	ND (0.37)
2,4-DINITROPHENOL	3	50	ND (0.74)	ND (0.75)	ND (0.76)	ND (0.73)	ND (0.72)
2,4-DINITROTOLUENE	0.7	10	ND (0.38)	ND (0.39)	ND (0.39)	ND (0.38)	ND (0.37)
2,6-DINITROTOLUENE	100	1000	ND (0.38)	ND (0.39)	ND (0.39)	ND (0.38)	ND (0.37)
DI-N-OCTYLPHTHALATE	1000	10000	ND (0.38)	ND (0.39)	ND (0.39)	ND (0.38)	ND (0.37)
1,2-DIPHENYLHYDRAZINE (AZOBENZENE)	50	500	ND (0.38)	ND (0.39)	ND (0.39)	ND (0.38)	ND (0.37)
FLUORANTHENE	1000	3000	ND (0.19)	ND (0.19)	ND (0.20)	ND (0.19)	ND (0.19)
FLUORENE	1000	3000	ND (0.19)	ND (0.19)	ND (0.20)	ND (0.19)	ND (0.19)
HEXACHLOROBENZENE	0.7	0.8	ND (0.38)	ND (0.39)	ND (0.39)	ND (0.38)	ND (0.37)
HEXACHLOROBUTADIENE	30	100	ND (0.38)	ND (0.39)	ND (0.39)	ND (0.38)	ND (0.37)
HEXACHLOROETHANE	0.7	3	ND (0.38)	ND (0.39)	ND (0.39)	ND (0.38)	ND (0.37)
INDENO(1,2,3-CD)PYRENE	7	40	ND (0.19)	ND (0.19)	ND (0.20)	ND (0.19)	ND (0.19)
ISOPHORONE	100	1000	ND (0.38)	ND (0.39)	ND (0.39)	ND (0.38)	ND (0.37)
2-METHYLNAPHTHALENE	0.7	80	ND (0.19)	ND (0.19)	ND (0.20)	ND (0.19)	ND (0.19)
O-CRESOL	500	5000	ND (0.38)	ND (0.39)	ND (0.39)	ND (0.38)	ND (0.37)
M/P-CRESOL	500	5000	ND (0.38)	ND (0.39)	ND (0.39)	ND (0.38)	ND (0.37)
NAPHTHALENE	4	20	ND (0.19)	ND (0.19)	ND (0.20)	ND (0.19)	ND (0.19)
NITROBENZENE	500	5000	ND (0.38)	ND (0.39)	ND (0.39)	ND (0.38)	ND (0.37)
2-NITROPHENOL	100	1000	ND (0.38)	ND (0.39)	ND (0.39)	ND (0.38)	ND (0.37)
4-NITROPHENOL	100	1000	ND (0.74)	ND (0.75)	ND (0.76)	ND (0.73)	ND (0.72)
PENTACHLOROPHENOL	3	10	ND (0.38)	ND (0.39)	ND (0.39)	ND (0.38)	ND (0.37)
PHENANTHRENE	10	1000	ND (0.19)	ND (0.19)	ND (0.20)	ND (0.19)	ND (0.19)
PHENOL	1	20	ND (0.38)	ND (0.39)	ND (0.39)	ND (0.38)	ND (0.37)
PYRENE	1000	3000	ND (0.19)	ND (0.19)	ND (0.20)	ND (0.19)	ND (0.19)
1,2,4-TRICHLOROBENZENE	2	6	ND (0.38)	ND (0.39)	ND (0.39)	ND (0.38)	ND (0.37)
2,4,5-TRICHLOROPHENOL	4	600	ND (0.38)	ND (0.39)	ND (0.39)	ND (0.38)	ND (0.37)
2,4,6-TRICHLOROPHENOL	0.7	20	ND (0.38)	ND (0.39)	ND (0.39)	ND (0.38)	ND (0.37)

Table 1 - Soil Results Table
Fernald School Cottage Area Subsurface Sampling
200 Trapelo Road, Waltham, Massachusetts

Parameter	Reportable Concentrations (RCs)		SAMPLING LOCATION				
	RCS-1	RCS-2	2012 0-5'	2012 5-10'	2017 0-5'	2017 5-9'	2019 0-5'
Sampling Date			10/3/2018 2:00:00 PM	10/3/2018 2:00:00 PM	10/4/2018 11:20:00 AM	10/4/2018 11:20:00 AM	10/4/2018 1:10:00 PM
Sample Depth			0-5 Feet	5-10 Feet	0-5 Feet	5-9 Feet	0-5 Feet
MADEP-EPH-04-1.1 (mg/Kg dry)							
C9-C18 ALIPHATICS	1000	3000	NT	NT	NT	NT	NT
C19-C36 ALIPHATICS	3000	5000	NT	NT	NT	NT	NT
UNAD USTED C11-C22 AROMATICS			NT	NT	NT	NT	NT
C11-C22 AROMATICS	1000	3000	NT	NT	NT	NT	NT
ACENAPHTHENE	4	3000	NT	NT	NT	NT	NT
ACENAPHTHYLENE	1	10	NT	NT	NT	NT	NT
ANTHRACENE	1000	3000	NT	NT	NT	NT	NT
BENZO(A)ANTHRACENE	7	40	NT	NT	NT	NT	NT
BENZO(A)PYRENE	2	7	NT	NT	NT	NT	NT
BENZO(B)FLUORANTHENE	7	40	NT	NT	NT	NT	NT
BENZO(G,H,I)PERYLENE	1000	3000	NT	NT	NT	NT	NT
BENZO( )FLUORANTHENE	70	400	NT	NT	NT	NT	NT
CHRYSENE	70	400	NT	NT	NT	NT	NT
DIBENZ(A,H)ANTHRACENE	0.7	4	NT	NT	NT	NT	NT
FLUORANTHENE	1000	3000	NT	NT	NT	NT	NT
FLUORENE	1000	3000	NT	NT	NT	NT	NT
INDENO(1,2,3-CD)PYRENE	7	40	NT	NT	NT	NT	NT
2-METHYLNAPHTHALENE	0.7	80	NT	NT	NT	NT	NT
NAPHTHALENE	4	20	NT	NT	NT	NT	NT
PHENANTHRENE	10	1000	NT	NT	NT	NT	NT
PYRENE	1000	3000	NT	NT	NT	NT	NT
MADEP-VPH-Feb 2018 Rev 2.1 (mg/Kg dry)							
UNAD USTED C5-C8 ALIPHATICS			NT	NT	NT	NT	NT
C5-C8 ALIPHATICS	100	500	NT	NT	NT	NT	NT
UNAD USTED C9-C12 ALIPHATICS			NT	NT	NT	NT	NT
C9-C12 ALIPHATICS	1000	3000	NT	NT	NT	NT	NT
C9-C10 AROMATICS	100	500	NT	NT	NT	NT	NT
BENZENE	2	200	NT	NT	NT	NT	NT
ETHYLBENZENE	40	1000	NT	NT	NT	NT	NT
METHYL TERT-BUTYL ETHER (MTBE)	0.1	100	NT	NT	NT	NT	NT
NAPHTHALENE	4	20	NT	NT	NT	NT	NT
TOLUENE	30	1000	NT	NT	NT	NT	NT
M/P-XYLENE	100	100	NT	NT	NT	NT	NT
O-XYLENE	100	100	NT	NT	NT	NT	NT
SM 2540G (% Wt)							
% Solids			89.3	90.8	91.2	86.5	76.6
SW-846 6010D (mg/Kg dry) Metals Digestion							
ANTIMONY	20	30	ND (1.9)	ND (1.8)	ND (1.8)	ND (1.9)	ND (2.2)
ARSENIC	20	20	ND (1.9)	ND (1.8)	ND (1.8)	ND (1.9)	ND (2.2)
BARIUM	1000	3000	60	45	46	42	47
BERYLLIUM	90	200	0.45	0.33	0.41	0.42	0.44
CADMIUM	70	100	ND (0.19)	ND (0.18)	ND (0.18)	ND (0.19)	ND (0.22)
CHROMIUM	100	200	12	12	12	13	15
LEAD	200	600	7.4	6.0	9.2	13	12
NIC EL	600	1000	9.6	9.0	9.2	11	10
SELENIUM	400	700	ND (3.8)	ND (3.6)	ND (3.6)	ND (3.8)	ND (4.4)
SILVER	100	200	ND (0.38)	ND (0.36)	ND (0.36)	ND (0.38)	ND (0.44)
THALLIUM	8	60	ND (1.9)	ND (1.8)	ND (1.8)	ND (1.9)	ND (2.2)
VANADIUM	400	700	42	36	36	47	33
ZINC	1000	3000	45	36	42	44	37
SW-846 7471B (mg/Kg dry) Metals Digestion							
MERCURY	20	30	ND (0.027)	ND (0.028)	ND (0.027)	0.057	0.060
SW-846 8082A (mg/Kg dry)							
PCB 1016	1	4	ND (0.088)	ND (0.086)	ND (0.087)	ND (0.089)	ND (0.10)
PCB 1221	1	4	ND (0.088)	ND (0.086)	ND (0.087)	ND (0.089)	ND (0.10)
PCB 1232	1	4	ND (0.088)	ND (0.086)	ND (0.087)	ND (0.089)	ND (0.10)
PCB 1242	1	4	ND (0.088)	ND (0.086)	ND (0.087)	ND (0.089)	ND (0.10)
PCB 1248	1	4	ND (0.088)	ND (0.086)	ND (0.087)	ND (0.089)	ND (0.10)
PCB 1254	1	4	ND (0.088)	ND (0.086)	ND (0.087)	ND (0.089)	ND (0.10)
PCB 1260	1	4	ND (0.088)	ND (0.086)	ND (0.087)	ND (0.089)	ND (0.10)
PCB 1262	1	4	ND (0.088)	ND (0.086)	ND (0.087)	ND (0.089)	ND (0.10)
PCB 1268	1	4	ND (0.088)	ND (0.086)	ND (0.087)	ND (0.089)	ND (0.10)

Table 1 - Soil Results Table
Fernald School Cottage Area Subsurface Sampling
200 Trapelo Road, Waltham, Massachusetts

SW-846 8260C (mg/Kg dry)							
ACETONE	6	50	NT	NT	NT	NT	NT
TERT-AMYL METHYL ETHER			NT	NT	NT	NT	NT
BENZENE	2	200	NT	NT	NT	NT	NT
BROMOBENZENE	100	1000	NT	NT	NT	NT	NT
BROMOCHLOROMETHANE			NT	NT	NT	NT	NT
BROMODICHLOROMETHANE	0.1	0.1	NT	NT	NT	NT	NT
BROMOFORM	0.1	1	NT	NT	NT	NT	NT
BROMOMETHANE	0.5	0.5	NT	NT	NT	NT	NT
2-BUTANONE (ME)	4	50	NT	NT	NT	NT	NT
N-BUTYLBENZENE			NT	NT	NT	NT	NT
SEC-BUTYLBENZENE			NT	NT	NT	NT	NT
TERT-BUTYLBENZENE	100	1000	NT	NT	NT	NT	NT
TERT-BUTYLETHYL ETHER			NT	NT	NT	NT	NT
CARBON DISULFIDE	100	1000	NT	NT	NT	NT	NT
CARBON TETRACHLORIDE	5	5	NT	NT	NT	NT	NT
CHLOROBENZENE	1	3	NT	NT	NT	NT	NT
CHLORODIBROMOMETHANE	0.005	0.03	NT	NT	NT	NT	NT
CHLOROETHANE	100	1000	NT	NT	NT	NT	NT
CHLOROFORM	0.2	0.2	NT	NT	NT	NT	NT
CHLOROMETHANE	100	1000	NT	NT	NT	NT	NT
2-CHLOROTOLUENE	100	1000	NT	NT	NT	NT	NT
4-CHLOROTOLUENE	100	1000	NT	NT	NT	NT	NT
1,2-DIBROMO-3-CHLOROPROPANE	10	100	NT	NT	NT	NT	NT
1,2-DIBROMOETHANE (EDB)	0.1	0.1	NT	NT	NT	NT	NT
DIBROMOMETHANE	500	5000	NT	NT	NT	NT	NT
1,2-DICHLOROBENZENE	9	100	NT	NT	NT	NT	NT
1,3-DICHLOROBENZENE	3	200	NT	NT	NT	NT	NT
1,4-DICHLOROBENZENE	0.7	1	NT	NT	NT	NT	NT
DICHLORODIFLUOROMETHANE	1000	10000	NT	NT	NT	NT	NT
1,1-DICHLOROETHANE	0.4	9	NT	NT	NT	NT	NT
1,2-DICHLOROETHANE	0.1	0.1	NT	NT	NT	NT	NT
1,1-DICHLOROETHYLENE	3	40	NT	NT	NT	NT	NT
CIS-1,2-DICHLOROETHYLENE	0.1	0.1	NT	NT	NT	NT	NT
TRANS-1,2-DICHLOROETHYLENE	1	1	NT	NT	NT	NT	NT
1,2-DICHLOROPROPANE	0.1	0.1	NT	NT	NT	NT	NT
1,3-DICHLOROPROPANE	500	5000	NT	NT	NT	NT	NT
2,2-DICHLOROPROPANE	0.1	0.2	NT	NT	NT	NT	NT
1,1-DICHLOROPROPENE	0.01	0.1	NT	NT	NT	NT	NT
CIS-1,3-DICHLOROPROPENE	0.01	0.1	NT	NT	NT	NT	NT
TRANS-1,3-DICHLOROPROPENE	0.01	0.1	NT	NT	NT	NT	NT
DIETHYL ETHER	100	1000	NT	NT	NT	NT	NT
DIISOPROPYL ETHER	100	1000	NT	NT	NT	NT	NT
1,4-DIOXANE	0.2	6	NT	NT	NT	NT	NT
ETHYLBENZENE	40	1000	NT	NT	NT	NT	NT
HEXACHLOROBUTADIENE	30	100	NT	NT	NT	NT	NT
2-HEXANONE	100	1000	NT	NT	NT	NT	NT
ISOPROPYLBENZENE	1000	10000	NT	NT	NT	NT	NT
P-ISOPROPYLTOLUENE	100	1000	NT	NT	NT	NT	NT
METHYL TERT-BUTYL ETHER (MTBE)	0.1	100	NT	NT	NT	NT	NT
METHYLENE CHLORIDE	0.1	20	NT	NT	NT	NT	NT
4-METHYL-2-PENTANONE (MIB)	0.4	50	NT	NT	NT	NT	NT
NAPHTHALENE	4	20	NT	NT	NT	NT	NT
N-PROPYLBENZENE	100	1000	NT	NT	NT	NT	NT
STYRENE	3	4	NT	NT	NT	NT	NT
1,1,1,2-TETRACHLOROETHANE	0.1	0.1	NT	NT	NT	NT	NT
1,1,2,2-TETRACHLOROETHANE	0.005	0.02	NT	NT	NT	NT	NT
TETRACHLOROETHYLENE	1	10	NT	NT	NT	NT	NT
TETRAHYDROFURAN	500	5000	NT	NT	NT	NT	NT
TOLUENE	30	1000	NT	NT	NT	NT	NT
1,2,3-TRICHLOROBENZENE			NT	NT	NT	NT	NT
1,2,4-TRICHLOROBENZENE	2	6	NT	NT	NT	NT	NT
1,1,1-TRICHLOROETHANE	30	600	NT	NT	NT	NT	NT
1,1,2-TRICHLOROETHANE	0.1	2	NT	NT	NT	NT	NT
TRICHLOROETHYLENE	0.3	0.3	NT	NT	NT	NT	NT
TRICHLOROFLUOROMETHANE	1000	10000	NT	NT	NT	NT	NT
1,2,3-TRICHLOROPROPANE	100	1000	NT	NT	NT	NT	NT
1,2,4-TRIMETHYLBENZENE	1000	10000	NT	NT	NT	NT	NT
1,3,5-TRIMETHYLBENZENE	10	100	NT	NT	NT	NT	NT
VINYL CHLORIDE	0.7	0.7	NT	NT	NT	NT	NT
M/P-XYLENE	100	100	NT	NT	NT	NT	NT
O-XYLENE	100	100	NT	NT	NT	NT	NT

Table 1 - Soil Results Table
Fernald School Cottage Area Subsurface Sampling
200 Trapelo Road, Waltham, Massachusetts

SW-846 8270D (mg/Kg dry)							
ACENAPHTHENE	4	3000	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.20)	ND (0.22)
ACENAPHTHYLENE	1	10	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.20)	ND (0.22)
ACETOPHENONE	1000	10000	ND (0.38)	ND (0.37)	ND (0.37)	ND (0.39)	ND (0.44)
ANILINE	1000	10000	ND (0.38)	ND (0.37)	ND (0.37)	ND (0.39)	ND (0.44)
ANTHRACENE	1000	3000	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.20)	ND (0.22)
BENZO(A)ANTHRACENE	7	40	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.20)	ND (0.22)
BENZO(A)PYRENE	2	7	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.20)	ND (0.22)
BENZO(B)FLUORANTHENE	7	40	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.20)	0.25
BENZO(G,H,I)PERYLENE	1000	3000	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.20)	ND (0.22)
BENZO( )FLUORANTHENE	70	400	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.20)	ND (0.22)
BIS(2-CHLOROETHOXY)METHANE	500	5000	ND (0.38)	ND (0.37)	ND (0.37)	ND (0.39)	ND (0.44)
BIS(2-CHLOROETHYL)ETHER	0.7	0.7	ND (0.38)	ND (0.37)	ND (0.37)	ND (0.39)	ND (0.44)
BIS(2-CHLOROISOPROPYL)ETHER	0.7	0.7	ND (0.38)	ND (0.37)	ND (0.37)	ND (0.39)	ND (0.44)
BIS(2-ETHYLHEXYL)PHTHALATE	90	600	ND (0.38)	ND (0.37)	ND (0.37)	ND (0.39)	ND (0.44)
4-BROMOPHENYL PHENYL ETHER	100	1000	ND (0.38)	ND (0.37)	ND (0.37)	ND (0.39)	ND (0.44)
BUTYLBENZYLPHTHALATE	100	1000	ND (0.38)	ND (0.37)	ND (0.37)	ND (0.39)	ND (0.44)
4-CHLOROANILINE	1	3	ND (0.73)	ND (0.72)	ND (0.72)	ND (0.76)	ND (0.86)
2-CHLORONAPHTHALENE	1000	10000	ND (0.38)	ND (0.37)	ND (0.37)	ND (0.39)	ND (0.44)
2-CHLOROPHENOL	0.7	100	ND (0.38)	ND (0.37)	ND (0.37)	ND (0.39)	ND (0.44)
CHRYSENE	70	400	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.20)	ND (0.22)
DIBENZ(A,H)ANTHRACENE	0.7	4	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.20)	ND (0.22)
DIBENZOFURAN	100	1000	ND (0.38)	ND (0.37)	ND (0.37)	ND (0.39)	ND (0.44)
DI-N-BUTYLPHTHALATE	50	500	ND (0.38)	ND (0.37)	ND (0.37)	ND (0.39)	ND (0.44)
1,2-DICHLOROBENZENE	9	100	ND (0.38)	ND (0.37)	ND (0.37)	ND (0.39)	ND (0.44)
1,3-DICHLOROBENZENE	3	200	ND (0.38)	ND (0.37)	ND (0.37)	ND (0.39)	ND (0.44)
1,4-DICHLOROBENZENE	0.7	1	ND (0.38)	ND (0.37)	ND (0.37)	ND (0.39)	ND (0.44)
3,3 -DICHLOROBENZIDINE	3	20	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.20)	ND (0.22)
2,4-DICHLOROPHENOL	0.7	40	ND (0.38)	ND (0.37)	ND (0.37)	ND (0.39)	ND (0.44)
DIETHYLPHTHALATE	10	200	ND (0.38)	ND (0.37)	ND (0.37)	ND (0.39)	ND (0.44)
2,4-DIMETHYLPHENOL	0.7	100	ND (0.38)	ND (0.37)	ND (0.37)	ND (0.39)	ND (0.44)
DIMETHYLPHTHALATE	0.7	50	ND (0.38)	ND (0.37)	ND (0.37)	ND (0.39)	ND (0.44)
2,4-DINITROPHENOL	3	50	ND (0.73)	ND (0.72)	ND (0.72)	ND (0.76)	ND (0.86)
2,4-DINITROTOLUENE	0.7	10	ND (0.38)	ND (0.37)	ND (0.37)	ND (0.39)	ND (0.44)
2,6-DINITROTOLUENE	100	1000	ND (0.38)	ND (0.37)	ND (0.37)	ND (0.39)	ND (0.44)
DI-N-OCTYLPHTHALATE	1000	10000	ND (0.38)	ND (0.37)	ND (0.37)	ND (0.39)	ND (0.44)
1,2-DIPHENYLHYDRAZINE (AZOBENZENE)	50	500	ND (0.38)	ND (0.37)	ND (0.37)	ND (0.39)	ND (0.44)
FLUORANTHENE	1000	3000	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.20)	0.40
FLUORENE	1000	3000	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.20)	ND (0.22)
HEXACHLOROBENZENE	0.7	0.8	ND (0.38)	ND (0.37)	ND (0.37)	ND (0.39)	ND (0.44)
HEXACHLOROBUTADIENE	30	100	ND (0.38)	ND (0.37)	ND (0.37)	ND (0.39)	ND (0.44)
HEXACHLOROETHANE	0.7	3	ND (0.38)	ND (0.37)	ND (0.37)	ND (0.39)	ND (0.44)
INDENO(1,2,3-CD)PYRENE	7	40	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.20)	ND (0.22)
ISOPHORONE	100	1000	ND (0.38)	ND (0.37)	ND (0.37)	ND (0.39)	ND (0.44)
2-METHYLNAPHTHALENE	0.7	80	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.20)	ND (0.22)
O-CRESOL	500	5000	ND (0.38)	ND (0.37)	ND (0.37)	ND (0.39)	ND (0.44)
M/P-CRESOL	500	5000	ND (0.38)	ND (0.37)	ND (0.37)	ND (0.39)	ND (0.44)
NAPHTHALENE	4	20	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.20)	ND (0.22)
NITROBENZENE	500	5000	ND (0.38)	ND (0.37)	ND (0.37)	ND (0.39)	ND (0.44)
2-NITROPHENOL	100	1000	ND (0.38)	ND (0.37)	ND (0.37)	ND (0.39)	ND (0.44)
4-NITROPHENOL	100	1000	ND (0.73)	ND (0.72)	ND (0.72)	ND (0.76)	ND (0.86)
PENTACHLOROPHENOL	3	10	ND (0.38)	ND (0.37)	ND (0.37)	ND (0.39)	ND (0.44)
PHENANTHRENE	10	1000	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.20)	ND (0.22)
PHENOL	1	20	ND (0.38)	ND (0.37)	ND (0.37)	ND (0.39)	ND (0.44)
PYRENE	1000	3000	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.20)	0.38
1,2,4-TRICHLOROBENZENE	2	6	ND (0.38)	ND (0.37)	ND (0.37)	ND (0.39)	ND (0.44)
2,4,5-TRICHLOROPHENOL	4	600	ND (0.38)	ND (0.37)	ND (0.37)	ND (0.39)	ND (0.44)
2,4,6-TRICHLOROPHENOL	0.7	20	ND (0.38)	ND (0.37)	ND (0.37)	ND (0.39)	ND (0.44)

Table 1 - Soil Results Table
Fernald School Cottage Area Subsurface Sampling
200 Trapelo Road, Waltham, Massachusetts

Parameter	Reportable Concentrations (RCs)		SAMPLING LOCATION				
	RCS-1	RCS-2	2019 5-10'	2020 0-5'	2020 5-10'	2023 0-5'	2023 5-10'
Sampling Date			10/4/2018 1:10:00 PM	10/4/2018 3:00:00 PM	10/4/2018 3:00:00 PM	10/4/2018 5:00:00 PM	10/4/2018 5:00:00 PM
Sample Depth			5-10 Feet	0-5 Feet	5-10 Feet	0-5 Feet	5-10 Feet
MADEP-EPH-04-1.1 (mg/Kg dry)							
C9-C18 ALIPHATICS	1000	3000	ND (11)	NT	NT	NT	NT
C19-C36 ALIPHATICS	3000	5000	ND (11)	NT	NT	NT	NT
UNAD USTED C11-C22 AROMATICS			ND (11)	NT	NT	NT	NT
C11-C22 AROMATICS	1000	3000	ND (11)	NT	NT	NT	NT
ACENAPHTHENE	4	3000	ND (0.11)	NT	NT	NT	NT
ACENAPHTHYLENE	1	10	ND (0.11)	NT	NT	NT	NT
ANTHRACENE	1000	3000	ND (0.11)	NT	NT	NT	NT
BENZO(A)ANTHRACENE	7	40	ND (0.11)	NT	NT	NT	NT
BENZO(A)PYRENE	2	7	ND (0.11)	NT	NT	NT	NT
BENZO(B)FLUORANTHENE	7	40	ND (0.11)	NT	NT	NT	NT
BENZO(G,H,I)PERYLENE	1000	3000	ND (0.11)	NT	NT	NT	NT
BENZO( )FLUORANTHENE	70	400	ND (0.11)	NT	NT	NT	NT
CHRYSENE	70	400	ND (0.11)	NT	NT	NT	NT
DIBENZ(A,H)ANTHRACENE	0.7	4	ND (0.11)	NT	NT	NT	NT
FLUORANTHENE	1000	3000	ND (0.11)	NT	NT	NT	NT
FLUORENE	1000	3000	ND (0.11)	NT	NT	NT	NT
INDENO(1,2,3-CD)PYRENE	7	40	ND (0.11)	NT	NT	NT	NT
2-METHYLNAPHTHALENE	0.7	80	ND (0.11)	NT	NT	NT	NT
NAPHTHALENE	4	20	ND (0.11)	NT	NT	NT	NT
PHENANTHRENE	10	1000	ND (0.11)	NT	NT	NT	NT
PYRENE	1000	3000	ND (0.11)	NT	NT	NT	NT
MADEP-VPH-Feb 2018 Rev 2.1 (mg/Kg dry)							
UNAD USTED C5-C8 ALIPHATICS			ND (14)	NT	NT	NT	NT
C5-C8 ALIPHATICS	100	500	ND (14)	NT	NT	NT	NT
UNAD USTED C9-C12 ALIPHATICS			ND (14)	NT	NT	NT	NT
C9-C12 ALIPHATICS	1000	3000	ND (14)	NT	NT	NT	NT
C9-C10 AROMATICS	100	500	ND (14)	NT	NT	NT	NT
BENZENE	2	200	ND (0.068)	NT	NT	NT	NT
ETHYLBENZENE	40	1000	ND (0.068)	NT	NT	NT	NT
METHYL TERT-BUTYL ETHER (MTBE)	0.1	100	ND (0.068)	NT	NT	NT	NT
NAPHTHALENE	4	20	ND (0.34)	NT	NT	NT	NT
TOLUENE	30	1000	ND (0.068)	NT	NT	NT	NT
M/P-XYLENE	100	100	ND (0.14)	NT	NT	NT	NT
O-XYLENE	100	100	ND (0.068)	NT	NT	NT	NT
SM 2540G (% Wt)							
% Solids			89.7	89.1	91.4	85.8	91.7
SW-846 6010D (mg/Kg dry) Metals Digestion							
ANTIMONY	20	30	ND (1.9)	ND (1.8)	ND (1.8)	ND (1.9)	ND (1.8)
ARSENIC	20	20	ND (1.9)	ND (1.8)	ND (1.8)	2.5	ND (1.8)
BARIUM	1000	3000	47	40	67	33	24
BERYLLIUM	90	200	0.31	0.42	0.67	0.37	0.22
CADMIUM	70	100	ND (0.19)	ND (0.18)	ND (0.18)	0.22	ND (0.18)
CHROMIUM	100	200	15	13	7.7	12	10
LEAD	200	600	4.8	11	21	33	6.4
NIC EL	600	1000	9.3	10	9.0	7.9	7.5
SELENIUM	400	700	ND (3.7)	ND (3.7)	ND (3.6)	ND (3.8)	ND (3.6)
SILVER	100	200	ND (0.37)	ND (0.37)	ND (0.36)	ND (0.38)	ND (0.36)
THALLIUM	8	60	ND (1.9)	ND (1.8)	ND (1.8)	ND (1.9)	ND (1.8)
VANADIUM	400	700	27	44	45	23	25
ZINC	1000	3000	29	45	46	41	28
SW-846 7471B (mg/Kg dry) Metals Digestion							
MERCURY	20	30	ND (0.028)	0.031	ND (0.027)	0.055	ND (0.028)
SW-846 8082A (mg/Kg dry)							
PCB 1016	1	4	ND (0.087)	ND (0.084)	ND (0.085)	ND (0.092)	ND (0.082)
PCB 1221	1	4	ND (0.087)	ND (0.084)	ND (0.085)	ND (0.092)	ND (0.082)
PCB 1232	1	4	ND (0.087)	ND (0.084)	ND (0.085)	ND (0.092)	ND (0.082)
PCB 1242	1	4	ND (0.087)	ND (0.084)	ND (0.085)	ND (0.092)	ND (0.082)
PCB 1248	1	4	ND (0.087)	ND (0.084)	ND (0.085)	ND (0.092)	ND (0.082)
PCB 1254	1	4	ND (0.087)	ND (0.084)	ND (0.085)	ND (0.092)	ND (0.082)
PCB 1260	1	4	ND (0.087)	ND (0.084)	ND (0.085)	ND (0.092)	ND (0.082)
PCB 1262	1	4	ND (0.087)	ND (0.084)	ND (0.085)	ND (0.092)	ND (0.082)
PCB 1268	1	4	ND (0.087)	ND (0.084)	ND (0.085)	ND (0.092)	ND (0.082)

Table 1 - Soil Results Table
Fernald School Cottage Area Subsurface Sampling
200 Trapelo Road, Waltham, Massachusetts

SW-846 8260C (mg/Kg dry)							
ACETONE	6	50	ND (3.3)	NT	NT	NT	NT
TERT-AMYL METHYL ETHER			ND (0.033)	NT	NT	NT	NT
BENZENE	2	200	ND (0.066)	NT	NT	NT	NT
BROMOBENZENE	100	1000	ND (0.066)	NT	NT	NT	NT
BROMOCHLOROMETHANE			ND (0.066)	NT	NT	NT	NT
BROMODICHLOROMETHANE	0.1	0.1	ND (0.066)	NT	NT	NT	NT
BROMOFORM	0.1	1	**ND (0.13) ***	NT	NT	NT	NT
BROMOMETHANE	0.5	0.5	ND (0.13)	NT	NT	NT	NT
2-BUTANONE (ME)	4	50	ND (1.3)	NT	NT	NT	NT
N-BUTYLBENZENE			ND (0.066)	NT	NT	NT	NT
SEC-BUTYLBENZENE			ND (0.066)	NT	NT	NT	NT
TERT-BUTYLBENZENE	100	1000	ND (0.066)	NT	NT	NT	NT
TERT-BUTYLETHYL ETHER			ND (0.033)	NT	NT	NT	NT
CARBON DISULFIDE	100	1000	ND (0.66)	NT	NT	NT	NT
CARBON TETRACHLORIDE	5	5	ND (0.066)	NT	NT	NT	NT
CHLOROBENZENE	1	3	ND (0.066)	NT	NT	NT	NT
CHLORODIBROMOMETHANE	0.005	0.03	**ND (0.033) ***	NT	NT	NT	NT
CHLOROETHANE	100	1000	ND (0.13)	NT	NT	NT	NT
CHLOROFORM	0.2	0.2	ND (0.13)	NT	NT	NT	NT
CHLOROMETHANE	100	1000	ND (0.13)	NT	NT	NT	NT
2-CHLOROTOLUENE	100	1000	ND (0.066)	NT	NT	NT	NT
4-CHLOROTOLUENE	100	1000	ND (0.066)	NT	NT	NT	NT
1,2-DIBROMO-3-CHLOROPROPANE	10	100	ND (0.26)	NT	NT	NT	NT
1,2-DIBROMOETHANE (EDB)	0.1	0.1	ND (0.033)	NT	NT	NT	NT
DIBROMOMETHANE	500	5000	ND (0.066)	NT	NT	NT	NT
1,2-DICHLOROBENZENE	9	100	ND (0.066)	NT	NT	NT	NT
1,3-DICHLOROBENZENE	3	200	ND (0.066)	NT	NT	NT	NT
1,4-DICHLOROBENZENE	0.7	1	ND (0.066)	NT	NT	NT	NT
DICHLORODIFLUOROMETHANE	1000	10000	ND (0.13)	NT	NT	NT	NT
1,1-DICHLOROETHANE	0.4	9	ND (0.066)	NT	NT	NT	NT
1,2-DICHLOROETHANE	0.1	0.1	ND (0.066)	NT	NT	NT	NT
1,1-DICHLOROETHYLENE	3	40	ND (0.066)	NT	NT	NT	NT
CIS-1,2-DICHLOROETHYLENE	0.1	0.1	ND (0.066)	NT	NT	NT	NT
TRANS-1,2-DICHLOROETHYLENE	1	1	ND (0.066)	NT	NT	NT	NT
1,2-DICHLOROPROPANE	0.1	0.1	ND (0.066)	NT	NT	NT	NT
1,3-DICHLOROPROPANE	500	5000	ND (0.033)	NT	NT	NT	NT
2,2-DICHLOROPROPANE	0.1	0.2	ND (0.066)	NT	NT	NT	NT
1,1-DICHLOROPROPENE	0.01	0.1	**ND (0.13) ***	NT	NT	NT	NT
CIS-1,3-DICHLOROPROPENE	0.01	0.1	**ND (0.033) ***	NT	NT	NT	NT
TRANS-1,3-DICHLOROPROPENE	0.01	0.1	**ND (0.033) ***	NT	NT	NT	NT
DIETHYL ETHER	100	1000	ND (0.13)	NT	NT	NT	NT
DIISOPROPYL ETHER	100	1000	ND (0.033)	NT	NT	NT	NT
1,4-DIOXANE	0.2	6	**ND (3.3) ***	NT	NT	NT	NT
ETHYLBENZENE	40	1000	ND (0.066)	NT	NT	NT	NT
HEXACHLOROBUTADIENE	30	100	ND (0.066)	NT	NT	NT	NT
2-HEXANONE	100	1000	ND (0.66)	NT	NT	NT	NT
ISOPROPYLBENZENE	1000	10000	ND (0.066)	NT	NT	NT	NT
P-ISOPROPYLTOLUENE	100	1000	ND (0.066)	NT	NT	NT	NT
METHYL TERT-BUTYL ETHER (MTBE)	0.1	100	ND (0.066)	NT	NT	NT	NT
METHYLENE CHLORIDE	0.1	20	**ND (0.33) ***	NT	NT	NT	NT
4-METHYL-2-PENTANONE (MIB)	0.4	50	**ND (0.66) ***	NT	NT	NT	NT
NAPHTHALENE	4	20	ND (0.13)	NT	NT	NT	NT
N-PROPYLBENZENE	100	1000	ND (0.066)	NT	NT	NT	NT
STYRENE	3	4	ND (0.066)	NT	NT	NT	NT
1,1,1,2-TETRACHLOROETHANE	0.1	0.1	ND (0.066)	NT	NT	NT	NT
1,1,2,2-TETRACHLOROETHANE	0.005	0.02	**ND (0.033) ***	NT	NT	NT	NT
TETRACHLOROETHYLENE	1	10	ND (0.066)	NT	NT	NT	NT
TETRAHYDROFURAN	500	5000	ND (0.26)	NT	NT	NT	NT
TOLUENE	30	1000	ND (0.066)	NT	NT	NT	NT
1,2,3-TRICHLOROBENZENE			ND (0.26)	NT	NT	NT	NT
1,2,4-TRICHLOROBENZENE	2	6	ND (0.066)	NT	NT	NT	NT
1,1,1-TRICHLOROETHANE	30	600	ND (0.066)	NT	NT	NT	NT
1,1,2-TRICHLOROETHANE	0.1	2	ND (0.066)	NT	NT	NT	NT
TRICHLOROETHYLENE	0.3	0.3	ND (0.066)	NT	NT	NT	NT
TRICHLOROFLUOROMETHANE	1000	10000	ND (0.13)	NT	NT	NT	NT
1,2,3-TRICHLOROPROPANE	100	1000	ND (0.13)	NT	NT	NT	NT
1,2,4-TRIMETHYLBENZENE	1000	10000	ND (0.066)	NT	NT	NT	NT
1,3,5-TRIMETHYLBENZENE	10	100	ND (0.066)	NT	NT	NT	NT
VINYL CHLORIDE	0.7	0.7	ND (0.13)	NT	NT	NT	NT
M/P-XYLENE	100	100	ND (0.13)	NT	NT	NT	NT
O-XYLENE	100	100	ND (0.066)	NT	NT	NT	NT

Table 1 - Soil Results Table
Fernald School Cottage Area Subsurface Sampling
200 Trapelo Road, Waltham, Massachusetts

SW-846 8270D (mg/Kg dry)							
ACENAPHTHENE	4	3000	ND (0.19)	ND (0.19)	ND (0.18)	ND (0.19)	ND (0.18)
ACENAPHTHYLENE	1	10	ND (0.19)	ND (0.19)	ND (0.18)	ND (0.19)	ND (0.18)
ACETOPHENONE	1000	10000	ND (0.38)	ND (0.38)	ND (0.37)	ND (0.39)	ND (0.37)
ANILINE	1000	10000	ND (0.38)	ND (0.38)	ND (0.37)	ND (0.39)	ND (0.37)
ANTHRACENE	1000	3000	ND (0.19)	ND (0.19)	ND (0.18)	ND (0.19)	ND (0.18)
BENZO(A)ANTHRACENE	7	40	ND (0.19)	ND (0.19)	ND (0.18)	ND (0.19)	ND (0.18)
BENZO(A)PYRENE	2	7	ND (0.19)	ND (0.19)	ND (0.18)	ND (0.19)	ND (0.18)
BENZO(B)FLUORANTHENE	7	40	ND (0.19)	ND (0.19)	ND (0.18)	ND (0.19)	ND (0.18)
BENZO(G,H,I)PERYLENE	1000	3000	ND (0.19)	ND (0.19)	ND (0.18)	ND (0.19)	ND (0.18)
BENZO( )FLUORANTHENE	70	400	ND (0.19)	ND (0.19)	ND (0.18)	ND (0.19)	ND (0.18)
BIS(2-CHLOROETHOXY)METHANE	500	5000	ND (0.38)	ND (0.38)	ND (0.37)	ND (0.39)	ND (0.37)
BIS(2-CHLOROETHYL)ETHER	0.7	0.7	ND (0.38)	ND (0.38)	ND (0.37)	ND (0.39)	ND (0.37)
BIS(2-CHLOROISOPROPYL)ETHER	0.7	0.7	ND (0.38)	ND (0.38)	ND (0.37)	ND (0.39)	ND (0.37)
BIS(2-ETHYLHEXYL)PHTHALATE	90	600	ND (0.38)	ND (0.38)	ND (0.37)	ND (0.39)	ND (0.37)
4-BROMOPHENYL PHENYL ETHER	100	1000	ND (0.38)	ND (0.38)	ND (0.37)	ND (0.39)	ND (0.37)
BUTYLBENZYLPHTHALATE	100	1000	ND (0.38)	ND (0.38)	ND (0.37)	ND (0.39)	ND (0.37)
4-CHLOROANILINE	1	3	ND (0.73)	ND (0.74)	ND (0.71)	ND (0.76)	ND (0.71)
2-CHLORONAPHTHALENE	1000	10000	ND (0.38)	ND (0.38)	ND (0.37)	ND (0.39)	ND (0.37)
2-CHLOROPHENOL	0.7	100	ND (0.38)	ND (0.38)	ND (0.37)	ND (0.39)	ND (0.37)
CHRYSENE	70	400	ND (0.19)	ND (0.19)	ND (0.18)	ND (0.19)	ND (0.18)
DIBENZ(A,H)ANTHRACENE	0.7	4	ND (0.19)	ND (0.19)	ND (0.18)	ND (0.19)	ND (0.18)
DIBENZOFURAN	100	1000	ND (0.38)	ND (0.38)	ND (0.37)	ND (0.39)	ND (0.37)
DI-N-BUTYLPHTHALATE	50	500	ND (0.38)	ND (0.38)	ND (0.37)	ND (0.39)	ND (0.37)
1,2-DICHLOROBENZENE	9	100	ND (0.38)	ND (0.38)	ND (0.37)	ND (0.39)	ND (0.37)
1,3-DICHLOROBENZENE	3	200	ND (0.38)	ND (0.38)	ND (0.37)	ND (0.39)	ND (0.37)
1,4-DICHLOROBENZENE	0.7	1	ND (0.38)	ND (0.38)	ND (0.37)	ND (0.39)	ND (0.37)
3,3 -DICHLOROBENZIDINE	3	20	ND (0.19)	ND (0.19)	ND (0.18)	ND (0.19)	ND (0.18)
2,4-DICHLOROPHENOL	0.7	40	ND (0.38)	ND (0.38)	ND (0.37)	ND (0.39)	ND (0.37)
DIETHYLPHTHALATE	10	200	ND (0.38)	ND (0.38)	ND (0.37)	ND (0.39)	ND (0.37)
2,4-DIMETHYLPHENOL	0.7	100	ND (0.38)	ND (0.38)	ND (0.37)	ND (0.39)	ND (0.37)
DIMETHYLPHTHALATE	0.7	50	ND (0.38)	ND (0.38)	ND (0.37)	ND (0.39)	ND (0.37)
2,4-DINITROPHENOL	3	50	ND (0.73)	ND (0.74)	ND (0.71)	ND (0.76)	ND (0.71)
2,4-DINITROTOLUENE	0.7	10	ND (0.38)	ND (0.38)	ND (0.37)	ND (0.39)	ND (0.37)
2,6-DINITROTOLUENE	100	1000	ND (0.38)	ND (0.38)	ND (0.37)	ND (0.39)	ND (0.37)
DI-N-OCTYLPHTHALATE	1000	10000	ND (0.38)	ND (0.38)	ND (0.37)	ND (0.39)	ND (0.37)
1,2-DIPHENYLHYDRAZINE (AZOBENZENE)	50	500	ND (0.38)	ND (0.38)	ND (0.37)	ND (0.39)	ND (0.37)
FLUORANTHENE	1000	3000	ND (0.19)	ND (0.19)	ND (0.18)	ND (0.19)	ND (0.18)
FLUORENE	1000	3000	ND (0.19)	ND (0.19)	ND (0.18)	ND (0.19)	ND (0.18)
HEXACHLOROBENZENE	0.7	0.8	ND (0.38)	ND (0.38)	ND (0.37)	ND (0.39)	ND (0.37)
HEXACHLOROBUTADIENE	30	100	ND (0.38)	ND (0.38)	ND (0.37)	ND (0.39)	ND (0.37)
HEXACHLOROETHANE	0.7	3	ND (0.38)	ND (0.38)	ND (0.37)	ND (0.39)	ND (0.37)
INDENO(1,2,3-CD)PYRENE	7	40	ND (0.19)	ND (0.19)	ND (0.18)	ND (0.19)	ND (0.18)
ISOPHORONE	100	1000	ND (0.38)	ND (0.38)	ND (0.37)	ND (0.39)	ND (0.37)
2-METHYLNAPHTHALENE	0.7	80	ND (0.19)	ND (0.19)	ND (0.18)	ND (0.19)	ND (0.18)
O-CRESOL	500	5000	ND (0.38)	ND (0.38)	ND (0.37)	ND (0.39)	ND (0.37)
M/P-CRESOL	500	5000	ND (0.38)	ND (0.38)	ND (0.37)	ND (0.39)	ND (0.37)
NAPHTHALENE	4	20	ND (0.19)	ND (0.19)	ND (0.18)	ND (0.19)	ND (0.18)
NITROBENZENE	500	5000	ND (0.38)	ND (0.38)	ND (0.37)	ND (0.39)	ND (0.37)
2-NITROPHENOL	100	1000	ND (0.38)	ND (0.38)	ND (0.37)	ND (0.39)	ND (0.37)
4-NITROPHENOL	100	1000	ND (0.73)	ND (0.74)	ND (0.71)	ND (0.76)	ND (0.71)
PENTACHLOROPHENOL	3	10	ND (0.38)	ND (0.38)	ND (0.37)	ND (0.39)	ND (0.37)
PHENANTHRENE	10	1000	ND (0.19)	ND (0.19)	ND (0.18)	ND (0.19)	ND (0.18)
PHENOL	1	20	ND (0.38)	ND (0.38)	ND (0.37)	ND (0.39)	ND (0.37)
PYRENE	1000	3000	ND (0.19)	ND (0.19)	ND (0.18)	ND (0.19)	ND (0.18)
1,2,4-TRICHLOROBENZENE	2	6	ND (0.38)	ND (0.38)	ND (0.37)	ND (0.39)	ND (0.37)
2,4,5-TRICHLOROPHENOL	4	600	ND (0.38)	ND (0.38)	ND (0.37)	ND (0.39)	ND (0.37)
2,4,6-TRICHLOROPHENOL	0.7	20	ND (0.38)	ND (0.38)	ND (0.37)	ND (0.39)	ND (0.37)

Table 1 - Soil Results Table
Fernald School Cottage Area Subsurface Sampling
200 Trapelo Road, Waltham, Massachusetts

Parameter	Reportable Concentrations (RCs)		SAMPLING LOCATION				
	RCS-1	RCS-2	2024 0-5'	2024 5-10'	SB/MW-2 0-5'	SB/MW-2 5-10'	
Sampling Date			10/4/2018 5:30:00 PM	10/4/2018 5:30:00 PM	10/3/2018 3:30:00 PM	10/3/2018 3:30:00 PM	
Sample Depth			0-5 Feet	5-10 Feet	0-5 Feet	5-10 Feet	
MADEP-EPH-04-1.1 (mg/Kg dry)							
C9-C18 ALIPHATICS	1000	3000	NT	NT	NT	NT	
C19-C36 ALIPHATICS	3000	5000	NT	NT	NT	NT	
UNAD USTED C11-C22 AROMATICS			NT	NT	NT	NT	
C11-C22 AROMATICS	1000	3000	NT	NT	NT	NT	
ACENAPHTHENE	4	3000	NT	NT	NT	NT	
ACENAPHTHYLENE	1	10	NT	NT	NT	NT	
ANTHRACENE	1000	3000	NT	NT	NT	NT	
BENZO(A)ANTHRACENE	7	40	NT	NT	NT	NT	
BENZO(A)PYRENE	2	7	NT	NT	NT	NT	
BENZO(B)FLUORANTHENE	7	40	NT	NT	NT	NT	
BENZO(G,H,I)PERYLENE	1000	3000	NT	NT	NT	NT	
BENZO( )FLUORANTHENE	70	400	NT	NT	NT	NT	
CHRYSENE	70	400	NT	NT	NT	NT	
DIBENZ(A,H)ANTHRACENE	0.7	4	NT	NT	NT	NT	
FLUORANTHENE	1000	3000	NT	NT	NT	NT	
FLUORENE	1000	3000	NT	NT	NT	NT	
INDENO(1,2,3-CD)PYRENE	7	40	NT	NT	NT	NT	
2-METHYLNAPHTHALENE	0.7	80	NT	NT	NT	NT	
NAPHTHALENE	4	20	NT	NT	NT	NT	
PHENANTHRENE	10	1000	NT	NT	NT	NT	
PYRENE	1000	3000	NT	NT	NT	NT	
MADEP-VPH-Feb 2018 Rev 2.1 (mg/Kg dry)							
UNAD USTED C5-C8 ALIPHATICS			NT	NT	NT	NT	
C5-C8 ALIPHATICS	100	500	NT	NT	NT	NT	
UNAD USTED C9-C12 ALIPHATICS			NT	NT	NT	NT	
C9-C12 ALIPHATICS	1000	3000	NT	NT	NT	NT	
C9-C10 AROMATICS	100	500	NT	NT	NT	NT	
BENZENE	2	200	NT	NT	NT	NT	
ETHYLBENZENE	40	1000	NT	NT	NT	NT	
METHYL TERT-BUTYL ETHER (MTBE)	0.1	100	NT	NT	NT	NT	
NAPHTHALENE	4	20	NT	NT	NT	NT	
TOLUENE	30	1000	NT	NT	NT	NT	
M/P-XYLENE	100	100	NT	NT	NT	NT	
O-XYLENE	100	100	NT	NT	NT	NT	
SM 2540G (% Wt)							
% Solids			89.1	91.2	89.2	87.1	
SW-846 6010D (mg/Kg dry) Metals Digestion							
ANTIMONY	20	30	ND (1.9)	ND (1.8)	ND (1.9)	ND (1.9)	
ARSENIC	20	20	ND (1.9)	ND (1.8)	ND (1.9)	ND (1.9)	
BARIUM	1000	3000	57	63	39	38	
BERYLLIUM	90	200	0.35	0.38	0.32	0.29	
CADMIUM	70	100	ND (0.19)	ND (0.18)	ND (0.19)	ND (0.19)	
CHROMIUM	100	200	12	12	8.9	11	
LEAD	200	600	7.1	6.7	6.5	4.3	
NIC EL	600	1000	10	11	7.0	6.7	
SELENIUM	400	700	ND (3.7)	ND (3.6)	ND (3.7)	ND (3.8)	
SILVER	100	200	ND (0.37)	ND (0.36)	ND (0.37)	ND (0.38)	
THALLIUM	8	60	ND (1.9)	ND (1.8)	ND (1.9)	ND (1.9)	
VANADIUM	400	700	36	38	26	30	
ZINC	1000	3000	34	48	30	23	
SW-846 7471B (mg/Kg dry) Metals Digestion							
MERCURY	20	30	ND (0.026)	ND (0.027)	ND (0.028)	ND (0.030)	
SW-846 8082A (mg/Kg dry)							
PCB 1016	1	4	ND (0.086)	ND (0.081)	ND (0.087)	ND (0.088)	
PCB 1221	1	4	ND (0.086)	ND (0.081)	ND (0.087)	ND (0.088)	
PCB 1232	1	4	ND (0.086)	ND (0.081)	ND (0.087)	ND (0.088)	
PCB 1242	1	4	ND (0.086)	ND (0.081)	ND (0.087)	ND (0.088)	
PCB 1248	1	4	ND (0.086)	ND (0.081)	ND (0.087)	ND (0.088)	
PCB 1254	1	4	ND (0.086)	ND (0.081)	ND (0.087)	ND (0.088)	
PCB 1260	1	4	ND (0.086)	ND (0.081)	ND (0.087)	ND (0.088)	
PCB 1262	1	4	ND (0.086)	ND (0.081)	ND (0.087)	ND (0.088)	
PCB 1268	1	4	ND (0.086)	ND (0.081)	ND (0.087)	ND (0.088)	
SW-846 8260C (mg/Kg dry)							
ACETONE	6	50	NT	NT	NT	NT	
TERT-AMYL METHYL ETHER			NT	NT	NT	NT	
BENZENE	2	200	NT	NT	NT	NT	
BROMOBENZENE	100	1000	NT	NT	NT	NT	

Table 1 - Soil Results Table
Fernald School Cottage Area Subsurface Sampling
200 Trapelo Road, Waltham, Massachusetts

BROMOCHLOROMETHANE			NT	NT	NT	NT	
BROMODICHLOROMETHANE	0.1	0.1	NT	NT	NT	NT	
BROMOFORM	0.1	1	NT	NT	NT	NT	
BROMOMETHANE	0.5	0.5	NT	NT	NT	NT	
2-BUTANONE (ME)	4	50	NT	NT	NT	NT	
N-BUTYLBENZENE			NT	NT	NT	NT	
SEC-BUTYLBENZENE			NT	NT	NT	NT	
TERT-BUTYLBENZENE	100	1000	NT	NT	NT	NT	
TERT-BUTYLETHYL ETHER			NT	NT	NT	NT	
CARBON DISULFIDE	100	1000	NT	NT	NT	NT	
CARBON TETRACHLORIDE	5	5	NT	NT	NT	NT	
CHLOROBENZENE	1	3	NT	NT	NT	NT	
CHLORODIBROMOMETHANE	0.005	0.03	NT	NT	NT	NT	
CHLOROETHANE	100	1000	NT	NT	NT	NT	
CHLOROFORM	0.2	0.2	NT	NT	NT	NT	
CHLOROMETHANE	100	1000	NT	NT	NT	NT	
2-CHLOROTOLUENE	100	1000	NT	NT	NT	NT	
4-CHLOROTOLUENE	100	1000	NT	NT	NT	NT	
1,2-DIBROMO-3-CHLOROPROPANE	10	100	NT	NT	NT	NT	
1,2-DIBROMOETHANE (EDB)	0.1	0.1	NT	NT	NT	NT	
DIBROMOMETHANE	500	5000	NT	NT	NT	NT	
1,2-DICHLOROBENZENE	9	100	NT	NT	NT	NT	
1,3-DICHLOROBENZENE	3	200	NT	NT	NT	NT	
1,4-DICHLOROBENZENE	0.7	1	NT	NT	NT	NT	
DICHLORODIFLUOROMETHANE	1000	10000	NT	NT	NT	NT	
1,1-DICHLOROETHANE	0.4	9	NT	NT	NT	NT	
1,2-DICHLOROETHANE	0.1	0.1	NT	NT	NT	NT	
1,1-DICHLOROETHYLENE	3	40	NT	NT	NT	NT	
CIS-1,2-DICHLOROETHYLENE	0.1	0.1	NT	NT	NT	NT	
TRANS-1,2-DICHLOROETHYLENE	1	1	NT	NT	NT	NT	
1,2-DICHLOROPROPANE	0.1	0.1	NT	NT	NT	NT	
1,3-DICHLOROPROPANE	500	5000	NT	NT	NT	NT	
2,2-DICHLOROPROPANE	0.1	0.2	NT	NT	NT	NT	
1,1-DICHLOROPROPENE	0.01	0.1	NT	NT	NT	NT	
CIS-1,3-DICHLOROPROPENE	0.01	0.1	NT	NT	NT	NT	
TRANS-1,3-DICHLOROPROPENE	0.01	0.1	NT	NT	NT	NT	
DIETHYL ETHER	100	1000	NT	NT	NT	NT	
DIISOPROPYL ETHER	100	1000	NT	NT	NT	NT	
1,4-DIOXANE	0.2	6	NT	NT	NT	NT	
ETHYLBENZENE	40	1000	NT	NT	NT	NT	
HEXACHLOROBUTADIENE	30	100	NT	NT	NT	NT	
2-HEXANONE	100	1000	NT	NT	NT	NT	
ISOPROPYLBENZENE	1000	10000	NT	NT	NT	NT	
P-ISOPROPYLTOLUENE	100	1000	NT	NT	NT	NT	
METHYL TERT-BUTYL ETHER (MTBE)	0.1	100	NT	NT	NT	NT	
METHYLENE CHLORIDE	0.1	20	NT	NT	NT	NT	
4-METHYL-2-PENTANONE (MIB)	0.4	50	NT	NT	NT	NT	
NAPHTHALENE	4	20	NT	NT	NT	NT	
N-PROPYLBENZENE	100	1000	NT	NT	NT	NT	
STYRENE	3	4	NT	NT	NT	NT	
1,1,1,2-TETRACHLOROETHANE	0.1	0.1	NT	NT	NT	NT	
1,1,2,2-TETRACHLOROETHANE	0.005	0.02	NT	NT	NT	NT	
TETRACHLOROETHYLENE	1	10	NT	NT	NT	NT	
TETRAHYDROFURAN	500	5000	NT	NT	NT	NT	
TOLUENE	30	1000	NT	NT	NT	NT	
1,2,3-TRICHLOROBENZENE			NT	NT	NT	NT	
1,2,4-TRICHLOROBENZENE	2	6	NT	NT	NT	NT	
1,1,1-TRICHLOROETHANE	30	600	NT	NT	NT	NT	
1,1,2-TRICHLOROETHANE	0.1	2	NT	NT	NT	NT	
TRICHLOROETHYLENE	0.3	0.3	NT	NT	NT	NT	
TRICHLOROFLUOROMETHANE	1000	10000	NT	NT	NT	NT	
1,2,3-TRICHLOROPROPANE	100	1000	NT	NT	NT	NT	
1,2,4-TRIMETHYLBENZENE	1000	10000	NT	NT	NT	NT	
1,3,5-TRIMETHYLBENZENE	10	100	NT	NT	NT	NT	
VINYL CHLORIDE	0.7	0.7	NT	NT	NT	NT	
M/P-XYLENE	100	100	NT	NT	NT	NT	
O-XYLENE	100	100	NT	NT	NT	NT	
SW-846 8270D (mg/Kg dry)							
ACENAPHTHENE	4	3000	ND (0.19)	ND (0.18)	ND (0.19)	ND (0.19)	
ACENAPHTHYLENE	1	10	ND (0.19)	ND (0.18)	ND (0.19)	ND (0.19)	
ACETOPHENONE	1000	10000	ND (0.38)	ND (0.37)	ND (0.38)	ND (0.39)	
ANILINE	1000	10000	ND (0.38)	ND (0.37)	ND (0.38)	ND (0.39)	

Table 1 - Soil Results Table
Fernald School Cottage Area Subsurface Sampling
200 Trapelo Road, Waltham, Massachusetts

ANTHRACENE	1000	3000	ND (0.19)	ND (0.18)	ND (0.19)	ND (0.19)	
BENZO(A)ANTHRACENE	7	40	ND (0.19)	ND (0.18)	ND (0.19)	ND (0.19)	
BENZO(A)PYRENE	2	7	ND (0.19)	ND (0.18)	ND (0.19)	ND (0.19)	
BENZO(B)FLUORANTHENE	7	40	ND (0.19)	ND (0.18)	ND (0.19)	ND (0.19)	
BENZO(G,H,I)PERYLENE	1000	3000	ND (0.19)	ND (0.18)	ND (0.19)	ND (0.19)	
BENZO( )FLUORANTHENE	70	400	ND (0.19)	ND (0.18)	ND (0.19)	ND (0.19)	
BIS(2-CHLOROETHOXY)METHANE	500	5000	ND (0.38)	ND (0.37)	ND (0.38)	ND (0.39)	
BIS(2-CHLOROETHYL)ETHER	0.7	0.7	ND (0.38)	ND (0.37)	ND (0.38)	ND (0.39)	
BIS(2-CHLOROISOPROPYL)ETHER	0.7	0.7	ND (0.38)	ND (0.37)	ND (0.38)	ND (0.39)	
BIS(2-ETHYLHEXYL)PHTHALATE	90	600	ND (0.38)	ND (0.37)	ND (0.38)	ND (0.39)	
4-BROMOPHENYL PHENYL ETHER	100	1000	ND (0.38)	ND (0.37)	ND (0.38)	ND (0.39)	
BUTYLBENZYLPHTHALATE	100	1000	ND (0.38)	ND (0.37)	ND (0.38)	ND (0.39)	
4-CHLOROANILINE	1	3	ND (0.73)	ND (0.71)	ND (0.73)	ND (0.75)	
2-CHLORONAPHTHALENE	1000	10000	ND (0.38)	ND (0.37)	ND (0.38)	ND (0.39)	
2-CHLOROPHENOL	0.7	100	ND (0.38)	ND (0.37)	ND (0.38)	ND (0.39)	
CHRYSENE	70	400	ND (0.19)	ND (0.18)	ND (0.19)	ND (0.19)	
DIBENZ(A,H)ANTHRACENE	0.7	4	ND (0.19)	ND (0.18)	ND (0.19)	ND (0.19)	
DIBENZOFURAN	100	1000	ND (0.38)	ND (0.37)	ND (0.38)	ND (0.39)	
DI-N-BUTYLPHTHALATE	50	500	ND (0.38)	ND (0.37)	ND (0.38)	ND (0.39)	
1,2-DICHLOROBENZENE	9	100	ND (0.38)	ND (0.37)	ND (0.38)	ND (0.39)	
1,3-DICHLOROBENZENE	3	200	ND (0.38)	ND (0.37)	ND (0.38)	ND (0.39)	
1,4-DICHLOROBENZENE	0.7	1	ND (0.38)	ND (0.37)	ND (0.38)	ND (0.39)	
3,3 -DICHLOROBENZIDINE	3	20	ND (0.19)	ND (0.18)	ND (0.19)	ND (0.19)	
2,4-DICHLOROPHENOL	0.7	40	ND (0.38)	ND (0.37)	ND (0.38)	ND (0.39)	
DIETHYLPHTHALATE	10	200	ND (0.38)	ND (0.37)	ND (0.38)	ND (0.39)	
2,4-DIMETHYLPHENOL	0.7	100	ND (0.38)	ND (0.37)	ND (0.38)	ND (0.39)	
DIMETHYLPHTHALATE	0.7	50	ND (0.38)	ND (0.37)	ND (0.38)	ND (0.39)	
2,4-DINITROPHENOL	3	50	ND (0.73)	ND (0.71)	ND (0.73)	ND (0.75)	
2,4-DINITROTOLUENE	0.7	10	ND (0.38)	ND (0.37)	ND (0.38)	ND (0.39)	
2,6-DINITROTOLUENE	100	1000	ND (0.38)	ND (0.37)	ND (0.38)	ND (0.39)	
DI-N-OCTYLPHTHALATE	1000	10000	ND (0.38)	ND (0.37)	ND (0.38)	ND (0.39)	
1,2-DIPHENYLHYDRAZINE (AZOBENZENE)	50	500	ND (0.38)	ND (0.37)	ND (0.38)	ND (0.39)	
FLUORANTHENE	1000	3000	ND (0.19)	0.24	ND (0.19)	ND (0.19)	
FLUORENE	1000	3000	ND (0.19)	ND (0.18)	ND (0.19)	ND (0.19)	
HEXACHLOROBENZENE	0.7	0.8	ND (0.38)	ND (0.37)	ND (0.38)	ND (0.39)	
HEXACHLOROBUTADIENE	30	100	ND (0.38)	ND (0.37)	ND (0.38)	ND (0.39)	
HEXACHLOROETHANE	0.7	3	ND (0.38)	ND (0.37)	ND (0.38)	ND (0.39)	
INDENO(1,2,3-CD)PYRENE	7	40	ND (0.19)	ND (0.18)	ND (0.19)	ND (0.19)	
ISOPHORONE	100	1000	ND (0.38)	ND (0.37)	ND (0.38)	ND (0.39)	
2-METHYLNAPHTHALENE	0.7	80	ND (0.19)	ND (0.18)	ND (0.19)	ND (0.19)	
O-CRESOL	500	5000	ND (0.38)	ND (0.37)	ND (0.38)	ND (0.39)	
M/P-CRESOL	500	5000	ND (0.38)	ND (0.37)	ND (0.38)	ND (0.39)	
NAPHTHALENE	4	20	ND (0.19)	ND (0.18)	ND (0.19)	ND (0.19)	
NITROBENZENE	500	5000	ND (0.38)	ND (0.37)	ND (0.38)	ND (0.39)	
2-NITROPHENOL	100	1000	ND (0.38)	ND (0.37)	ND (0.38)	ND (0.39)	
4-NITROPHENOL	100	1000	ND (0.73)	ND (0.71)	ND (0.73)	ND (0.75)	
PENTACHLOROPHENOL	3	10	ND (0.38)	ND (0.37)	ND (0.38)	ND (0.39)	
PHENANTHRENE	10	1000	ND (0.19)	0.19	ND (0.19)	ND (0.19)	
PHENOL	1	20	ND (0.38)	ND (0.37)	ND (0.38)	ND (0.39)	
PYRENE	1000	3000	ND (0.19)	0.23	ND (0.19)	ND (0.19)	
1,2,4-TRICHLOROBENZENE	2	6	ND (0.38)	ND (0.37)	ND (0.38)	ND (0.39)	
2,4,5-TRICHLOROPHENOL	4	600	ND (0.38)	ND (0.37)	ND (0.38)	ND (0.39)	
2,4,6-TRICHLOROPHENOL	0.7	20	ND (0.38)	ND (0.37)	ND (0.38)	ND (0.39)	

NOTES:

1. An asterisk ( ) following a detection limit indicates that the minimum laboratory reporting limit exceeds one or more of the regulatory criteria.
2. ND = Not detected above the lab reporting limits shown in parenthesis.
3. NT = Not tested.
4. ~ = No Method 1 Standard or UCL available
5. Shaded values exceed the MCP Reportable Concentrations (RCs).
6. Bolded values exceed the Method 1 Cleanup Standards.
7. Bold Red values exceed the TCLP limits.

Table 2 - Groundwater Sampling Results
Fernald School Cottage Area
200 Trapelo Road, Waltham, Massachusetts

CLIENT ID	Units	GW-2 RC	MW-1	MW-2	MW-3
Volatile Organic Compounds by GC/MS					
Acetone	µg/L	50,000	<10	<10	<10
tert-Amyl Methyl Ether (TAME)	µg/L	NS	<2.0	<2.0	<2.0
Benzene	µg/L	1,000	**1.1**	<1.0	<1.0
Bromobenzene	µg/L	10,000	<1.0	<1.0	<1.0
Bromochloromethane	µg/L	NS	<1.0	<1.0	<1.0
Bromodichloromethane	µg/L	6	<1.0	<1.0	<1.0
Bromoform	µg/L	700	<2.0	<2.0	<2.0
Bromomethane	µg/L	7	<2.0	<2.0	<2.0
2-Butanone (MEK)	µg/L	50,000	<10	<10	<10
n-Butylbenzene	µg/L	NS	<1.0	<1.0	<1.0
sec-Butylbenzene	µg/L	NS	<1.0	<1.0	<1.0
tert-Butylbenzene	µg/L	NS	<1.0	<1.0	<1.0
tert-Butyl Ethyl Ether (TBEE)	µg/L	NS	<1.0	<1.0	<1.0
Carbon Disulfide	µg/L	10,000	<5.0	<5.0	<5.0
Carbon Tetrachloride	µg/L	2	<1.0	<1.0	<1.0
Chlorobenzene	µg/L	200	<1.0	<1.0	<1.0
Chlorodibromomethane	µg/L	20	<0.50	<0.50	<0.50
Chloroethane	µg/L	10,000	<2.0	<2.0	<2.0
Chloroform	µg/L	50	<2.0	<2.0	<2.0
Chloromethane	µg/L	10,000	<2.0	<2.0	<2.0
2-Chlorotoluene	µg/L	NS	<1.0	<1.0	<1.0
4-Chlorotoluene	µg/L	NS	<1.0	<1.0	<1.0
1,2-Dibromo-3-chloropropane (DBCP)	µg/L	1,000	<2.0	<2.0	<2.0
1,2-Dibromoethane (EDB)	µg/L	2	<0.50	<0.50	<0.50
Dibromomethane	µg/L	NS	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	µg/L	2,000	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	µg/L	6,000	<1.0	<1.0	<1.0
1,4-Dichlorobenzene	µg/L	60	<1.0	<1.0	<1.0
Dichlorodifluoromethane (Freon 12)	µg/L	100,000	<2.0	<2.0	<2.0
1,1-Dichloroethane	µg/L	2,000	<1.0	<1.0	<1.0
1,2-Dichloroethane	µg/L	5	<1.0	<1.0	<1.0
1,1-Dichloroethylene	µg/L	80	<1.0	<1.0	<1.0
cis-1,2-Dichloroethylene	µg/L	80	<1.0	<1.0	<1.0
trans-1,2-Dichloroethylene	µg/L	80	<1.0	<1.0	<1.0
1,2-Dichloropropane	µg/L	3	<1.0	<1.0	<1.0
1,3-Dichloropropane	µg/L	NS	<0.50	<0.50	<0.50
2,2-Dichloropropane	µg/L	NS	<1.0	<1.0	<1.0
1,1-Dichloropropene	µg/L	NS	<0.50	<0.50	<0.50
cis-1,3-Dichloropropene	µg/L	NS	<0.40	<0.40	<0.40
trans-1,3-Dichloropropene	µg/L	NS	<0.40	<0.40	<0.40
Diethyl Ether	µg/L	10,000	<2.0	<2.0	<2.0
Diisopropyl Ether (DIPE)	µg/L	NS	<0.50	<0.50	<0.50
1,4-Dioxane	µg/L	6,000	<50	<50	<50
Ethylbenzene	µg/L	5,000	**1.2**	<1.0	<1.0
Hexachlorobutadiene	µg/L	NS	<2.0	<2.0	<2.0
2-Hexanone (MBK)	µg/L	10,000	<10	<10	<10
Isopropylbenzene (Cumene)	µg/L	100,000	<1.0	<1.0	<1.0
p-Isopropyltoluene (p-Cymene)	µg/L	NS	<1.0	<1.0	<1.0
Methyl tert-Butyl Ether (MTBE)	µg/L	5,000	<1.0	<1.0	<1.0
Methylene Chloride	µg/L	10,000	<5.0	<5.0	<5.0
4-Methyl-2-pentanone (MIBK)	µg/L	50,000	<10	<10	<10
Naphthalene	µg/L	700	<5.0	<5.0	<5.0
n-Propylbenzene	µg/L	NS	<1.0	<1.0	<1.0
Styrene	µg/L	100	<1.0	<1.0	<1.0
1,1,1,2-Tetrachloroethane	µg/L	10	<1.0	<1.0	<1.0

Table 2 - Groundwater Sampling Results
Fernald School Cottage Area
200 Trapelo Road, Waltham, Massachusetts

1,1,2,2-Tetrachloroethane	µg/L	NS	<0.50	<0.50	<0.50
Tetrachloroethylene	µg/L	50	<1.0	<1.0	<1.0
Tetrahydrofuran	µg/L	NS	<2.0	<2.0	<2.0
Toluene	µg/L	40,000	**5.4**	<1.0	<1.0
1,2,3-Trichlorobenzene	µg/L	NS	<5.0	<5.0	<5.0
1,2,4-Trichlorobenzene	µg/L	NS	<2.0	<2.0	<2.0
1,1,1-Trichloroethane	µg/L	NS	<1.0	<1.0	<1.0
1,1,2-Trichloroethane	µg/L	NS	<1.0	<1.0	<1.0
Trichloroethylene	µg/L	5	<1.0	<1.0	<1.0
Trichlorofluoromethane (Freon 11)	µg/L	100,000	<2.0	<2.0	**2.3**
1,2,3-Trichloropropane	µg/L	NS	<2.0	<2.0	<2.0
1,2,4-Trimethylbenzene	µg/L	100,000	<1.0	<1.0	<1.0
1,3,5-Trimethylbenzene	µg/L	NS	<1.0	<1.0	<1.0
Vinyl Chloride	µg/L	2	<2.0	<2.0	<2.0
m+p Xylene	µg/L	3,000*	**3.2**	<2.0	<2.0
o-Xylene	µg/L	3,000*	**1.6**	<1.0	<1.0
Semivolatile Organic Compounds by GC/MS					
Acenaphthene	µg/L	6,000	<5.1	<4.9	<4.9
Acenaphthene (SIM)	µg/L	6,000	<1.2	<0.29	<0.29
Acenaphthylene	µg/L	40	<5.1	<4.9	<4.9
Acenaphthylene (SIM)	µg/L	40	<0.81	<0.20	<0.19
Acetophenone	µg/L	100,000	<10	<9.8	<9.7
Aniline	µg/L	100,000	<5.1	<4.9	<4.9
Anthracene	µg/L	30	<5.1	<4.9	<4.9
Anthracene (SIM)	µg/L	30	<0.81	<0.20	<0.19
Benzo(a)anthracene	µg/L	1,000	<5.1	<4.9	<4.9
Benzo(a)anthracene (SIM)	µg/L	1,000	<0.20	<0.049	<0.049
Benzo(a)pyrene	µg/L	500	<5.1	<4.9	<4.9
Benzo(a)pyrene (SIM)	µg/L	500	<0.40	<0.098	<0.097
Benzo(b)fluoranthene	µg/L	400	<5.1	<4.9	<4.9
Benzo(b)fluoranthene (SIM)	µg/L	400	<0.20	<0.049	<0.049
Benzo(g,h,i)perylene	µg/L	20	<5.1	<4.9	<4.9
Benzo(g,h,i)perylene (SIM)	µg/L	20	<2.0	<0.49	<0.49
Benzo(k)fluoranthene	µg/L	400	<5.1	<4.9	<4.9
Benzo(k)fluoranthene (SIM)	µg/L	400	<0.81	<0.20	<0.19
Bis(2-chloroethoxy)methane	µg/L	NS	<10	<9.8	<9.7
Bis(2-chloroethyl)ether	µg/L	NS	<10	<9.8	<9.7
Bis(2-chloroisopropyl)ether	µg/L	100	<10	<9.8	<9.7
Bis(2-Ethylhexyl)phthalate	µg/L	50,000	<10	<9.8	<9.7
4-Bromophenylphenylether	µg/L	NS	<10	<9.8	<9.7
Butylbenzylphthalate	µg/L	NS	<10	<9.8	<9.7
4-Chloroaniline	µg/L	NS	<10	<9.8	<9.7
2-Chloronaphthalene	µg/L	100,000	<10	<9.8	<9.7

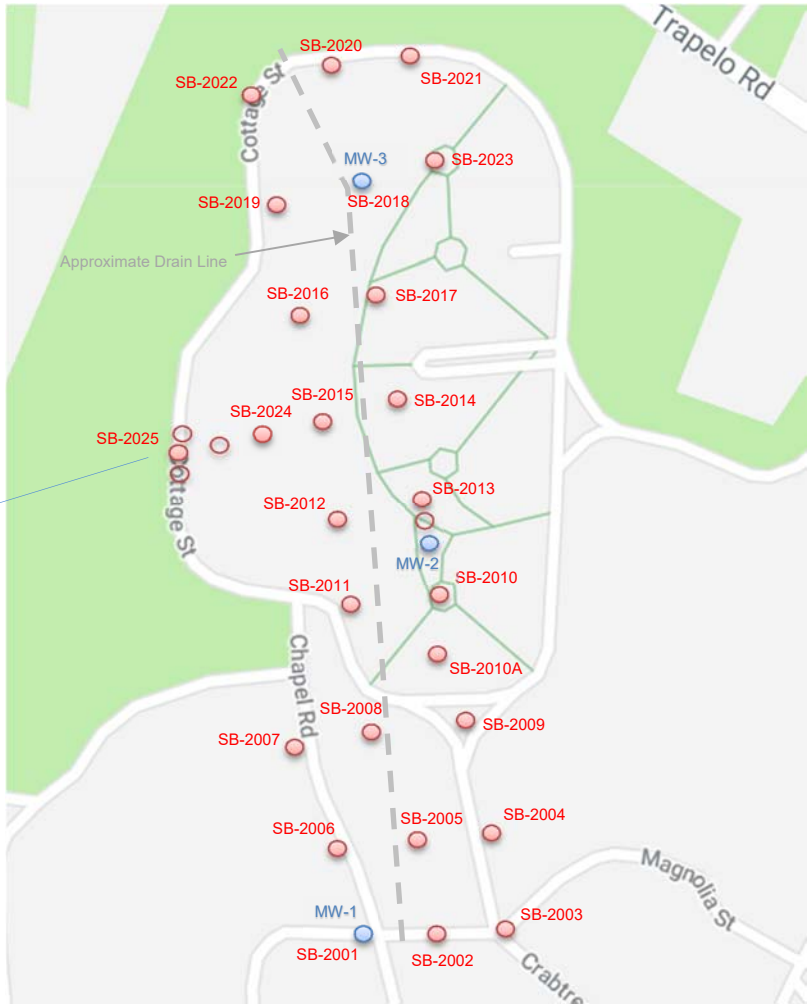
Table 2 - Groundwater Sampling Results
Fernald School Cottage Area
200 Trapelo Road, Waltham, Massachusetts

2-Chlorophenol	µg/L	7,000	<10	<9.8	<9.7
Chrysene	µg/L	70	<5.1	<4.9	<4.9
Chrysene (SIM)	µg/L	70	<0.81	<0.20	<0.19
Dibenz(a,h)anthracene	µg/L	40	<5.1	<4.9	<4.9
Dibenz(a,h)anthracene (SIM)	µg/L	40	<0.40	<0.098	<0.097
Dibenzofuran	µg/L	10,000	<5.1	<4.9	<4.9
Di-n-butylphthalate	µg/L	NS	<10	<9.8	<9.7
1,2-Dichlorobenzene	µg/L	2,000	<5.1	<4.9	<4.9
1,3-Dichlorobenzene	µg/L	6,000	<5.1	<4.9	<4.9
1,4-Dichlorobenzene	µg/L	60	<5.1	<4.9	<4.9
3,3-Dichlorobenzidine	µg/L	NS	<10	<9.8	<9.7
2,4-Dichlorophenol	µg/L	2,000	<10	<9.8	<9.7
Diethylphthalate	µg/L	NS	<10	<9.8	<9.7
2,4-Dimethylphenol	µg/L	NS	<10	<9.8	<9.7
Dimethylphthalate	µg/L	NS	<10	<9.8	<9.7
2,4-Dinitrophenol	µg/L	20,000	<10	<9.8	<9.7
2,4-Dinitrotoluene	µg/L	20,000	<10	<9.8	<9.7
2,6-Dinitrotoluene	µg/L	10,000	<10	<9.8	<9.7
Di-n-octylphthalate	µg/L	NS	<10	<9.8	<9.7
1,2-Diphenylhydrazine (as Azobenzene)	µg/L	5,000	<10	<9.8	<9.7
Fluoranthene	µg/L	200	<5.1	<4.9	<4.9
Fluoranthene (SIM)	µg/L	200	<2.0	<0.49	<0.49
Fluorene	µg/L	40	<5.1	<4.9	<4.9
Fluorene (SIM)	µg/L	40	<4.0	<0.98	<0.97
Hexachlorobenzene	µg/L	1	<10	<9.8	<9.7
Hexachlorobutadiene	µg/L	50	<10	<9.8	<9.7
Hexachloroethane	µg/L	100	<10	<9.8	<9.7
Indeno(1,2,3-cd)pyrene	µg/L	100	<5.1	<4.9	<4.9
Indeno(1,2,3-cd)pyrene (SIM)	µg/L	100	<0.40	<0.098	<0.097
Isophorone	µg/L	10,000	<10	<9.8	<9.7
2-Methylnaphthalene	µg/L	2,000	<5.1	<4.9	<4.9
2-Methylnaphthalene (SIM)	µg/L	2,000	<4.0	<0.98	<0.97
2-Methylphenol	µg/L	NS	<10	<9.8	<9.7
3/4-Methylphenol	µg/L	NS	<10	<9.8	<9.7
Naphthalene	µg/L	700	<5.1	<4.9	<4.9
Naphthalene (SIM)	µg/L	700	<4.0	<0.98	<0.97
Nitrobenzene	µg/L	50,000	<10	<9.8	<9.7
2-Nitrophenol	µg/L	10,000	<10	<9.8	<9.7
4-Nitrophenol	µg/L	10,000	<10	<9.8	<9.7
Pentachlorophenol	µg/L	200	<10	<9.8	<9.7
Phenanthrene	µg/L	10,000	<5.1	<4.9	<4.9
Phenanthrene (SIM)	µg/L	10,000	<0.20	<0.049	<0.049
Phenol	µg/L	2,000	<10	<9.8	<9.7
Pyrene	µg/L	20	<5.1	<4.9	<4.9
Pyrene (SIM)	µg/L	20	<4.0	<0.98	<0.97
1,2,4-Trichlorobenzene	µg/L	200	<5.1	<4.9	<4.9
2,4,5-Trichlorophenol	µg/L	3,000	<10	<9.8	<9.7
2,4,6-Trichlorophenol	µg/L	500	<10	<9.8	<9.7
Petroleum Hydrocarbons Analyses					
Diesel Range Organics	mg/L	5,000	**0.42**	<0.20	<0.20

*Total Xylenes cannot exceed 3,000 ug/L
BOLD - Detectable concentration
NS - No Standard
Shading - Detection Limit Exceeds RCGW-2

ATTACHMENT A

SAMPLE LOCATION PLAN



MW-4 was not installed due to refusal/no observed water

Base Map: Google Maps (2018)

Locations and Features are Approximate

= Soil Boring Locations & ID (SB-2001)

= Soil Boring Locations (Refusal/Not Sampled)

= Soil Boring & Monitoring Well Locations & ID (MW-1)

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Sample Location Plan

200 Trapelo Road ("Cottage Area")

Waltham, MA 02452

Project # 020.00107

ATTACHMENT B

BORING LOGS

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BOSTON NORTH

Client: City of Waltham			***BORING ID: SB-2001/MW-1***
Project Name/Number: ***020.00107***			
200 Trapelo Road, Waltham, Massachusetts			
Boring Location: Cottage Area			*Sheet:* ***1 of 1***
Drilling Contractor: GeoSearch, Inc.	*Drilling Method: GeoProbe*		*Monitoring Well Installed (Y/N):* ***Y***
Logged By: ***Pat Panza***	*Date Started:* ***10/2/2018***	*Boring Diameter: 2"*	*Approx Hammer Weigth/Fall:* ***N/A***
Ground Elevation: ***N/A***	*Date Completed: 10/2/2018*	*Depth of Boring: 12'*	*Approx. Water Level at Completion: ~9'*

Sample ID	Blows per 6"	Recovery (inches)	tVOCs (ppmv)	Depth (feet)	SOIL CLASSIFICATION	BORING & SAMPLING NOTES
SB-2001 (0-5')	N/A	32	N/A	0.5	Pavement	ND
				1	Tan Fine-Coarse SAND some SILT some Fine-Coarse GRAVEL	
				2	Black Fine-Medium SAND and SILT some Fine-Coarse GRAVEL	
				3	Brown SILT and Fine-Medium SAND some Fine-Coarse GRAVEL (some ORGANICS)	
				4		
				5		
SB-2001 (5-10')	N/A	48	N/A	6	Reddish-Brown Coarse SAND and SILT and Coarse GRAVEL	ND
				7		
				8		
				9		
				10		
SB-2001 (10-15')	N/A	17	N/A	11	Dark Brown Coarse SAND and SILT	ND
				12	Tan Coarse SAND and Coarse GRAVEL Refusal @ 12'	
				13	Completed with flush mounted road box (10' of Screen)	
				14		
				15		
				16		
				17		
				18		
				19		
				20		

Ntoes: Stratum Features are approximate. Proportions used 0-10% Trace, 10-20% Little, 20-35% Some & 35-50% And. tVOCs = Total Volatile Organic Compounds (PID calibrated to represent the bezene equivilant in part per million by volume (ppmv)). ND = None Detected

efi global BOSTON NORTH	*Client: City of Waltham*		***BORING ID: SB-2002***
	Project Name/Number: ***020.00107***		
	200 Trapelo Road, Waltham, Massachusetts		
	Boring Location: Cottage Area		*Sheet:* ***1 of 1***
	Drilling Contractor: GeoSearch, Inc.	*Drilling Method: GeoProbe*	*Monitoring Well Installed (Y/N):* ***N***
Logged By: ***Pat Panza***	*Date Started:* ***10/2/2018***	*Boring Diameter: 2"*	*Approx Hammer Weigth/Fall:* ***N/A***
Ground Elevation: ***N/A***	*Date Completed: 10/2/2018*	*Depth of Boring: 10'*	*Approx. Water Level at Completion: N/A*

Sample ID	Blows per 6"	Recovery (inches)	tVOCs (ppmv)	Depth (feet)	SOIL CLASSIFICATION	BORING & SAMPLING NOTES
SB-2002 (0-5')	N/A	33.5	N/A	0.5 1 2 3 4 5	Pavement Tan Fine-Coarse SAND some SILT some Fine-Coarse GRAVEL Black SILT and Fine-Medium SAND some Fine-Coarse GRAVEL Gray/Brown SILT and Fine-Medium SAND some Fine-Coarse GRAVEL	ND
SB-2002 (5-10')	N/A	35	N/A	6 7 8 9 10	Tan-Brown Medium-Coarse SAND and SILT some Fine-Coarse GRAVEL and CLAY Black-Dark Brown Medium-Coarse SAND and SILT and Fine-Coarse GRAVEL Reddish-Brown Coarse SAND and Fine GRAVEL	ND
				11 12 13 14 15	End of Exploration	
				16 17 18 19 20		

Ntoes: Stratum Features are approximate. Proportions used 0-10% Trace, 10-20% Little, 20-35% Some & 35-50% And. tVOCs = Total Volatile Organic Compounds (PID calibrated to represent the bezene equivilant in part per million by volume (ppmv)). ND = None Detected

efi global BOSTON NORTH					*Client: City of Waltham* *Project Name/Number:* ***020.00107*** ***200 Trapelo Road, Waltham, Massachusetts***	***BORING ID: SB-2003***
					Boring Location: Cottage Area	*Sheet:* ***1 of 1***
					Drilling Contractor: GeoSearch, Inc. — *Drilling Method: GeoProbe*	*Monitoring Well Installed (Y/N):* ***N***
Logged By: ***Pat Panza***					*Date Started:* ***10/2/2018*** — *Boring Diameter: 2"*	*Approx Hammer Weigth/Fall:* ***N/A***
Ground Elevation: ***N/A***					*Date Completed: 10/2/2018* — *Depth of Boring: 10'*	*Approx. Water Level at Completion: N/A*

Sample ID	Blows per 6"	Recovery (inches)	tVOCs (ppmv)	Depth (feet)	SOIL CLASSIFICATION	BORING & SAMPLING NOTES
SB-2003 (0-5')	N/A	30	N/A	0.5 1 2 3 4 5	Pavement Tan-Brown Medium-Coarse SAND and SILT and Fine-Coarse GRAVEL Dark Gray/Brown SILT and Fine-Medium SAND some Fine-Coarse GRAVEL	ND
SB-2003 (5-10')	N/A	24.5	N/A	6 7 8 9 10	Tan-Brown Coarse SAND and SILTand Fine-Coarse GRAVEL and CLAY Black-Dark Brown Fine-Medium SAND and SILT and Fine-Coarse GRAVEL Dark Gray SILT some Fine-Coarse GRAVEL trace Fine-Medium SAND	ND
				11 12 13 14 15	End of Exploration	
				16 17 18 19 20		

Ntoes: Stratum Features are approximate. Proportions used 0-10% Trace, 10-20% Little, 20-35% Some & 35-50% And. tVOCs = Total Volatile Organic Compounds (PID calibrated to represent the bezene equivilant in part per million by volume (ppmv)). ND = None Detected

efi global BOSTON NORTH	*Client: City of Waltham*		**BORING ID: SB-2004**
	Project Name/Number: ***020.00107***		
	200 Trapelo Road, Waltham, Massachusetts		
	Boring Location: Cottage Area		*Sheet:* ***1 of 1***
	Drilling Contractor: GeoSearch, Inc.	*Drilling Method: GeoProbe*	*Monitoring Well Installed (Y/N):* ***N***
Logged By: ***Pat Panza***	*Date Started:* ***10/2/2018***	*Boring Diameter: 2"*	*Approx Hammer Weigth/Fall:* ***N/A***
Ground Elevation: ***N/A***	*Date Completed: 10/2/2018*	*Depth of Boring: 10'*	*Approx. Water Level at Completion: N/A*

Sample ID	Blows per 6"	Recovery (inches)	tVOCs (ppmv)	Depth (feet)	SOIL CLASSIFICATION	BORING & SAMPLING NOTES
SB-2004 (0-5')	N/A	23	N/A	0.5 1 2 3 4 5	Loam Tan-Brown Fine-Coarse SAND and SILT some Fine-Coarse GRAVEL	ND
SB-2004 (5-10')	N/A	25	N/A	6 7 8 9 10	Tan SILT and Fine-Medium SAND some Fine-Coarse GRAVEL Dark Gray SILT some Fine-Coarse GRAVEL and Fine-Medium SAND	ND
				11 12 13 14 15	End of Exploration	
				16 17 18 19 20		

Ntoes: Stratum Features are approximate. Proportions used 0-10% Trace, 10-20% Little, 20-35% Some & 35-50% And. tVOCs = Total Volatile Organic Compounds (PID calibrated to represent the bezene equivilant in part per million by volume (ppmv)). ND = None Detected

efi global BOSTON NORTH					Client: City of Waltham	**BORING ID: SB-2005**
					Project Name/Number: **020.00107**	
					200 Trapelo Road, Waltham, Massachusetts	
					Boring Location: Cottage Area	Sheet: **1 of 1**
					Drilling Contractor: GeoSearch, Inc. / Drilling Method: GeoProbe	Monitoring Well Installed (Y/N): **N**
Logged By: **Pat Panza**					Date Started: **10/2/2018** / Boring Diameter: 2"	Approx Hammer Weigth/Fall: **N/A**
Ground Elevation: **N/A**					Date Completed: 10/2/2018 / Depth of Boring: 5'	Approx. Water Level at Completion: N/A

Sample ID	Blows per 6"	Recovery (inches)	tVOCs (ppmv)	Depth (feet)	SOIL CLASSIFICATION	BORING & SAMPLING NOTES
SB-2005 (0-5')	N/A	44	N/A	0.5 1 2 3 4 5	Pavement Tan-Brown Fine-Coarse SAND and SILT some Fine-Coarse GRAVEL Dark Brown-Brown/Gray Fine-Medium SAND little SILT and Fine-Coarse GRAVEL	ND
				6 7 8 9 10	End of Exploration	
				11 12 13 14 15		
				16 17 18 19 20		

Ntoes: Stratum Features are approximate. Proportions used 0-10% Trace, 10-20% Little, 20-35% Some & 35-50% And. tVOCs = Total Volatile Organic Compounds (PID calibrated to represent the bezene equivilant in part per million by volume (ppmv)). ND = None Detected

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BOSTON NORTH

Client: City of Waltham			***BORING ID: SB-2006***
Project Name/Number: ***020.00107***			
200 Trapelo Road, Waltham, Massachusetts			
Boring Location: Cottage Area			*Sheet:* ***1 of 1***
Drilling Contractor: GeoSearch, Inc.	*Drilling Method: GeoProbe*		*Monitoring Well Installed (Y/N):* ***N***
Logged By: ***Pat Panza***	*Date Started:* ***10/2/2018***	*Boring Diameter: 2"*	*Approx Hammer Weigth/Fall:* ***N/A***
Ground Elevation: ***N/A***	*Date Completed: 10/2/2018*	*Depth of Boring: 5'*	*Approx. Water Level at Completion: N/A*

Sample ID	Blows per 6"	Recovery (inches)	tVOCs (ppmv)	Depth (feet)	SOIL CLASSIFICATION	BORING & SAMPLING NOTES
SB-2006 (0-5')	N/A	20	N/A	0.5 1 2 3 4 5	Loam Brown Medium-Coarse SAND and SILT and Fine-Coarse GRAVEL	ND
				6 7 8 9 10	End of Exploration	
				11 12 13 14 15		
				16 17 18 19 20		

Ntoes: Stratum Features are approximate. Proportions used 0-10% Trace, 10-20% Little, 20-35% Some & 35-50% And. tVOCs = Total Volatile Organic Compounds (PID calibrated to represent the bezene equivilant in part per million by volume (ppmv)). ND = None Detected

efi global BOSTON NORTH	*Client: City of Waltham*		***BORING ID: SB-2007***
	Project Name/Number: ***020.00107***		
	200 Trapelo Road, Waltham, Massachusetts		
	Boring Location: Cottage Area		*Sheet:* ***1 of 1***
	Drilling Contractor: GeoSearch, Inc.	*Drilling Method: GeoProbe*	*Monitoring Well Installed (Y/N):* ***N***
Logged By: ***Pat Panza***	*Date Started:* ***10/3/2018***	*Boring Diameter: 2"*	*Approx Hammer Weigth/Fall:* ***N/A***
Ground Elevation: ***N/A***	*Date Completed: 10/3/2018*	*Depth of Boring: 15'*	*Approx. Water Level at Completion: N/A*

Sample ID	Blows per 6"	Recovery (inches)	tVOCs (ppmv)	Depth (feet)	SOIL CLASSIFICATION	BORING & SAMPLING NOTES
SB-2007 (0-5')	N/A	32	N/A	0.5 1 2 3 4 5	Loam Brown Medium-Coarse SAND and SILT and Fine-Coarse GRAVEL	ND
SB-2007 (5-10')	N/A	37	N/A	6 7 8 9 10	Black-Dark Brown Medium-Coarse SAND and SILT and Fine-Coarse GRAVEL Tan Fine-Coarse SAND and SILT some Fine-Coarse GRAVEL and CLAY (ORGANICS and potential ash) Brown Medium-Coarse SAND and SILT and Fine-Coarse GRAVEL and CLAY	ND
SB-2007 (10-15')	N/A	35	N/A	11 12 13 14 15	Tan-Brown Fine-Coarse SAND and SILT little Fine-Coarse GRAVEL	ND
				16 17 18 19 20	End of Exploration	

Ntoes: Stratum Features are approximate. Proportions used 0-10% Trace, 10-20% Little, 20-35% Some & 35-50% And. tVOCs = Total Volatile Organic Compounds (PID calibrated to represent the bezene equivilant in part per million by volume (ppmv)). ND = None Detected

efi global BOSTON NORTH	*Client: City of Waltham*		***BORING ID: SB-2008***
	Project Name/Number: ***020.00107***		
	200 Trapelo Road, Waltham, Massachusetts		
	Boring Location: Cottage Area		*Sheet:* ***1 of 1***
	Drilling Contractor: GeoSearch, Inc.	*Drilling Method: GeoProbe*	*Monitoring Well Installed (Y/N):* ***N***
Logged By: ***Pat Panza***	*Date Started:* ***10/3/2018***	*Boring Diameter: 2"*	*Approx Hammer Weigth/Fall:* ***N/A***
Ground Elevation: ***N/A***	*Date Completed: 10/3/2018*	*Depth of Boring: 10'*	*Approx. Water Level at Completion: N/A*

Sample ID	Blows per 6"	Recovery (inches)	tVOCs (ppmv)	Depth (feet)	SOIL CLASSIFICATION	BORING & SAMPLING NOTES
SB-2008 (0-5')	N/A	16	N/A	0.5 1 2 3 4 5	Loam Tan-Brown Fine-Coarse SAND and SILT some Fine-Coarse GRAVEL	ND
SB-2008 (5-10')	N/A	12	N/A	6 7 8 9 10	Tan-Brown Fine-Coarse SAND and SILT some Fine-Coarse GRAVEL	ND
				11 12 13 14 15	End of Exploration (Poor Recovery)	
				16 17 18 19 20		

Ntoes: Stratum Features are approximate. Proportions used 0-10% Trace, 10-20% Little, 20-35% Some & 35-50% And. tVOCs = Total Volatile Organic Compounds (PID calibrated to represent the bezene equivilant in part per million by volume (ppmv)). ND = None Detected

efi global

BOSTON NORTH

Client: City of Waltham			***BORING ID: SB-2009***
*Project Name/Number: **020.00107***			
200 Trapelo Road, Waltham, Massachusetts			
Boring Location: Cottage Area			*Sheet: **1 of 1***
Drilling Contractor: GeoSearch, Inc.	*Drilling Method: GeoProbe*		*Monitoring Well Installed (Y/N): **N***
*Logged By: **Pat Panza***	*Date Started: **10/3/2018***	*Boring Diameter: 2"*	*Approx Hammer Weigth/Fall: **N/A***
*Ground Elevation: **N/A***	*Date Completed: 10/3/2018*	*Depth of Boring: 15'*	*Approx. Water Level at Completion: N/A*

Sample ID	Blows per 6"	Recovery (inches)	tVOCs (ppmv)	Depth (feet)	SOIL CLASSIFICATION	BORING & SAMPLING NOTES
SB-2009 (0-5')	N/A	38	N/A	0.5	Loam	ND
				1		
				2	Brown Fine-Coarse SAND some SILT and Fine-Coarse GRAVEL	
				3		
				4		
				5		
SB-2009 (5-10')	N/A	31	N/A	6	Gray-Tan Fine-Medium SAND and SILT little GRAVEL	ND
				7		
				8		
				9		
				10		
SB-2009 (10-15')	N/A	13	N/A	11	Gray-Tan Fine-Medium SAND and SILT little GRAVEL (poor recovery)	ND
				12		
				13		
				14		
				15		
				16	End of Exploration	
				17		
				18		
				19		
				20		

Ntoes: Stratum Features are approximate. Proportions used 0-10% Trace, 10-20% Little, 20-35% Some & 35-50% And. tVOCs = Total Volatile Organic Compounds (PID calibrated to represent the bezene equivilant in part per million by volume (ppmv)). ND = None Detected

efi global BOSTON NORTH					*Client: City of Waltham*		***BORING ID: SB-2010***
					Project Name/Number: ***020.00107***		
					200 Trapelo Road, Waltham, Massachusetts		
					Boring Location: Cottage Area		*Sheet:* ***1 of 1***
					Drilling Contractor: GeoSearch, Inc.	*Drilling Method: GeoProbe*	*Monitoring Well Installed (Y/N):* ***N***
Logged By: ***Pat Panza***					*Date Started:* ***10/3/2018***	*Boring Diameter: 2"*	*Approx Hammer Weigth/Fall:* ***N/A***
Ground Elevation: ***N/A***					*Date Completed: 10/3/2018*	*Depth of Boring: 10'*	*Approx. Water Level at Completion: N/A*

Sample ID	Blows per 6"	Recovery (inches)	tVOCs (ppmv)	Depth (feet)	SOIL CLASSIFICATION	BORING & SAMPLING NOTES
SB-2010 (0-5')	N/A	38	N/A	0.5 1 2 3 4 5	Loam Tan-Brown Medium-Coarse SAND and SILT and Fine-Coarse GRAVEL Black Medium-Coarse SAND and SILT Gray-Tan Fine-Medium SAND and SILT little Fine-Coarse GRAVEL	ND
SB-2010 (5-10')	N/A	29	N/A	6 7 8 9 10	` Tan-Brown Coarse SAND some SILT and Fine-Coarse GRAVEL and CLAY Dark Gray SILT some Fine-Coarse GRAVEL trace Fine-Medium SAND	ND
				11 12 13 14 15	End of Exploration	
				16 17 18 19 20		

Ntoes: Stratum Features are approximate. Proportions used 0-10% Trace, 10-20% Little, 20-35% Some & 35-50% And. tVOCs = Total Volatile Organic Compounds (PID calibrated to represent the bezene equivilant in part per million by volume (ppmv)). ND = None Detected

efi global BOSTON NORTH	*Client: City of Waltham*		***BORING ID: SB-2011***
	Project Name/Number: ***020.00107***		
	200 Trapelo Road, Waltham, Massachusetts		
	Boring Location: Cottage Area		*Sheet:* ***1 of 1***
	Drilling Contractor: GeoSearch, Inc.	*Drilling Method: GeoProbe*	*Monitoring Well Installed (Y/N):* ***N***
Logged By: ***Pat Panza***	*Date Started:* ***10/3/2018***	*Boring Diameter: 2"*	*Approx Hammer Weigth/Fall:* ***N/A***
Ground Elevation: ***N/A***	*Date Completed: 10/3/2018*	*Depth of Boring: 10'*	*Approx. Water Level at Completion: N/A*

Sample ID	Blows per 6"	Recovery (inches)	tVOCs (ppmv)	Depth (feet)	SOIL CLASSIFICATION	BORING & SAMPLING NOTES
SB-2011 (0-5')	N/A	29	N/A	0.5 1 2 3 4 5	Loam Gray-Tan Fine-Medium SAND and SILT some GRAVEL	ND
SB-2011 (5-10')	N/A	27	N/A	6 7 8 9 10	Gray-Tan Fine-Medium SAND and SILT and GRAVEL	ND
				11 12 13 14 15	End of Exploration	
				16 17 18 19 20		

Ntoes: Stratum Features are approximate. Proportions used 0-10% Trace, 10-20% Little, 20-35% Some & 35-50% And. tVOCs = Total Volatile Organic Compounds (PID calibrated to represent the bezene equivilant in part per million by volume (ppmv)). ND = None Detected

efi global BOSTON NORTH	*Client: City of Waltham*		***BORING ID: SB-2012***
	Project Name/Number: ***020.00107***		
	200 Trapelo Road, Waltham, Massachusetts		
	Boring Location: Cottage Area		*Sheet:* ***1 of 1***
	Drilling Contractor: GeoSearch, Inc.	*Drilling Method: GeoProbe*	*Monitoring Well Installed (Y/N):* ***N***
Logged By: ***Pat Panza***	*Date Started:* ***10/3/2018***	*Boring Diameter: 2"*	*Approx Hammer Weigth/Fall:* ***N/A***
Ground Elevation: ***N/A***	*Date Completed: 10/3/2018*	*Depth of Boring: 10'*	*Approx. Water Level at Completion: N/A*

Sample ID	Blows per 6"	Recovery (inches)	tVOCs (ppmv)	Depth (feet)	SOIL CLASSIFICATION	BORING & SAMPLING NOTES
SB-2012 (0-5')	N/A	29	N/A	0.5 1 2 3 4 5	Loam Coarse GRAVEL little Gray-Tan Fine-Medium SAND and SILT Gray-Tan Fine-Medium SAND and SILT some GRAVEL	ND
SB-2012 (5-10')	N/A	27	N/A	6 7 8 9 10	Gray/Reddish-Tan Fine-Medium SAND and SILT and GRAVEL	ND
				11 12 13 14 15	End of Exploration	
				16 17 18 19 20		

Ntoes: Stratum Features are approximate. Proportions used 0-10% Trace, 10-20% Little, 20-35% Some & 35-50% And. tVOCs = Total Volatile Organic Compounds (PID calibrated to represent the bezene equivilant in part per million by volume (ppmv)). ND = None Detected

efi global

BOSTON NORTH

Client: City of Waltham			***BORING ID: SB-2013***
Project Name/Number: ***020.00107***			
200 Trapelo Road, Waltham, Massachusetts			
Boring Location: Cottage Area			*Sheet:* ***1 of 1***
Drilling Contractor: GeoSearch, Inc.	*Drilling Method: GeoProbe*		*Monitoring Well Installed (Y/N):* ***N***
Logged By: ***Pat Panza***	*Date Started:* ***10/3/2018***	*Boring Diameter: 2"*	*Approx Hammer Weigth/Fall:* ***N/A***
Ground Elevation: ***N/A***	*Date Completed: 10/3/2018*	*Depth of Boring: 8'*	*Approx. Water Level at Completion: N/A*

Sample ID	Blows per 6"	Recovery (inches)	tVOCs (ppmv)	Depth (feet)	SOIL CLASSIFICATION	BORING & SAMPLING NOTES
SB-2013 (0-5')	N/A	<6	N/A	0.5 – 5	Loam Gray-Tan Fine-Medium SAND and SILT some GRAVEL	ND
SB-2013 (5-10')	N/A	N/A	N/A	6 – 10	No Recovery Refusal @ 8'	
				11 – 15		
				16 – 20		

Ntoes: Stratum Features are approximate. Proportions used 0-10% Trace, 10-20% Little, 20-35% Some & 35-50% And. tVOCs = Total Volatile Organic Compounds (PID calibrated to represent the bezene equivilant in part per million by volume (ppmv)). ND = None Detected

efi global

BOSTON NORTH

Client: City of Waltham			***BORING ID: MW-2***
*Project Name/Number: **020.00107***			
200 Trapelo Road, Waltham, Massachusetts			
Boring Location: Cottage Area			*Sheet: **1 of 1***
Drilling Contractor: GeoSearch, Inc.	*Drilling Method: GeoProbe*		*Monitoring Well Installed (Y/N): **Y***
*Logged By: **Pat Panza***	*Date Started: **10/3/2018***	*Boring Diameter: 2"*	*Approx Hammer Weigth/Fall: **N/A***
*Ground Elevation: **N/A***	*Date Completed: 10/3/2018*	*Depth of Boring: 10'*	*Approx. Water Level at Completion: ~9'*

Sample ID	Blows per 6"	Recovery (inches)	tVOCs (ppmv)	Depth (feet)	SOIL CLASSIFICATION	BORING & SAMPLING NOTES
MW-2 (0-5')	N/A	29	N/A	0.5 1 2 3 4 5	Loam Tan-Brown Fine-Medium SAND some SILT	ND
MW-2 (5-10')	N/A	44	N/A	6 7 8 9 10	Dark Brown to Tan-Brown Fine-Coarse SAND and SILT little Fine-Coarse GRAVEL	ND
				11 12 13 14 15	Refusal @ 10' Completed with stand pipe (7' of Screen)	
				16 17 18 19 20		

Ntoes: Stratum Features are approximate. Proportions used 0-10% Trace, 10-20% Little, 20-35% Some & 35-50% And. tVOCs = Total Volatile Organic Compounds (PID calibrated to represent the bezene equivilant in part per million by volume (ppmv)). ND = None Detected

efi global BOSTON NORTH	*Client: City of Waltham*		***BORING ID: SB-2014***
	Project Name/Number: ***020.00107***		
	200 Trapelo Road, Waltham, Massachusetts		
	Boring Location: Cottage Area		*Sheet:* ***1 of 1***
	Drilling Contractor: GeoSearch, Inc.	*Drilling Method: GeoProbe*	*Monitoring Well Installed (Y/N):* ***N***
Logged By: ***Pat Panza***	*Date Started:* ***10/4/2018***	*Boring Diameter: 2"*	*Approx Hammer Weigth/Fall:* ***N/A***
Ground Elevation: ***N/A***	*Date Completed: 10/4/2018*	*Depth of Boring: 15'*	*Approx. Water Level at Completion: N/A*

Sample ID	Blows per 6"	Recovery (inches)	tVOCs (ppmv)	Depth (feet)	SOIL CLASSIFICATION	BORING & SAMPLING NOTES
SB-2014 (0-5')	N/A	18	N/A	0.5 1 2 3 4 5	Pavement Tan to Dark Brown Fine-Coarse SAND and SILT trace Fine-Coarse GRAVEL	ND
SB-2014 (5-10')	N/A	30	N/A	6 7 8 9 10	Dark Brown Fine-Medium SAND and SILT trace Fine-Coarse GRAVEL	ND
SB-2014 (10-15')	N/A	10	N/A	11 12 13 14 15	Dark Brown Fine-Medium SAND and SILT trace Fine-Coarse GRAVEL (poor recovery)	ND
				16 17 18 19 20	End of Exploration	

Ntoes: Stratum Features are approximate. Proportions used 0-10% Trace, 10-20% Little, 20-35% Some & 35-50% And. tVOCs = Total Volatile Organic Compounds (PID calibrated to represent the bezene equivilant in part per million by volume (ppmv)). ND = None Detected

efi global

BOSTON NORTH

Client: City of Waltham			***BORING ID: SB-2015***
*Project Name/Number: **020.00107***			
200 Trapelo Road, Waltham, Massachusetts			
Boring Location: Cottage Area			*Sheet: **1 of 1***
Drilling Contractor: GeoSearch, Inc.	*Drilling Method: GeoProbe*		*Monitoring Well Installed (Y/N): **N***
*Logged By: **Pat Panza***	*Date Started: **10/4/2018***	*Boring Diameter: 2"*	*Approx Hammer Weigth/Fall: **N/A***
*Ground Elevation: **N/A***	*Date Completed: 10/4/2018*	*Depth of Boring: 10'*	*Approx. Water Level at Completion: N/A*

Sample ID	Blows per 6"	Recovery (inches)	tVOCs (ppmv)	Depth (feet)	SOIL CLASSIFICATION	BORING & SAMPLING NOTES
SB-2015 (0-5')	N/A	16	N/A	0.5 1 2 3 4 5	Loam Gray-Tan Fine-Medium SAND and SILT some GRAVEL	ND
SB-2015 (5-10')	N/A	47	N/A	6 7 8 9 10	GRAVEL and Gray-Tan Fine-Coarse SAND some SILT Tan Coarse SAND and Fine-Coarse GRAVEL	ND
				11 12 13 14 15	End of Exploration	
				16 17 18 19 20		

Ntoes: Stratum Features are approximate. Proportions used 0-10% Trace, 10-20% Little, 20-35% Some & 35-50% And. tVOCs = Total Volatile Organic Compounds (PID calibrated to represent the bezene equivilant in part per million by volume (ppmv)). ND = None Detected

efi global

BOSTON NORTH

Client: City of Waltham			**BORING ID: SB-2016**
Project Name/Number: **020.00107**			
200 Trapelo Road, Waltham, Massachusetts			
Boring Location: Cottage Area			Sheet: **1 of 1**
Drilling Contractor: GeoSearch, Inc.	Drilling Method: GeoProbe		Monitoring Well Installed (Y/N): **N**
Logged By: **Pat Panza**	Date Started: **10/4/2018**	Boring Diameter: 2"	Approx Hammer Weigth/Fall: **N/A**
Ground Elevation: **N/A**	Date Completed: 10/4/2018	Depth of Boring: 11'	Approx. Water Level at Completion: N/A

Sample ID	Blows per 6"	Recovery (inches)	tVOCs (ppmv)	Depth (feet)	SOIL CLASSIFICATION	BORING & SAMPLING NOTES
SB-2016 (0-5')	N/A	33	N/A	0.5	Loam	ND
				1		
				2	Gray-Tan Fine-Medium SAND and SILT some GRAVEL	
				3	(trace pavement)	
				4		
				5		
SB-2016 (5-10')	N/A	35	N/A	6	Gray-Tan Fine-Medium SAND and SILT some GRAVEL	ND
				7		
				8		
				9		
				10	(ORGANICS)	
SB-2016 (10-15')	N/A	N/A	N/A	11	No Recovery	N/A
				12	Refusal @ 11'	
				13		
				14		
				15		
				16		
				17		
				18		
				19		
				20		

Ntoes: Stratum Features are approximate. Proportions used 0-10% Trace, 10-20% Little, 20-35% Some & 35-50% And. tVOCs = Total Volatile Organic Compounds (PID calibrated to represent the bezene equivilant in part per million by volume (ppmv)). ND = None Detected

efi global BOSTON NORTH					Client: City of Waltham		**BORING ID: SB-2017**
					Project Name/Number: **020.00107**		
					200 Trapelo Road, Waltham, Massachusetts		
					Boring Location: Cottage Area		Sheet: **1 of 1**
					Drilling Contractor: GeoSearch, Inc.	Drilling Method: GeoProbe	Monitoring Well Installed (Y/N): **N**
Logged By: **Pat Panza**					Date Started: **10/4/2018**	Boring Diameter: 2"	Approx Hammer Weigth/Fall: **N/A**
Ground Elevation: **N/A**					Date Completed: 10/4/2018	Depth of Boring: 9'	Approx. Water Level at Completion: N/A

Sample ID	Blows per 6"	Recovery (inches)	tVOCs (ppmv)	Depth (feet)	SOIL CLASSIFICATION	BORING & SAMPLING NOTES
SB-2017 (0-5')	N/A	34	N/A	0.5 1 2 3 4 5	Loam Gray-Tan Fine-Medium SAND and SILT some GRAVEL	ND
SB-2017 (5-10')	N/A	21	N/A	6 7 8 9 10	Gray Fine-Medium SAND and SILT some GRAVEL trace CLAY (ORGANICS) Refusal @ 9'	ND
				11 12 13 14 15		
				16 17 18 19 20		

Ntoes: Stratum Features are approximate. Proportions used 0-10% Trace, 10-20% Little, 20-35% Some & 35-50% And. tVOCs = Total Volatile Organic Compounds (PID calibrated to represent the bezene equivilant in part per million by volume (ppmv)). ND = None Detected

efi global BOSTON NORTH	*Client: City of Waltham*		***BORING ID: SB-2018/MW-3***
	Project Name/Number: ***020.00107***		
	200 Trapelo Road, Waltham, Massachusetts		
	Boring Location: Cottage Area		*Sheet:* ***1 of 1***
	Drilling Contractor: GeoSearch, Inc.	*Drilling Method: GeoProbe*	*Monitoring Well Installed (Y/N):* ***Y***
Logged By: ***Pat Panza***	*Date Started:* ***10/4/2018***	*Boring Diameter: 2"*	*Approx Hammer Weigth/Fall:* ***N/A***
Ground Elevation: ***N/A***	*Date Completed: 10/4/2018*	*Depth of Boring: 15'*	*Approx. Water Level at Completion: ~9'*

Sample ID	Blows per 6"	Recovery (inches)	tVOCs (ppmv)	Depth (feet)	SOIL CLASSIFICATION	BORING & SAMPLING NOTES
SB-2018 (0-5')	N/A	34	N/A	0.5 1 2 3 4 5	Loam Gray-Tan Fine-Medium SAND and SILT	ND
SB-2018 (5-10')	N/A	26	N/A	6 7 8 9 10	Gray-Tan Fine-Medium SAND and SILT some Fine- Coarse GRAVEL trace CLAY	ND
SB-2018 (10-15')	N/A	8	N/A	11 12 13 14 15	Black SILT some SAND trace CLAY and Coarse GRAVEL	ND
				16 17 18 19 20	End of Exploration Completed with stand pipe (10' of Screen)	

Ntoes: Stratum Features are approximate. Proportions used 0-10% Trace, 10-20% Little, 20-35% Some & 35-50% And. tVOCs = Total Volatile Organic Compounds (PID calibrated to represent the bezene equivilant in part per million by volume (ppmv)). ND = None Detected

efi global BOSTON NORTH	*Client: City of Waltham*		***BORING ID: SB-2019***
	Project Name/Number: ***020.00107***		
	200 Trapelo Road, Waltham, Massachusetts		
	Boring Location: Cottage Area		*Sheet:* ***1 of 1***
	Drilling Contractor: GeoSearch, Inc.	*Drilling Method: GeoProbe*	*Monitoring Well Installed (Y/N):* ***N***
Logged By: ***Pat Panza***	*Date Started:* ***10/4/2018***	*Boring Diameter: 2"*	*Approx Hammer Weigth/Fall:* ***N/A***
Ground Elevation: ***N/A***	*Date Completed: 10/4/2018*	*Depth of Boring: 15'*	*Approx. Water Level at Completion: N/A*

Sample ID	Blows per 6"	Recovery (inches)	tVOCs (ppmv)	Depth (feet)	SOIL CLASSIFICATION	BORING & SAMPLING NOTES
SB-2019 (0-5')	N/A	37	N/A	0.5 1 2 3 4 5	Loam Black-Gray Fine-Coarse SAND some SILT and Fine-Coarse GRAVEL	ND
SB-2019 (5-10')	N/A	44	N/A	6 7 8 9 10	Tan Fine-Coarse SAND and SILT some Fine-Coarse GRAVEL and CLAY	2.2
SB-2019 (10-15')	N/A	15	N/A	11 12 13 14 15	Tan-Brown Fine-Coarse SAND and SILT some CLAY	ND
				16 17 18 19 20	End of Exploration	

Ntoes: Stratum Features are approximate. Proportions used 0-10% Trace, 10-20% Little, 20-35% Some & 35-50% And. tVOCs = Total Volatile Organic Compounds (PID calibrated to represent the bezene equivilant in part per million by volume (ppmv)). ND = None Detected

efi global BOSTON NORTH	*Client: City of Waltham*		***BORING ID: SB-2020***
	Project Name/Number: ***020.00107***		
	200 Trapelo Road, Waltham, Massachusetts		
	Boring Location: Cottage Area		*Sheet:* ***1 of 1***
	Drilling Contractor: GeoSearch, Inc.	*Drilling Method: GeoProbe*	*Monitoring Well Installed (Y/N):* ***N***
Logged By: ***Pat Panza***	*Date Started:* ***10/4/2018***	*Boring Diameter: 2"*	*Approx Hammer Weigth/Fall:* ***N/A***
Ground Elevation: ***N/A***	*Date Completed: 10/4/2018*	*Depth of Boring: 10'*	*Approx. Water Level at Completion: N/A*

Sample ID	Blows per 6"	Recovery (inches)	tVOCs (ppmv)	Depth (feet)	SOIL CLASSIFICATION	BORING & SAMPLING NOTES
SB-2020 (0-5')	N/A	33	N/A	0.5 1 2 3 4 5	Loam Tan-Brown Fine-Coarse SAND and SILT little Fine-Coarse GRAVEL Fine-Coarse GRAVEL little Tan-Brown Fine-Coarse SAND and SILT trace COBBLES	ND
SB-2020 (5-10')	N/A	23	N/A	6 7 8 9 10	` Fine-Coarse GRAVEL little Brown Medium-Coarse SAND some SILT	ND
				11 12 13 14 15	End of Exploration	
				16 17 18 19 20		

Ntoes: Stratum Features are approximate. Proportions used 0-10% Trace, 10-20% Little, 20-35% Some & 35-50% And. tVOCs = Total Volatile Organic Compounds (PID calibrated to represent the bezene equivilant in part per million by volume (ppmv)). ND = None Detected

efi global BOSTON NORTH	*Client: City of Waltham*		***BORING ID: SB-2021***
	Project Name/Number: ***020.00107***		
	200 Trapelo Road, Waltham, Massachusetts		
	Boring Location: Cottage Area		*Sheet:* ***1 of 1***
	Drilling Contractor: GeoSearch, Inc.	*Drilling Method: GeoProbe*	*Monitoring Well Installed (Y/N):* ***N***
Logged By: ***Pat Panza***	*Date Started:* ***10/4/2018***	*Boring Diameter: 2"*	*Approx Hammer Weigth/Fall:* ***N/A***
Ground Elevation: ***N/A***	*Date Completed: 10/4/2018*	*Depth of Boring: 15'*	*Approx. Water Level at Completion: N/A*

Sample ID	Blows per 6"	Recovery (inches)	tVOCs (ppmv)	Depth (feet)	SOIL CLASSIFICATION	BORING & SAMPLING NOTES
SB-2021 (0-5')	N/A	23	N/A	0.5 1 2 3 4 5	Loam Brown Fine-Coarse SAND some SILT Greenish-Gray Fine SAND and SILT some GRAVEL trace CLAY	ND
SB-2021 (5-10')	N/A	24	N/A	6 7 8 9 10	Greenish-Gray Fine SAND and SILT some GRAVEL Brown Fine-Medium SAND little SILT	ND
SB-2021 (10-15')	N/A	24	N/A	11 12 13 14 15	Tan-Brown Fine-Coarse SAND some SILT	ND
				16 17 18 19 20	End of Exploration	

Ntoes: Stratum Features are approximate. Proportions used 0-10% Trace, 10-20% Little, 20-35% Some & 35-50% And. tVOCs = Total Volatile Organic Compounds (PID calibrated to represent the bezene equivilant in part per million by volume (ppmv)). ND = None Detected

efi global

BOSTON NORTH

Client: City of Waltham			***BORING ID: SB-2022***
Project Name/Number: ***020.00107***			
200 Trapelo Road, Waltham, Massachusetts			
Boring Location: Cottage Area			*Sheet:* ***1 of 1***
Drilling Contractor: GeoSearch, Inc.	*Drilling Method: GeoProbe*		*Monitoring Well Installed (Y/N):* ***N***
Logged By: ***Pat Panza***	*Date Started:* ***10/4/2018***	*Boring Diameter: 2"*	*Approx Hammer Weigth/Fall:* ***N/A***
Ground Elevation: ***N/A***	*Date Completed: 10/4/2018*	*Depth of Boring: 10'*	*Approx. Water Level at Completion: N/A*

Sample ID	Blows per 6"	Recovery (inches)	tVOCs (ppmv)	Depth (feet)	SOIL CLASSIFICATION	BORING & SAMPLING NOTES
SB-2022 (0-5')	N/A	33	N/A	0.5 1 2 3 4 5	Loam Brown Fine-Coarse SAND some SILT Greenish-Gray Fine SAND and SILT some GRAVEL trace CLAY	ND
SB-2022 (5-10')	N/A	35	N/A	6 7 8 9 10	Greenish-Gray Fine SAND and SILT some GRAVEL Brown Fine-Medium SAND little SILT	ND
				11 12 13 14 15	End of Exploration	
				16 17 18 19 20		

Ntoes: Stratum Features are approximate. Proportions used 0-10% Trace, 10-20% Little, 20-35% Some & 35-50% And. tVOCs = Total Volatile Organic Compounds (PID calibrated to represent the bezene equivilant in part per million by volume (ppmv)). ND = None Detected

efi global

BOSTON NORTH

Client: City of Waltham			**BORING ID: SB-2023**
Project Name/Number: ***020.00107***			
200 Trapelo Road, Waltham, Massachusetts			
Boring Location: Cottage Area			*Sheet:* ***1 of 1***
Drilling Contractor: GeoSearch, Inc.	*Drilling Method: GeoProbe*		*Monitoring Well Installed (Y/N):* ***N***
Logged By: ***Pat Panza***	*Date Started:* ***10/4/2018***	*Boring Diameter: 2"*	*Approx Hammer Weigth/Fall:* ***N/A***
Ground Elevation: ***N/A***	*Date Completed: 10/4/2018*	*Depth of Boring: 15'*	*Approx. Water Level at Completion: N/A*

Sample ID	Blows per 6"	Recovery (inches)	tVOCs (ppmv)	Depth (feet)	SOIL CLASSIFICATION	BORING & SAMPLING NOTES
SB-2023 (0-5')	N/A	33	N/A	0.5	Loam	ND
				1		
				2	Tan Fine-Medium SAND little SILT	
				3	Brown Fine-Medium SAND little SILT	
				4	Tan-Brown SILT Fine SAND trace CLAY and GRAVEL	
				5		
SB-2023 (5-10')	N/A	32	N/A	6		ND
				7	Greenish-Gray Fine SAND and SILT some GRAVEL	
				8	Brown Fine-Coarse SAND little SILT and GRAVEL	
				9		
				10		
SB-2023 (10-15')	N/A	39	N/A	11		ND
				12		
				13	Brown Fine-Coarse SAND little SILT and GRAVEL	
				14	Gray-Tan Fine-Medium SAND and SILT trace GRAVEL	
				15		
				16	End of Exploration	
				17		
				18		
				19		
				20		

Ntoes: Stratum Features are approximate. Proportions used 0-10% Trace, 10-20% Little, 20-35% Some & 35-50% And. tVOCs = Total Volatile Organic Compounds (PID calibrated to represent the bezene equivilant in part per million by volume (ppmv)). ND = None Detected

efi global BOSTON NORTH	*Client: City of Waltham*		***BORING ID: SB-2024***
	Project Name/Number: ***020.00107***		
	200 Trapelo Road, Waltham, Massachusetts		
	Boring Location: Cottage Area		*Sheet:* ***1 of 1***
	Drilling Contractor: GeoSearch, Inc.	*Drilling Method: GeoProbe*	*Monitoring Well Installed (Y/N):* ***N***
Logged By: ***Pat Panza***	*Date Started:* ***10/4/2018***	*Boring Diameter: 2"*	*Approx Hammer Weigth/Fall:* ***N/A***
Ground Elevation: ***N/A***	*Date Completed: 10/4/2018*	*Depth of Boring: 7'*	*Approx. Water Level at Completion: N/A*

Sample ID	Blows per 6"	Recovery (inches)	tVOCs (ppmv)	Depth (feet)	SOIL CLASSIFICATION	BORING & SAMPLING NOTES
SB-2024 (0-5')	N/A	31	N/A	0.5 1 2 3 4 5	Loam Gray-Tan Fine-Medium SAND and SILT some GRAVEL	ND
SB-2024 (5-10')	N/A	17	N/A	6 7 8 9 10	Gray-Tan Fine-Medium SAND and SILT some GRAVEL Refusal @ 7'	ND
				11 12 13 14 15		
				16 17 18 19 20		

Ntoes: Stratum Features are approximate. Proportions used 0-10% Trace, 10-20% Little, 20-35% Some & 35-50% And. tVOCs = Total Volatile Organic Compounds (PID calibrated to represent the bezene equivilant in part per million by volume (ppmv)). ND = None Detected

efi global BOSTON NORTH	*Client: City of Waltham*		**BORING ID: SB-2025/MW-4**
	Project Name/Number: ***020.00107***		
	200 Trapelo Road, Waltham, Massachusetts		
	Boring Location: Cottage Area		*Sheet:* ***1 of 1***
	Drilling Contractor: GeoSearch, Inc.	*Drilling Method: GeoProbe*	*Monitoring Well Installed (Y/N):* ***N***
Logged By: ***Pat Panza***	*Date Started:* ***10/4/2018***	*Boring Diameter: 2"*	*Approx Hammer Weigth/Fall:* ***N/A***
Ground Elevation: ***N/A***	*Date Completed: 10/4/2018*	*Depth of Boring: 7'*	*Approx. Water Level at Completion: N/A*

Sample ID	Blows per 6"	Recovery (inches)	tVOCs (ppmv)	Depth (feet)	SOIL CLASSIFICATION	BORING & SAMPLING NOTES
SB-2025 (0-5')	N/A	28	N/A	0.5 1 2 3 4 5	Loam Tan-Brown Fine-Coarse SAND and GRAVEL some SILT	ND
SB-2025 (5-10')	N/A	18	N/A	6 7 8 9 10	Gray-Tan Fine-Medium SAND and SILT some GRAVEL Refusal @ 7' No Well Installed	ND
				11 12 13 14 15		
				16 17 18 19 20		

Ntoes: Stratum Features are approximate. Proportions used 0-10% Trace, 10-20% Little, 20-35% Some & 35-50% And. tVOCs = Total Volatile Organic Compounds (PID calibrated to represent the bezene equivilant in part per million by volume (ppmv)). ND = None Detected

ATTACHMENT C

LABORATORY ANALYTICAL REPORTS

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

October 19, 2018

John Vaz
EFI Global
155 West Street, Suite 6
Wilmington, MA 01887

Project Location: 200 Trapelo Rd., Waltham, MA
Client Job Number:
Project Number: 020.00107
Laboratory Work Order Number: 18J0650

Enclosed are results of analyses for samples received by the laboratory on October 12, 2018. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Kerry K. McGee
Project Manager

Table of Contents

Sample Summary 5

Case Narrative 9

Sample Results 14

18J0650-01 14

18J0650-02 19

18J0650-03 24

18J0650-04 29

18J0650-05 34

18J0650-06 39

18J0650-07 44

18J0650-08 49

18J0650-09 54

18J0650-10 59

18J0650-11 64

18J0650-12 69

18J0650-13 74

18J0650-14 79

18J0650-15 84

18J0650-16 89

18J0650-18 98

18J0650-19 103

18J0650-20 108

18J0650-21 113

18J0650-22 118

18J0650-23 123

Table of Contents (continued)

18J0650-24 128

18J0650-25 133

Sample Preparation Information 138

QC Data 142

Volatile Organic Compounds by GC/MS 142

B214517 142

Semivolatile Organic Compounds by GC/MS 147

B214942 147

B214943 153

Polychlorinated Biphenyls with 3540 Soxhlet Extraction 158

B214859 158

B214861 159

Petroleum Hydrocarbons Analyses - EPH 161

B214945 161

Petroleum Hydrocarbons Analyses - VPH 164

B215011 164

Metals Analyses (Total) 166

B214905 166

B214921 167

B215021 168

B215065 169

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total) 170

B214769 170

Dual Column RPD Report 171

Flag/Qualifier Summary 179

Table of Contents (continued)

Certifications 180

Chain of Custody/Sample Receipt 186

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EFI Global
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Wilmington, MA 01887
ATTN: John Vaz

REPORT DATE: 10/19/2018

PURCHASE ORDER NUMBER:

PROJECT NUMBER: 020.00107

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 18J0650

The results of analyses performed on the following samples submitted to the CON-TEST Analytical Laboratory are found in this report.

PROJECT LOCATION: 200 Trapelo Rd., Waltham, MA

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
2001 0-5'	18J0650-01	Soil		SM 2540G	
				SW-846 6010D	
				SW-846 7471B	
				SW-846 8082A	
				SW-846 8270D	
2001 5-10'	18J0650-02	Soil		SM 2540G	
				SW-846 6010D	
				SW-846 7471B	
				SW-846 8082A	
				SW-846 8270D	
2005 0-5'	18J0650-03	Soil		SM 2540G	
				SW-846 6010D	
				SW-846 7471B	
				SW-846 8082A	
				SW-846 8270D	
2005 5-7'	18J0650-04	Soil		SM 2540G	
				SW-846 6010D	
				SW-846 7471B	
				SW-846 8082A	
				SW-846 8270D	
2009 0-5'	18J0650-05	Soil		SM 2540G	
				SW-846 6010D	
				SW-846 7471B	
				SW-846 8082A	
				SW-846 8270D	
2009 5-10'	18J0650-06	Soil		SM 2540G	
				SW-846 6010D	
				SW-846 7471B	
				SW-846 8082A	
				SW-846 8270D	
2010 0-5'	18J0650-07	Soil		SM 2540G	
				SW-846 6010D	
				SW-846 7471B	
				SW-846 8082A	
				SW-846 8270D	
2010 5-10'	18J0650-08	Soil		SM 2540G	
				SW-846 6010D	
				SW-846 7471B	
				SW-846 8082A	
				SW-846 8270D	

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ATTN: John Vaz

REPORT DATE: 10/19/2018

PURCHASE ORDER NUMBER:

PROJECT NUMBER: 020.00107

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 18J0650

The results of analyses performed on the following samples submitted to the CON-TEST Analytical Laboratory are found in this report.

PROJECT LOCATION: 200 Trapelo Rd., Waltham, MA

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
2011 0-5'	18J0650-09	Soil		SM 2540G	
				SW-846 6010D	
				SW-846 7471B	
				SW-846 8082A	
				SW-846 8270D	
2011 5-10'	18J0650-10	Soil		SM 2540G	
				SW-846 6010D	
				SW-846 7471B	
				SW-846 8082A	
				SW-846 8270D	
2012 0-5'	18J0650-11	Soil		SM 2540G	
				SW-846 6010D	
				SW-846 7471B	
				SW-846 8082A	
				SW-846 8270D	
2012 5-10'	18J0650-12	Soil		SM 2540G	
				SW-846 6010D	
				SW-846 7471B	
				SW-846 8082A	
				SW-846 8270D	
2017 0-5'	18J0650-13	Soil		SM 2540G	
				SW-846 6010D	
				SW-846 7471B	
				SW-846 8082A	
				SW-846 8270D	
2017 5-9'	18J0650-14	Soil		SM 2540G	
				SW-846 6010D	
				SW-846 7471B	
				SW-846 8082A	
				SW-846 8270D	
2019 0-5'	18J0650-15	Soil		SM 2540G	
				SW-846 6010D	
				SW-846 7471B	
				SW-846 8082A	
				SW-846 8270D	

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EFI Global
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ATTN: John Vaz

REPORT DATE: 10/19/2018

PURCHASE ORDER NUMBER:

PROJECT NUMBER: 020.00107

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 18J0650

The results of analyses performed on the following samples submitted to the CON-TEST Analytical Laboratory are found in this report.

PROJECT LOCATION: 200 Trapelo Rd., Waltham, MA

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
2019 5-10'	18J0650-16	Soil		MADEP-EPH-04-1.1	
				MADEP-VPH-Feb 2018 Rev 2.1	
				SM 2540G	
				SW-846 6010D	
				SW-846 7471B	
				SW-846 8082A	
				SW-846 8260C	
				SW-846 8270D	
2020 0-5'	18J0650-18	Soil		SM 2540G	
				SW-846 6010D	
				SW-846 7471B	
				SW-846 8082A	
				SW-846 8270D	
2020 5-10'	18J0650-19	Soil		SM 2540G	
				SW-846 6010D	
				SW-846 7471B	
				SW-846 8082A	
				SW-846 8270D	
2023 0-5'	18J0650-20	Soil		SM 2540G	
				SW-846 6010D	
				SW-846 7471B	
				SW-846 8082A	
				SW-846 8270D	
2023 5-10'	18J0650-21	Soil		SM 2540G	
				SW-846 6010D	
				SW-846 7471B	
				SW-846 8082A	
				SW-846 8270D	
2024 0-5'	18J0650-22	Soil		SM 2540G	
				SW-846 6010D	
				SW-846 7471B	
				SW-846 8082A	
				SW-846 8270D	
2024 5-10'	18J0650-23	Soil		SM 2540G	
				SW-846 6010D	
				SW-846 7471B	
				SW-846 8082A	
				SW-846 8270D	

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EFI Global
155 West Street, Suite 6
Wilmington, MA 01887
ATTN: John Vaz

REPORT DATE: 10/19/2018

PURCHASE ORDER NUMBER:

PROJECT NUMBER: 020.00107

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 18J0650

The results of analyses performed on the following samples submitted to the CON-TEST Analytical Laboratory are found in this report.

PROJECT LOCATION: 200 Trapelo Rd., Waltham, MA

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
SB/MW-2 0-5'	18J0650-24	Soil		SM 2540G	
				SW-846 6010D	
				SW-846 7471B	
				SW-846 8082A	
				SW-846 8270D	
SB/MW-2 5-10'	18J0650-25	Soil		SM 2540G	
				SW-846 6010D	
				SW-846 7471B	
				SW-846 8082A	
				SW-846 8270D	

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CASE NARRATIVE SUMMARY

All reported results are within defined laboratory quality control objectives unless listed below or otherwise qualified in this report.

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MADEP-EPH-04-1.1

Qualifications:

B

Analyte is found in the associated laboratory blank as well as in the sample.

Analyte & Samples(s) Qualified:

n-Octadecane
B214945-BS1, B214945-BSD1

SW-846 6010D

Qualifications:

MS-07

Matrix spike recovery is outside of control limits. Analysis is in control based on laboratory fortified blank recovery.Possibility of sample matrix effects that lead to low bias for reported result or non-homogeneous sample aliquot cannot be eliminated.

Analyte & Samples(s) Qualified:

Antimony
18J0650-02[2001 5-10'], B214905-MS1

MS-14

Matrix spike recovery is outside of control limits. Data validation is not affected since sample result is "not detected" and recovery bias is on the high side for this compound.

Analyte & Samples(s) Qualified:

Thallium
18J0650-02[2001 5-10'], B214905-MS1

SW-846 8082A

Qualifications:

O-32

A dilution was performed as part of the standard analytical procedure.

Analyte & Samples(s) Qualified:

18J0650-01[2001 0-5'], 18J0650-02[2001 5-10'], 18J0650-03[2005 0-5'], 18J0650-04[2005 5-7'], 18J0650-05[2009 0-5'], 18J0650-06[2009 5-10'], 18J0650-07[2010 0-5'], 18J0650-08[2010 5-10'], 18J0650-09[2011 0-5'], 18J0650-10[2011 5-10'], 18J0650-11[2012 0-5'], 18J0650-12[2012 5-10'], 18J0650-13[2017 0-5'], 18J0650-14[2017 5-9'], 18J0650-15[2019 0-5'], 18J0650-16[2019 5-10'], 18J0650-18[2020 0-5'], 18J0650-19[2020 5-10'], 18J0650-20[2023 0-5'], 18J0650-21[2023 5-10'], 18J0650-22[2024 0-5'], 18J0650-23[2024 5-10'], 18J0650-24[SB/MW-2 0-5'], 18J0650-25[SB/MW-2 5-10']

SW-846 8260C

Qualifications:

L-07A

Either laboratory fortified blank/laboratory control sample or duplicate recovery is outside of control limits, but the other is within limits. RPD outside of control limits. Reduced precision anticipated for any reported result for this compound.

Analyte & Samples(s) Qualified:

Acetone
B214517-BSD1

R-05

Laboratory fortified blank duplicate RPD is outside of control limits. Reduced precision is anticipated for any reported value for this compound.

Analyte & Samples(s) Qualified:

2-Butanone (MEK)
18J0650-16[2019 5-10'], B214517-BLK1, B214517-BS1, B214517-BSD1, S028363-CCV1

Acetone
18J0650-16[2019 5-10'], B214517-BLK1, B214517-BS1, B214517-BSD1, S028363-CCV1

V-16

Response factor is less than method specified minimum acceptable value. Reduced precision and accuracy may be associated with reported result.

Analyte & Samples(s) Qualified:

1,4-Dioxane
18J0650-16[2019 5-10'], B214517-BLK1, B214517-BS1, B214517-BSD1, S028363-CCV1

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V-20

Continuing calibration did not meet method specifications and was biased on the high side. Data validation is not affected since sample result was "not detected" for this compound.

Analyte & Samples(s) Qualified:

Bromomethane

B214517-BS1, B214517-BSD1, S028363-CCV1

SW-846 8270D

Qualifications:

MS-09

Matrix spike recovery and/or matrix spike duplicate recovery outside of control limits. Possibility of sample matrix effects that lead to a low bias for reported result or non-homogeneous sample aliquots cannot be eliminated.

Analyte & Samples(s) Qualified:

4-Chloroaniline

18J0650-01[2001 0-5'], B214942-MS1, B214942-MSD1

Aniline

18J0650-01[2001 0-5'], B214942-MS1, B214942-MSD1

RL-04

Elevated reporting limit due to sample matrix interference. Requested reporting limit not met.

Analyte & Samples(s) Qualified:

18J0650-03[2005 0-5']

V-06

Continuing calibration did not meet method specifications and was biased on the high side for this compound.

Analyte & Samples(s) Qualified:

4-Nitrophenol

B214942-BS1, B214942-BSD1, B214942-MS1, B214942-MSD1

Bis(2-chloroethyl)ether

B214942-BS1, B214942-BSD1, B214942-MS1, B214942-MSD1

Bis(2-chloroisopropyl)ether

B214942-BS1, B214942-BSD1, B214942-MS1, B214942-MSD1, B214943-BS1, B214943-BSD1

Di-n-octylphthalate

B214942-BS1, B214942-BSD1, B214942-MS1, B214942-MSD1

V-19

Initial calibration did not meet method specifications. Compound was calibrated using linear regression with correlation coefficient <0.99. Reported result is estimated.

Analyte & Samples(s) Qualified:

2,4-Dinitrophenol

18J0650-01[2001 0-5'], 18J0650-02[2001 5-10'], 18J0650-03[2005 0-5'], 18J0650-04[2005 5-7'], 18J0650-05[2009 0-5'], 18J0650-06[2009 5-10'], 18J0650-07[2010 0-5'], 18J0650-08[2010 5-10'], 18J0650-09[2011 0-5'], 18J0650-10[2011 5-10'], 18J0650-11[2012 0-5'], 18J0650-12[2012 5-10'], 18J0650-13[2017 0-5'], 18J0650-14[2017 5-9'], 18J0650-15[2019 0-5'], 18J0650-16[2019 5-10'], 18J0650-18[2020 0-5'], 18J0650-19[2020 5-10'], 18J0650-20[2023 0-5'], 18J0650-21[2023 5-10'], 18J0650-22[2024 0-5'], 18J0650-23[2024 5-10'], 18J0650-24[SB/MW-2 0-5'], 18J0650-25[SB/MW-2 5-10'], B214942-BLK1, B214942-BS1, B214942-BSD1, B214942-MS1, B214942-MSD1, B214943-BLK1, B214943-BS1, B214943-BSD1

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V-20

Continuing calibration did not meet method specifications and was biased on the high side. Data validation is not affected since sample result was "not detected" for this compound.

Analyte & Samples(s) Qualified:

4-Nitrophenol

18J0650-01[2001 0-5'], 18J0650-02[2001 5-10'], 18J0650-04[2005 5-7'], 18J0650-05[2009 0-5'], 18J0650-06[2009 5-10'], 18J0650-07[2010 0-5'], 18J0650-08[2010 5-10'], 18J0650-09[2011 0-5'], 18J0650-10[2011 5-10'], 18J0650-11[2012 0-5'], 18J0650-12[2012 5-10'], 18J0650-13[2017 0-5'], 18J0650-14[2017 5-9'], 18J0650-15[2019 0-5'], 18J0650-16[2019 5-10'], 18J0650-18[2020 0-5'], 18J0650-19[2020 5-10'], 18J0650-20[2023 0-5'], 18J0650-21[2023 5-10'], B214942-BLK1

Bis(2-chloroethyl)ether

18J0650-01[2001 0-5'], 18J0650-02[2001 5-10'], 18J0650-04[2005 5-7'], 18J0650-05[2009 0-5'], 18J0650-06[2009 5-10'], 18J0650-07[2010 0-5'], 18J0650-08[2010 5-10'], 18J0650-09[2011 0-5'], 18J0650-10[2011 5-10'], 18J0650-11[2012 0-5'], 18J0650-12[2012 5-10'], 18J0650-13[2017 0-5'], 18J0650-14[2017 5-9'], 18J0650-15[2019 0-5'], 18J0650-16[2019 5-10'], 18J0650-18[2020 0-5'], 18J0650-19[2020 5-10'], 18J0650-20[2023 0-5'], 18J0650-21[2023 5-10'], B214942-BLK1

Bis(2-chloroisopropyl)ether

18J0650-01[2001 0-5'], 18J0650-02[2001 5-10'], 18J0650-04[2005 5-7'], 18J0650-05[2009 0-5'], 18J0650-06[2009 5-10'], 18J0650-07[2010 0-5'], 18J0650-08[2010 5-10'], 18J0650-09[2011 0-5'], 18J0650-10[2011 5-10'], 18J0650-11[2012 0-5'], 18J0650-12[2012 5-10'], 18J0650-13[2017 0-5'], 18J0650-14[2017 5-9'], 18J0650-15[2019 0-5'], 18J0650-16[2019 5-10'], 18J0650-18[2020 0-5'], 18J0650-19[2020 5-10'], 18J0650-20[2023 0-5'], 18J0650-21[2023 5-10'], 18J0650-22[2024 0-5'], 18J0650-23[2024 5-10'], 18J0650-24[SB/MW-2 0-5'], 18J0650-25[SB/MW-2 5-10'], B214942-BLK1, B214943-BLK1

Di-n-octylphthalate

18J0650-01[2001 0-5'], 18J0650-02[2001 5-10'], 18J0650-04[2005 5-7'], 18J0650-05[2009 0-5'], 18J0650-06[2009 5-10'], 18J0650-07[2010 0-5'], 18J0650-08[2010 5-10'], 18J0650-09[2011 0-5'], 18J0650-10[2011 5-10'], 18J0650-11[2012 0-5'], 18J0650-12[2012 5-10'], 18J0650-13[2017 0-5'], 18J0650-14[2017 5-9'], 18J0650-15[2019 0-5'], 18J0650-16[2019 5-10'], 18J0650-18[2020 0-5'], 18J0650-19[2020 5-10'], 18J0650-20[2023 0-5'], 18J0650-21[2023 5-10'], B214942-BLK1

V-34

Initial calibration verification (ICV) did not meet method specifications and was biased on the low side for this compound. Reported result is estimated.

Analyte & Samples(s) Qualified:

4-Chloroaniline

18J0650-01[2001 0-5'], 18J0650-02[2001 5-10'], 18J0650-03[2005 0-5'], 18J0650-04[2005 5-7'], 18J0650-05[2009 0-5'], 18J0650-06[2009 5-10'], 18J0650-07[2010 0-5'], 18J0650-08[2010 5-10'], 18J0650-09[2011 0-5'], 18J0650-10[2011 5-10'], 18J0650-11[2012 0-5'], 18J0650-12[2012 5-10'], 18J0650-13[2017 0-5'], 18J0650-14[2017 5-9'], 18J0650-15[2019 0-5'], 18J0650-16[2019 5-10'], 18J0650-18[2020 0-5'], 18J0650-19[2020 5-10'], 18J0650-20[2023 0-5'], 18J0650-21[2023 5-10'], 18J0650-22[2024 0-5'], 18J0650-23[2024 5-10'], 18J0650-24[SB/MW-2 0-5'], 18J0650-25[SB/MW-2 5-10'], B214942-BLK1, B214942-BS1, B214942-BSD1, B214942-MS1, B214942-MSD1, B214943-BLK1, B214943-BS1, B214943-BSD1

Aniline

18J0650-01[2001 0-5'], 18J0650-02[2001 5-10'], 18J0650-03[2005 0-5'], 18J0650-04[2005 5-7'], 18J0650-05[2009 0-5'], 18J0650-06[2009 5-10'], 18J0650-07[2010 0-5'], 18J0650-08[2010 5-10'], 18J0650-09[2011 0-5'], 18J0650-10[2011 5-10'], 18J0650-11[2012 0-5'], 18J0650-12[2012 5-10'], 18J0650-13[2017 0-5'], 18J0650-14[2017 5-9'], 18J0650-15[2019 0-5'], 18J0650-16[2019 5-10'], 18J0650-18[2020 0-5'], 18J0650-19[2020 5-10'], 18J0650-20[2023 0-5'], 18J0650-21[2023 5-10'], 18J0650-22[2024 0-5'], 18J0650-23[2024 5-10'], 18J0650-24[SB/MW-2 0-5'], 18J0650-25[SB/MW-2 5-10'], B214942-BLK1, B214942-BS1, B214942-BSD1, B214942-MS1, B214942-MSD1, B214943-BLK1, B214943-BS1, B214943-BSD1

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MADEP-EPH-04-1.1

SPE cartridge contamination with non-petroleum compounds, if present, is verified by GC/MS in each method blank per extraction batch and excluded from C11-C22 aromatic range fraction in all samples in the batch. No significant modifications were made to the method.

MADEP-VPH-Feb 2018 Rev 2.1

No significant modifications were made to the method. All VPH samples were received preserved properly in methanol with a soil/methanol ratio of 1:1 +/- 25% completely covered by methanol in the proper containers specified on the chain-of-custody form unless specified in this narrative.

Analytical column used for VPH analysis is Restek, Rtx-502.2, 105meter, 0.53mmID, 3um df. Trap used for VPH analysis is Carbopack B/CarboSieveS-III.

SW-846 8260C

Laboratory control sample recoveries for required MCP Data Enhancement 8260 compounds were all within limits specified by the method except for “difficult analytes” where recovery control limits of 40-160% are used and/or unless otherwise listed in this narrative. Difficult analytes: MIBK, MEK, acetone, 1,4-dioxane, chloromethane, dichlorodifluoromethane, 2-hexanone, and bromomethane.

SW-846 8270D

Laboratory control sample recoveries for required MCP Data Enhancement 8270 compounds were all within control limits specified by the method, 40-140% for base/neutrals and 30-130% for acids except for “difficult analytes” listed below and/or otherwise listed in this narrative. Difficult analytes limits are 15 and 140%: 2,4-dinitrophenol, 4-chloroaniline, 4-nitrophenol, and phenol.

The results of analyses reported only relate to samples submitted to the Con-Test Analytical Laboratory for testing.
I certify that the analyses listed above, unless specifically listed as subcontracted, if any, were performed under my direction according to the approved methodologies listed in this document, and that based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

Lisa A. Worthington
Project Manager

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2001 0-5' Sampled: 10/2/2018 09:30

Sample ID: 18J0650-01

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	ND	0.21	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:02	CDT
Acenaphthylene	ND	0.21	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:02	CDT
Acetophenone	ND	0.42	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:02	CDT
Aniline	ND	0.42	mg/Kg dry	1	MS-09, V-34	SW-846 8270D	10/16/18	10/18/18 19:02	CDT
Anthracene	ND	0.21	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:02	CDT
Benzo(a)anthracene	ND	0.21	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:02	CDT
Benzo(a)pyrene	ND	0.21	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:02	CDT
Benzo(b)fluoranthene	ND	0.21	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:02	CDT
Benzo(g,h,i)perylene	ND	0.21	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:02	CDT
Benzo(k)fluoranthene	ND	0.21	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:02	CDT
Bis(2-chloroethoxy)methane	ND	0.42	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:02	CDT
Bis(2-chloroethyl)ether	ND	0.42	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/18/18 19:02	CDT
Bis(2-chloroisopropyl)ether	ND	0.42	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/18/18 19:02	CDT
Bis(2-Ethylhexyl)phthalate	ND	0.42	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:02	CDT
4-Bromophenylphenylether	ND	0.42	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:02	CDT
Butylbenzylphthalate	ND	0.42	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:02	CDT
4-Chloroaniline	ND	0.81	mg/Kg dry	1	MS-09, V-34	SW-846 8270D	10/16/18	10/18/18 19:02	CDT
2-Chloronaphthalene	ND	0.42	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:02	CDT
2-Chlorophenol	ND	0.42	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:02	CDT
Chrysene	ND	0.21	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:02	CDT
Dibenz(a,h)anthracene	ND	0.21	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:02	CDT
Dibenzofuran	ND	0.42	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:02	CDT
Di-n-butylphthalate	ND	0.42	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:02	CDT
1,2-Dichlorobenzene	ND	0.42	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:02	CDT
1,3-Dichlorobenzene	ND	0.42	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:02	CDT
1,4-Dichlorobenzene	ND	0.42	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:02	CDT
3,3-Dichlorobenzidine	ND	0.21	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:02	CDT
2,4-Dichlorophenol	ND	0.42	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:02	CDT
Diethylphthalate	ND	0.42	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:02	CDT
2,4-Dimethylphenol	ND	0.42	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:02	CDT
Dimethylphthalate	ND	0.42	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:02	CDT
2,4-Dinitrophenol	ND	0.81	mg/Kg dry	1	V-19	SW-846 8270D	10/16/18	10/18/18 19:02	CDT
2,4-Dinitrotoluene	ND	0.42	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:02	CDT
2,6-Dinitrotoluene	ND	0.42	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:02	CDT
Di-n-octylphthalate	ND	0.42	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/18/18 19:02	CDT
1,2-Diphenylhydrazine (as Azobenzene)	ND	0.42	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:02	CDT
Fluoranthene	ND	0.21	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:02	CDT
Fluorene	ND	0.21	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:02	CDT
Hexachlorobenzene	ND	0.42	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:02	CDT
Hexachlorobutadiene	ND	0.42	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:02	CDT
Hexachloroethane	ND	0.42	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:02	CDT
Indeno(1,2,3-cd)pyrene	ND	0.21	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:02	CDT
Isophorone	ND	0.42	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:02	CDT
2-Methylnaphthalene	ND	0.21	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:02	CDT

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2001 0-5' Sampled: 10/2/2018 09:30

Sample ID: 18J0650-01

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
2-Methylphenol	ND	0.42	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:02	CDT
3/4-Methylphenol	ND	0.42	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:02	CDT
Naphthalene	ND	0.21	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:02	CDT
Nitrobenzene	ND	0.42	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:02	CDT
2-Nitrophenol	ND	0.42	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:02	CDT
4-Nitrophenol	ND	0.81	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/18/18 19:02	CDT
Pentachlorophenol	ND	0.42	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:02	CDT
Phenanthrene	ND	0.21	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:02	CDT
Phenol	ND	0.42	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:02	CDT
Pyrene	ND	0.21	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:02	CDT
1,2,4-Trichlorobenzene	ND	0.42	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:02	CDT
2,4,5-Trichlorophenol	ND	0.42	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:02	CDT
2,4,6-Trichlorophenol	ND	0.42	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:02	CDT

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2-Fluorophenol	61.2	30-130		10/18/18 19:02
Phenol-d6	70.3	30-130		10/18/18 19:02
Nitrobenzene-d5	73.8	30-130		10/18/18 19:02
2-Fluorobiphenyl	70.5	30-130		10/18/18 19:02
2,4,6-Tribromophenol	69.5	30-130		10/18/18 19:02
p-Terphenyl-d14	76.6	30-130		10/18/18 19:02

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Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2001 0-5' Sampled: 10/2/2018 09:30

Sample ID: 18J0650-01

Sample Matrix: Soil

Sample Flags: O-32

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.097	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:17	TG
Aroclor-1221 [1]	ND	0.097	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:17	TG
Aroclor-1232 [1]	ND	0.097	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:17	TG
Aroclor-1242 [1]	ND	0.097	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:17	TG
Aroclor-1248 [1]	ND	0.097	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:17	TG
Aroclor-1254 [1]	ND	0.097	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:17	TG
Aroclor-1260 [1]	ND	0.097	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:17	TG
Aroclor-1262 [1]	ND	0.097	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:17	TG
Aroclor-1268 [1]	ND	0.097	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:17	TG

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	67.7	30-150		10/18/18 17:17
Decachlorobiphenyl [2]	61.3	30-150		10/18/18 17:17
Tetrachloro-m-xylene [1]	59.8	30-150		10/18/18 17:17
Tetrachloro-m-xylene [2]	66.0	30-150		10/18/18 17:17

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2001 0-5' Sampled: 10/2/2018 09:30

Sample ID: 18J0650-01

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Antimony	ND	2.1	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 13:47	QNW
Arsenic	ND	2.1	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 13:47	QNW
Barium	49	2.1	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 13:47	QNW
Beryllium	0.53	0.21	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 13:47	QNW
Cadmium	ND	0.21	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 13:47	QNW
Chromium	16	0.42	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 13:47	QNW
Lead	34	0.63	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 13:47	QNW
Mercury	ND	0.032	mg/Kg dry	1		SW-846 7471B	10/16/18	10/17/18 13:29	EJB
Nickel	8.9	0.42	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 13:47	QNW
Selenium	ND	4.2	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 13:47	QNW
Silver	ND	0.42	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 13:47	QNW
Thallium	ND	2.1	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 13:47	QNW
Vanadium	35	0.84	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 13:47	QNW
Zinc	30	0.84	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 13:47	QNW

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Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2001 0-5' Sampled: 10/2/2018 09:30

Sample ID: 18J0650-01

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	79.9		% Wt	1		SM 2540G	10/15/18	10/16/18 14:39	JFC

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Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2001 5-10' Sampled: 10/2/2018 09:30

Sample ID: 18J0650-02

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:28	CDT
Acenaphthylene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:28	CDT
Acetophenone	ND	0.36	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:28	CDT
Aniline	ND	0.36	mg/Kg dry	1	V-34	SW-846 8270D	10/16/18	10/18/18 19:28	CDT
Anthracene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:28	CDT
Benzo(a)anthracene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:28	CDT
Benzo(a)pyrene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:28	CDT
Benzo(b)fluoranthene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:28	CDT
Benzo(g,h,i)perylene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:28	CDT
Benzo(k)fluoranthene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:28	CDT
Bis(2-chloroethoxy)methane	ND	0.36	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:28	CDT
Bis(2-chloroethyl)ether	ND	0.36	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/18/18 19:28	CDT
Bis(2-chloroisopropyl)ether	ND	0.36	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/18/18 19:28	CDT
Bis(2-Ethylhexyl)phthalate	ND	0.36	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:28	CDT
4-Bromophenylphenylether	ND	0.36	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:28	CDT
Butylbenzylphthalate	ND	0.36	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:28	CDT
4-Chloroaniline	ND	0.71	mg/Kg dry	1	V-34	SW-846 8270D	10/16/18	10/18/18 19:28	CDT
2-Chloronaphthalene	ND	0.36	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:28	CDT
2-Chlorophenol	ND	0.36	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:28	CDT
Chrysene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:28	CDT
Dibenz(a,h)anthracene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:28	CDT
Dibenzofuran	ND	0.36	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:28	CDT
Di-n-butylphthalate	ND	0.36	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:28	CDT
1,2-Dichlorobenzene	ND	0.36	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:28	CDT
1,3-Dichlorobenzene	ND	0.36	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:28	CDT
1,4-Dichlorobenzene	ND	0.36	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:28	CDT
3,3-Dichlorobenzidine	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:28	CDT
2,4-Dichlorophenol	ND	0.36	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:28	CDT
Diethylphthalate	ND	0.36	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:28	CDT
2,4-Dimethylphenol	ND	0.36	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:28	CDT
Dimethylphthalate	ND	0.36	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:28	CDT
2,4-Dinitrophenol	ND	0.71	mg/Kg dry	1	V-19	SW-846 8270D	10/16/18	10/18/18 19:28	CDT
2,4-Dinitrotoluene	ND	0.36	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:28	CDT
2,6-Dinitrotoluene	ND	0.36	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:28	CDT
Di-n-octylphthalate	ND	0.36	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/18/18 19:28	CDT
1,2-Diphenylhydrazine (as Azobenzene)	ND	0.36	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:28	CDT
Fluoranthene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:28	CDT
Fluorene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:28	CDT
Hexachlorobenzene	ND	0.36	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:28	CDT
Hexachlorobutadiene	ND	0.36	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:28	CDT
Hexachloroethane	ND	0.36	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:28	CDT
Indeno(1,2,3-cd)pyrene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:28	CDT
Isophorone	ND	0.36	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:28	CDT
2-Methylnaphthalene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:28	CDT

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2001 5-10' Sampled: 10/2/2018 09:30

Sample ID: 18J0650-02

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
2-Methylphenol	ND	0.36	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:28	CDT
3/4-Methylphenol	ND	0.36	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:28	CDT
Naphthalene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:28	CDT
Nitrobenzene	ND	0.36	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:28	CDT
2-Nitrophenol	ND	0.36	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:28	CDT
4-Nitrophenol	ND	0.71	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/18/18 19:28	CDT
Pentachlorophenol	ND	0.36	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:28	CDT
Phenanthrene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:28	CDT
Phenol	ND	0.36	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:28	CDT
Pyrene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:28	CDT
1,2,4-Trichlorobenzene	ND	0.36	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:28	CDT
2,4,5-Trichlorophenol	ND	0.36	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:28	CDT
2,4,6-Trichlorophenol	ND	0.36	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:28	CDT

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2-Fluorophenol	77.5	30-130		10/18/18 19:28
Phenol-d6	87.0	30-130		10/18/18 19:28
Nitrobenzene-d5	89.6	30-130		10/18/18 19:28
2-Fluorobiphenyl	88.6	30-130		10/18/18 19:28
2,4,6-Tribromophenol	96.0	30-130		10/18/18 19:28
p-Terphenyl-d14	97.3	30-130		10/18/18 19:28

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2001 5-10' Sampled: 10/2/2018 09:30

Sample ID: 18J0650-02

Sample Matrix: Soil

Sample Flags: O-32

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.084	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:35	TG
Aroclor-1221 [1]	ND	0.084	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:35	TG
Aroclor-1232 [1]	ND	0.084	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:35	TG
Aroclor-1242 [1]	ND	0.084	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:35	TG
Aroclor-1248 [1]	ND	0.084	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:35	TG
Aroclor-1254 [1]	ND	0.084	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:35	TG
Aroclor-1260 [1]	ND	0.084	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:35	TG
Aroclor-1262 [1]	ND	0.084	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:35	TG
Aroclor-1268 [1]	ND	0.084	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:35	TG

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	70.8	30-150		10/18/18 17:35
Decachlorobiphenyl [2]	64.6	30-150		10/18/18 17:35
Tetrachloro-m-xylene [1]	64.1	30-150		10/18/18 17:35
Tetrachloro-m-xylene [2]	71.1	30-150		10/18/18 17:35

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2001 5-10' Sampled: 10/2/2018 09:30

Sample ID: 18J0650-02

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Antimony	ND	1.7	mg/Kg dry	1	MS-07	SW-846 6010D	10/16/18	10/18/18 13:43	QNW
Arsenic	ND	1.7	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 13:43	QNW
Barium	27	1.7	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 13:43	QNW
Beryllium	0.41	0.17	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 13:43	QNW
Cadmium	ND	0.17	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 13:43	QNW
Chromium	16	0.35	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 13:43	QNW
Lead	9.0	0.52	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 13:43	QNW
Mercury	ND	0.026	mg/Kg dry	1		SW-846 7471B	10/16/18	10/17/18 13:24	EJB
Nickel	8.6	0.35	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 13:43	QNW
Selenium	ND	3.5	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 13:43	QNW
Silver	ND	0.35	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 13:43	QNW
Thallium	ND	1.7	mg/Kg dry	1	MS-14	SW-846 6010D	10/16/18	10/18/18 13:43	QNW
Vanadium	24	0.70	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 13:43	QNW
Zinc	99	0.70	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 13:43	QNW

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2001 5-10' Sampled: 10/2/2018 09:30

Sample ID: 18J0650-02

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	93.2		% Wt	1		SM 2540G	10/15/18	10/16/18 14:40	JFC

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2005 0-5' Sampled: 10/2/2018 15:00

Sample ID: 18J0650-03

Sample Matrix: Soil

Sample Flags: RL-04

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	ND	0.78	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
Acenaphthylene	ND	0.78	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
Acetophenone	ND	1.6	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
Aniline	ND	1.6	mg/Kg dry	4	V-34	SW-846 8270D	10/16/18	10/18/18 14:21	CDT
Anthracene	ND	0.78	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
Benzo(a)anthracene	ND	0.78	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
Benzo(a)pyrene	ND	0.78	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
Benzo(b)fluoranthene	ND	0.78	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
Benzo(g,h,i)perylene	ND	0.78	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
Benzo(k)fluoranthene	ND	0.78	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
Bis(2-chloroethoxy)methane	ND	1.6	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
Bis(2-chloroethyl)ether	ND	1.6	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
Bis(2-chloroisopropyl)ether	ND	1.6	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
Bis(2-Ethylhexyl)phthalate	ND	1.6	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
4-Bromophenylphenylether	ND	1.6	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
Butylbenzylphthalate	ND	1.6	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
4-Chloroaniline	ND	3.0	mg/Kg dry	4	V-34	SW-846 8270D	10/16/18	10/18/18 14:21	CDT
2-Chloronaphthalene	ND	1.6	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
2-Chlorophenol	ND	1.6	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
Chrysene	ND	0.78	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
Dibenz(a,h)anthracene	ND	0.78	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
Dibenzofuran	ND	1.6	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
Di-n-butylphthalate	ND	1.6	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
1,2-Dichlorobenzene	ND	1.6	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
1,3-Dichlorobenzene	ND	1.6	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
1,4-Dichlorobenzene	ND	1.6	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
3,3-Dichlorobenzidine	ND	0.78	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
2,4-Dichlorophenol	ND	1.6	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
Diethylphthalate	ND	1.6	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
2,4-Dimethylphenol	ND	1.6	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
Dimethylphthalate	ND	1.6	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
2,4-Dinitrophenol	ND	3.0	mg/Kg dry	4	V-19	SW-846 8270D	10/16/18	10/18/18 14:21	CDT
2,4-Dinitrotoluene	ND	1.6	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
2,6-Dinitrotoluene	ND	1.6	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
Di-n-octylphthalate	ND	1.6	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
1,2-Diphenylhydrazine (as Azobenzene)	ND	1.6	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
Fluoranthene	ND	0.78	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
Fluorene	ND	0.78	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
Hexachlorobenzene	ND	1.6	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
Hexachlorobutadiene	ND	1.6	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
Hexachloroethane	ND	1.6	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
Indeno(1,2,3-cd)pyrene	ND	0.78	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
Isophorone	ND	1.6	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
2-Methylnaphthalene	ND	0.78	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT

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Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2005 0-5' Sampled: 10/2/2018 15:00

Sample ID: 18J0650-03

Sample Matrix: Soil

Sample Flags: RL-04

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
2-Methylphenol	ND	1.6	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
3/4-Methylphenol	ND	1.6	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
Naphthalene	ND	0.78	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
Nitrobenzene	ND	1.6	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
2-Nitrophenol	ND	1.6	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
4-Nitrophenol	ND	3.0	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
Pentachlorophenol	ND	1.6	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
Phenanthrene	ND	0.78	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
Phenol	ND	1.6	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
Pyrene	ND	0.78	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
1,2,4-Trichlorobenzene	ND	1.6	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
2,4,5-Trichlorophenol	ND	1.6	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT
2,4,6-Trichlorophenol	ND	1.6	mg/Kg dry	4		SW-846 8270D	10/16/18	10/18/18 14:21	CDT

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2-Fluorophenol	61.4	30-130		10/18/18 14:21
Phenol-d6	68.7	30-130		10/18/18 14:21
Nitrobenzene-d5	73.4	30-130		10/18/18 14:21
2-Fluorobiphenyl	70.1	30-130		10/18/18 14:21
2,4,6-Tribromophenol	61.6	30-130		10/18/18 14:21
p-Terphenyl-d14	65.4	30-130		10/18/18 14:21

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA | Sample Description: | Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2005 0-5' | Sampled: 10/2/2018 15:00

Sample ID: 18J0650-03

Sample Matrix: Soil

Sample Flags: O-32

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.089	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:52	TG
Aroclor-1221 [1]	ND	0.089	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:52	TG
Aroclor-1232 [1]	ND	0.089	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:52	TG
Aroclor-1242 [1]	ND	0.089	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:52	TG
Aroclor-1248 [1]	ND	0.089	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:52	TG
Aroclor-1254 [1]	ND	0.089	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:52	TG
Aroclor-1260 [1]	ND	0.089	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:52	TG
Aroclor-1262 [1]	ND	0.089	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:52	TG
Aroclor-1268 [1]	ND	0.089	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:52	TG

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	66.5	30-150		10/18/18 17:52
Decachlorobiphenyl [2]	61.6	30-150		10/18/18 17:52
Tetrachloro-m-xylene [1]	65.4	30-150		10/18/18 17:52
Tetrachloro-m-xylene [2]	73.4	30-150		10/18/18 17:52

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2005 0-5' Sampled: 10/2/2018 15:00

Sample ID: 18J0650-03

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Antimony	ND	1.9	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 13:52	QNW
Arsenic	ND	1.9	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 13:52	QNW
Barium	56	1.9	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 13:52	QNW
Beryllium	0.35	0.19	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 13:52	QNW
Cadmium	ND	0.19	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 13:52	QNW
Chromium	9.6	0.38	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 13:52	QNW
Lead	5.2	0.57	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 13:52	QNW
Mercury	ND	0.030	mg/Kg dry	1		SW-846 7471B	10/16/18	10/17/18 13:31	EJB
Nickel	7.8	0.38	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 13:52	QNW
Selenium	ND	3.8	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 13:52	QNW
Silver	ND	0.38	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 13:52	QNW
Thallium	ND	1.9	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 13:52	QNW
Vanadium	31	0.75	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 13:52	QNW
Zinc	52	0.75	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 13:52	QNW

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Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2005 0-5' Sampled: 10/2/2018 15:00

Sample ID: 18J0650-03

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	86.9		% Wt	1		SM 2540G	10/15/18	10/16/18 14:40	JFC

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Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2005 5-7' Sampled: 10/2/2018 15:00

Sample ID: 18J0650-04

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	ND	0.22	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:54	CDT
Acenaphthylene	ND	0.22	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:54	CDT
Acetophenone	ND	0.43	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:54	CDT
Aniline	ND	0.43	mg/Kg dry	1	V-34	SW-846 8270D	10/16/18	10/18/18 19:54	CDT
Anthracene	ND	0.22	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:54	CDT
Benzo(a)anthracene	ND	0.22	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:54	CDT
Benzo(a)pyrene	ND	0.22	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:54	CDT
Benzo(b)fluoranthene	ND	0.22	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:54	CDT
Benzo(g,h,i)perylene	ND	0.22	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:54	CDT
Benzo(k)fluoranthene	ND	0.22	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:54	CDT
Bis(2-chloroethoxy)methane	ND	0.43	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:54	CDT
Bis(2-chloroethyl)ether	ND	0.43	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/18/18 19:54	CDT
Bis(2-chloroisopropyl)ether	ND	0.43	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/18/18 19:54	CDT
Bis(2-Ethylhexyl)phthalate	ND	0.43	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:54	CDT
4-Bromophenylphenylether	ND	0.43	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:54	CDT
Butylbenzylphthalate	ND	0.43	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:54	CDT
4-Chloroaniline	ND	0.84	mg/Kg dry	1	V-34	SW-846 8270D	10/16/18	10/18/18 19:54	CDT
2-Chloronaphthalene	ND	0.43	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:54	CDT
2-Chlorophenol	ND	0.43	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:54	CDT
Chrysene	ND	0.22	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:54	CDT
Dibenz(a,h)anthracene	ND	0.22	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:54	CDT
Dibenzofuran	ND	0.43	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:54	CDT
Di-n-butylphthalate	ND	0.43	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:54	CDT
1,2-Dichlorobenzene	ND	0.43	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:54	CDT
1,3-Dichlorobenzene	ND	0.43	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:54	CDT
1,4-Dichlorobenzene	ND	0.43	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:54	CDT
3,3-Dichlorobenzidine	ND	0.22	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:54	CDT
2,4-Dichlorophenol	ND	0.43	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:54	CDT
Diethylphthalate	ND	0.43	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:54	CDT
2,4-Dimethylphenol	ND	0.43	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:54	CDT
Dimethylphthalate	ND	0.43	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:54	CDT
2,4-Dinitrophenol	ND	0.84	mg/Kg dry	1	V-19	SW-846 8270D	10/16/18	10/18/18 19:54	CDT
2,4-Dinitrotoluene	ND	0.43	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:54	CDT
2,6-Dinitrotoluene	ND	0.43	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:54	CDT
Di-n-octylphthalate	ND	0.43	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/18/18 19:54	CDT
1,2-Diphenylhydrazine (as Azobenzene)	ND	0.43	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:54	CDT
Fluoranthene	ND	0.22	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:54	CDT
Fluorene	ND	0.22	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:54	CDT
Hexachlorobenzene	ND	0.43	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:54	CDT
Hexachlorobutadiene	ND	0.43	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:54	CDT
Hexachloroethane	ND	0.43	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:54	CDT
Indeno(1,2,3-cd)pyrene	ND	0.22	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:54	CDT
Isophorone	ND	0.43	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:54	CDT
2-Methylnaphthalene	ND	0.22	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:54	CDT

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Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2005 5-7' Sampled: 10/2/2018 15:00

Sample ID: 18J0650-04

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
2-Methylphenol	ND	0.43	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:54	CDT
3/4-Methylphenol	ND	0.43	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:54	CDT
Naphthalene	ND	0.22	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:54	CDT
Nitrobenzene	ND	0.43	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:54	CDT
2-Nitrophenol	ND	0.43	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:54	CDT
4-Nitrophenol	ND	0.84	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/18/18 19:54	CDT
Pentachlorophenol	ND	0.43	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:54	CDT
Phenanthrene	ND	0.22	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:54	CDT
Phenol	ND	0.43	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:54	CDT
Pyrene	ND	0.22	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:54	CDT
1,2,4-Trichlorobenzene	ND	0.43	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:54	CDT
2,4,5-Trichlorophenol	ND	0.43	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:54	CDT
2,4,6-Trichlorophenol	ND	0.43	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 19:54	CDT

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2-Fluorophenol	75.8	30-130		10/18/18 19:54
Phenol-d6	82.0	30-130		10/18/18 19:54
Nitrobenzene-d5	83.5	30-130		10/18/18 19:54
2-Fluorobiphenyl	82.9	30-130		10/18/18 19:54
2,4,6-Tribromophenol	82.6	30-130		10/18/18 19:54
p-Terphenyl-d14	92.2	30-130		10/18/18 19:54

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Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2005 5-7' Sampled: 10/2/2018 15:00

Sample ID: 18J0650-04

Sample Matrix: Soil

Sample Flags: O-32

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.095	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 18:10	TG
Aroclor-1221 [1]	ND	0.095	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 18:10	TG
Aroclor-1232 [1]	ND	0.095	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 18:10	TG
Aroclor-1242 [1]	ND	0.095	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 18:10	TG
Aroclor-1248 [1]	ND	0.095	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 18:10	TG
Aroclor-1254 [1]	ND	0.095	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 18:10	TG
Aroclor-1260 [1]	ND	0.095	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 18:10	TG
Aroclor-1262 [1]	ND	0.095	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 18:10	TG
Aroclor-1268 [1]	ND	0.095	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 18:10	TG

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	65.6	30-150		10/18/18 18:10
Decachlorobiphenyl [2]	61.6	30-150		10/18/18 18:10
Tetrachloro-m-xylene [1]	66.8	30-150		10/18/18 18:10
Tetrachloro-m-xylene [2]	74.2	30-150		10/18/18 18:10

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Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2005 5-7' Sampled: 10/2/2018 15:00

Sample ID: 18J0650-04

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Antimony	ND	2.1	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 13:57	QNW
Arsenic	ND	2.1	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 13:57	QNW
Barium	65	2.1	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 13:57	QNW
Beryllium	0.54	0.21	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 13:57	QNW
Cadmium	ND	0.21	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 13:57	QNW
Chromium	11	0.42	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 13:57	QNW
Lead	7.2	0.62	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 13:57	QNW
Mercury	ND	0.031	mg/Kg dry	1		SW-846 7471B	10/16/18	10/17/18 13:33	EJB
Nickel	7.2	0.42	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 13:57	QNW
Selenium	ND	4.2	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 13:57	QNW
Silver	ND	0.42	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 13:57	QNW
Thallium	ND	2.1	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 13:57	QNW
Vanadium	65	0.83	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 13:57	QNW
Zinc	84	0.83	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 13:57	QNW

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Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2005 5-7' Sampled: 10/2/2018 15:00

Sample ID: 18J0650-04

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	78.4		% Wt	1		SM 2540G	10/15/18	10/16/18 14:40	JFC

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Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2009 0-5' Sampled: 10/3/2018 10:30

Sample ID: 18J0650-05

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:22	CDT
Acenaphthylene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:22	CDT
Acetophenone	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:22	CDT
Aniline	ND	0.38	mg/Kg dry	1	V-34	SW-846 8270D	10/16/18	10/18/18 20:22	CDT
Anthracene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:22	CDT
Benzo(a)anthracene	0.31	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:22	CDT
Benzo(a)pyrene	0.30	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:22	CDT
Benzo(b)fluoranthene	0.35	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:22	CDT
Benzo(g,h,i)perylene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:22	CDT
Benzo(k)fluoranthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:22	CDT
Bis(2-chloroethoxy)methane	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:22	CDT
Bis(2-chloroethyl)ether	ND	0.38	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/18/18 20:22	CDT
Bis(2-chloroisopropyl)ether	ND	0.38	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/18/18 20:22	CDT
Bis(2-Ethylhexyl)phthalate	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:22	CDT
4-Bromophenylphenylether	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:22	CDT
Butylbenzylphthalate	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:22	CDT
4-Chloroaniline	ND	0.74	mg/Kg dry	1	V-34	SW-846 8270D	10/16/18	10/18/18 20:22	CDT
2-Chloronaphthalene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:22	CDT
2-Chlorophenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:22	CDT
Chrysene	0.30	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:22	CDT
Dibenz(a,h)anthracene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:22	CDT
Dibenzofuran	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:22	CDT
Di-n-butylphthalate	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:22	CDT
1,2-Dichlorobenzene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:22	CDT
1,3-Dichlorobenzene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:22	CDT
1,4-Dichlorobenzene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:22	CDT
3,3-Dichlorobenzidine	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:22	CDT
2,4-Dichlorophenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:22	CDT
Diethylphthalate	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:22	CDT
2,4-Dimethylphenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:22	CDT
Dimethylphthalate	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:22	CDT
2,4-Dinitrophenol	ND	0.74	mg/Kg dry	1	V-19	SW-846 8270D	10/16/18	10/18/18 20:22	CDT
2,4-Dinitrotoluene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:22	CDT
2,6-Dinitrotoluene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:22	CDT
Di-n-octylphthalate	ND	0.38	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/18/18 20:22	CDT
1,2-Diphenylhydrazine (as Azobenzene)	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:22	CDT
Fluoranthene	0.48	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:22	CDT
Fluorene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:22	CDT
Hexachlorobenzene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:22	CDT
Hexachlorobutadiene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:22	CDT
Hexachloroethane	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:22	CDT
Indeno(1,2,3-cd)pyrene	0.22	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:22	CDT
Isophorone	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:22	CDT
2-Methylnaphthalene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:22	CDT

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2009 0-5' Sampled: 10/3/2018 10:30

Sample ID: 18J0650-05

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
2-Methylphenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:22	CDT
3/4-Methylphenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:22	CDT
Naphthalene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:22	CDT
Nitrobenzene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:22	CDT
2-Nitrophenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:22	CDT
4-Nitrophenol	ND	0.74	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/18/18 20:22	CDT
Pentachlorophenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:22	CDT
Phenanthrene	0.23	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:22	CDT
Phenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:22	CDT
Pyrene	0.49	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:22	CDT
1,2,4-Trichlorobenzene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:22	CDT
2,4,5-Trichlorophenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:22	CDT
2,4,6-Trichlorophenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:22	CDT

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2-Fluorophenol	66.6	30-130		10/18/18 20:22
Phenol-d6	78.2	30-130		10/18/18 20:22
Nitrobenzene-d5	82.8	30-130		10/18/18 20:22
2-Fluorobiphenyl	84.3	30-130		10/18/18 20:22
2,4,6-Tribromophenol	86.5	30-130		10/18/18 20:22
p-Terphenyl-d14	93.3	30-130		10/18/18 20:22

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2009 0-5' Sampled: 10/3/2018 10:30

Sample ID: 18J0650-05

Sample Matrix: Soil

Sample Flags: O-32

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.086	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 18:28	TG
Aroclor-1221 [1]	ND	0.086	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 18:28	TG
Aroclor-1232 [1]	ND	0.086	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 18:28	TG
Aroclor-1242 [1]	ND	0.086	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 18:28	TG
Aroclor-1248 [1]	ND	0.086	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 18:28	TG
Aroclor-1254 [1]	ND	0.086	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 18:28	TG
Aroclor-1260 [1]	ND	0.086	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 18:28	TG
Aroclor-1262 [1]	ND	0.086	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 18:28	TG
Aroclor-1268 [1]	ND	0.086	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 18:28	TG

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	65.1	30-150		10/18/18 18:28
Decachlorobiphenyl [2]	61.1	30-150		10/18/18 18:28
Tetrachloro-m-xylene [1]	63.7	30-150		10/18/18 18:28
Tetrachloro-m-xylene [2]	70.1	30-150		10/18/18 18:28

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2009 0-5' Sampled: 10/3/2018 10:30

Sample ID: 18J0650-05

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Antimony	ND	1.9	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 14:03	QNW
Arsenic	2.7	1.9	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 14:03	QNW
Barium	48	1.9	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 14:03	QNW
Beryllium	0.42	0.19	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 14:03	QNW
Cadmium	0.27	0.19	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 14:03	QNW
Chromium	14	0.37	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 14:03	QNW
Lead	60	0.56	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 14:03	QNW
Mercury	0.14	0.028	mg/Kg dry	1		SW-846 7471B	10/16/18	10/17/18 13:34	EJB
Nickel	11	0.37	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 14:03	QNW
Selenium	ND	3.7	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 14:03	QNW
Silver	ND	0.37	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 14:03	QNW
Thallium	ND	1.9	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 14:03	QNW
Vanadium	29	0.74	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 14:03	QNW
Zinc	63	0.74	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 14:03	QNW

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2009 0-5' Sampled: 10/3/2018 10:30

Sample ID: 18J0650-05

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	88.7		% Wt	1		SM 2540G	10/15/18	10/16/18 14:40	JFC

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2009 5-10' Sampled: 10/3/2018 10:30

Sample ID: 18J0650-06

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:49	CDT
Acenaphthylene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:49	CDT
Acetophenone	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:49	CDT
Aniline	ND	0.38	mg/Kg dry	1	V-34	SW-846 8270D	10/16/18	10/18/18 20:49	CDT
Anthracene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:49	CDT
Benzo(a)anthracene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:49	CDT
Benzo(a)pyrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:49	CDT
Benzo(b)fluoranthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:49	CDT
Benzo(g,h,i)perylene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:49	CDT
Benzo(k)fluoranthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:49	CDT
Bis(2-chloroethoxy)methane	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:49	CDT
Bis(2-chloroethyl)ether	ND	0.38	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/18/18 20:49	CDT
Bis(2-chloroisopropyl)ether	ND	0.38	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/18/18 20:49	CDT
Bis(2-Ethylhexyl)phthalate	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:49	CDT
4-Bromophenylphenylether	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:49	CDT
Butylbenzylphthalate	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:49	CDT
4-Chloroaniline	ND	0.74	mg/Kg dry	1	V-34	SW-846 8270D	10/16/18	10/18/18 20:49	CDT
2-Chloronaphthalene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:49	CDT
2-Chlorophenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:49	CDT
Chrysene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:49	CDT
Dibenz(a,h)anthracene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:49	CDT
Dibenzofuran	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:49	CDT
Di-n-butylphthalate	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:49	CDT
1,2-Dichlorobenzene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:49	CDT
1,3-Dichlorobenzene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:49	CDT
1,4-Dichlorobenzene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:49	CDT
3,3-Dichlorobenzidine	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:49	CDT
2,4-Dichlorophenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:49	CDT
Diethylphthalate	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:49	CDT
2,4-Dimethylphenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:49	CDT
Dimethylphthalate	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:49	CDT
2,4-Dinitrophenol	ND	0.74	mg/Kg dry	1	V-19	SW-846 8270D	10/16/18	10/18/18 20:49	CDT
2,4-Dinitrotoluene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:49	CDT
2,6-Dinitrotoluene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:49	CDT
Di-n-octylphthalate	ND	0.38	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/18/18 20:49	CDT
1,2-Diphenylhydrazine (as Azobenzene)	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:49	CDT
Fluoranthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:49	CDT
Fluorene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:49	CDT
Hexachlorobenzene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:49	CDT
Hexachlorobutadiene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:49	CDT
Hexachloroethane	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:49	CDT
Indeno(1,2,3-cd)pyrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:49	CDT
Isophorone	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:49	CDT
2-Methylnaphthalene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:49	CDT

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2009 5-10' Sampled: 10/3/2018 10:30

Sample ID: 18J0650-06

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
2-Methylphenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:49	CDT
3/4-Methylphenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:49	CDT
Naphthalene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:49	CDT
Nitrobenzene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:49	CDT
2-Nitrophenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:49	CDT
4-Nitrophenol	ND	0.74	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/18/18 20:49	CDT
Pentachlorophenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:49	CDT
Phenanthrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:49	CDT
Phenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:49	CDT
Pyrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:49	CDT
1,2,4-Trichlorobenzene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:49	CDT
2,4,5-Trichlorophenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:49	CDT
2,4,6-Trichlorophenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 20:49	CDT

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2-Fluorophenol	75.2	30-130		10/18/18 20:49
Phenol-d6	83.7	30-130		10/18/18 20:49
Nitrobenzene-d5	81.2	30-130		10/18/18 20:49
2-Fluorobiphenyl	84.6	30-130		10/18/18 20:49
2,4,6-Tribromophenol	93.1	30-130		10/18/18 20:49
p-Terphenyl-d14	91.7	30-130		10/18/18 20:49

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2009 5-10' Sampled: 10/3/2018 10:30

Sample ID: 18J0650-06

Sample Matrix: Soil

Sample Flags: O-32

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.088	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 18:46	TG
Aroclor-1221 [1]	ND	0.088	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 18:46	TG
Aroclor-1232 [1]	ND	0.088	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 18:46	TG
Aroclor-1242 [1]	ND	0.088	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 18:46	TG
Aroclor-1248 [1]	ND	0.088	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 18:46	TG
Aroclor-1254 [1]	ND	0.088	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 18:46	TG
Aroclor-1260 [1]	ND	0.088	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 18:46	TG
Aroclor-1262 [1]	ND	0.088	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 18:46	TG
Aroclor-1268 [1]	ND	0.088	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 18:46	TG

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	64.1	30-150		10/18/18 18:46
Decachlorobiphenyl [2]	59.5	30-150		10/18/18 18:46
Tetrachloro-m-xylene [1]	53.5	30-150		10/18/18 18:46
Tetrachloro-m-xylene [2]	61.5	30-150		10/18/18 18:46

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2009 5-10' Sampled: 10/3/2018 10:30

Sample ID: 18J0650-06

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Antimony	ND	1.9	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 14:08	QNW
Arsenic	ND	1.9	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 14:08	QNW
Barium	47	1.9	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 14:08	QNW
Beryllium	0.30	0.19	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 14:08	QNW
Cadmium	ND	0.19	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 14:08	QNW
Chromium	12	0.38	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 14:08	QNW
Lead	8.1	0.57	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 14:08	QNW
Mercury	ND	0.029	mg/Kg dry	1		SW-846 7471B	10/16/18	10/17/18 13:36	EJB
Nickel	8.6	0.38	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 14:08	QNW
Selenium	ND	3.8	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 14:08	QNW
Silver	ND	0.38	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 14:08	QNW
Thallium	ND	1.9	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 14:08	QNW
Vanadium	29	0.76	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 14:08	QNW
Zinc	35	0.76	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 14:08	QNW

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA | Sample Description: | Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2009 5-10' | Sampled: 10/3/2018 10:30

Sample ID: 18J0650-06

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	87.9		% Wt	1		SM 2540G	10/15/18	10/16/18 14:40	JFC

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2010 0-5' Sampled: 10/3/2018 12:00

Sample ID: 18J0650-07

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:41	CDT
Acenaphthylene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:41	CDT
Acetophenone	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:41	CDT
Aniline	ND	0.39	mg/Kg dry	1	V-34	SW-846 8270D	10/16/18	10/19/18 2:41	CDT
Anthracene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:41	CDT
Benzo(a)anthracene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:41	CDT
Benzo(a)pyrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:41	CDT
Benzo(b)fluoranthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:41	CDT
Benzo(g,h,i)perylene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:41	CDT
Benzo(k)fluoranthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:41	CDT
Bis(2-chloroethoxy)methane	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:41	CDT
Bis(2-chloroethyl)ether	ND	0.39	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/19/18 2:41	CDT
Bis(2-chloroisopropyl)ether	ND	0.39	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/19/18 2:41	CDT
Bis(2-Ethylhexyl)phthalate	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:41	CDT
4-Bromophenylphenylether	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:41	CDT
Butylbenzylphthalate	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:41	CDT
4-Chloroaniline	ND	0.75	mg/Kg dry	1	V-34	SW-846 8270D	10/16/18	10/19/18 2:41	CDT
2-Chloronaphthalene	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:41	CDT
2-Chlorophenol	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:41	CDT
Chrysene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:41	CDT
Dibenz(a,h)anthracene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:41	CDT
Dibenzofuran	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:41	CDT
Di-n-butylphthalate	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:41	CDT
1,2-Dichlorobenzene	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:41	CDT
1,3-Dichlorobenzene	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:41	CDT
1,4-Dichlorobenzene	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:41	CDT
3,3-Dichlorobenzidine	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:41	CDT
2,4-Dichlorophenol	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:41	CDT
Diethylphthalate	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:41	CDT
2,4-Dimethylphenol	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:41	CDT
Dimethylphthalate	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:41	CDT
2,4-Dinitrophenol	ND	0.75	mg/Kg dry	1	V-19	SW-846 8270D	10/16/18	10/19/18 2:41	CDT
2,4-Dinitrotoluene	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:41	CDT
2,6-Dinitrotoluene	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:41	CDT
Di-n-octylphthalate	ND	0.39	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/19/18 2:41	CDT
1,2-Diphenylhydrazine (as Azobenzene)	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:41	CDT
Fluoranthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:41	CDT
Fluorene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:41	CDT
Hexachlorobenzene	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:41	CDT
Hexachlorobutadiene	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:41	CDT
Hexachloroethane	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:41	CDT
Indeno(1,2,3-cd)pyrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:41	CDT
Isophorone	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:41	CDT
2-Methylnaphthalene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:41	CDT

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2010 0-5' Sampled: 10/3/2018 12:00

Sample ID: 18J0650-07

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
2-Methylphenol	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:41	CDT
3/4-Methylphenol	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:41	CDT
Naphthalene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:41	CDT
Nitrobenzene	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:41	CDT
2-Nitrophenol	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:41	CDT
4-Nitrophenol	ND	0.75	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/19/18 2:41	CDT
Pentachlorophenol	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:41	CDT
Phenanthrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:41	CDT
Phenol	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:41	CDT
Pyrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:41	CDT
1,2,4-Trichlorobenzene	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:41	CDT
2,4,5-Trichlorophenol	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:41	CDT
2,4,6-Trichlorophenol	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:41	CDT

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2-Fluorophenol	54.7	30-130		10/19/18 2:41
Phenol-d6	60.9	30-130		10/19/18 2:41
Nitrobenzene-d5	68.1	30-130		10/19/18 2:41
2-Fluorobiphenyl	62.0	30-130		10/19/18 2:41
2,4,6-Tribromophenol	54.3	30-130		10/19/18 2:41
p-Terphenyl-d14	77.5	30-130		10/19/18 2:41

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2010 0-5' Sampled: 10/3/2018 12:00

Sample ID: 18J0650-07

Sample Matrix: Soil

Sample Flags: O-32

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.091	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 19:04	TG
Aroclor-1221 [1]	ND	0.091	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 19:04	TG
Aroclor-1232 [1]	ND	0.091	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 19:04	TG
Aroclor-1242 [1]	ND	0.091	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 19:04	TG
Aroclor-1248 [1]	ND	0.091	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 19:04	TG
Aroclor-1254 [1]	ND	0.091	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 19:04	TG
Aroclor-1260 [1]	ND	0.091	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 19:04	TG
Aroclor-1262 [1]	ND	0.091	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 19:04	TG
Aroclor-1268 [1]	ND	0.091	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 19:04	TG

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	63.3	30-150		10/18/18 19:04
Decachlorobiphenyl [2]	59.8	30-150		10/18/18 19:04
Tetrachloro-m-xylene [1]	63.3	30-150		10/18/18 19:04
Tetrachloro-m-xylene [2]	72.5	30-150		10/18/18 19:04

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2010 0-5' Sampled: 10/3/2018 12:00

Sample ID: 18J0650-07

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Antimony	ND	1.9	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 14:12	QNW
Arsenic	13	1.9	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 14:12	QNW
Barium	41	1.9	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 14:12	QNW
Beryllium	0.33	0.19	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 14:12	QNW
Cadmium	0.53	0.19	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 14:12	QNW
Chromium	14	0.38	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 14:12	QNW
Lead	12	0.57	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 14:12	QNW
Mercury	0.035	0.028	mg/Kg dry	1		SW-846 7471B	10/16/18	10/17/18 13:37	EJB
Nickel	10	0.38	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 14:12	QNW
Selenium	ND	3.8	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 14:12	QNW
Silver	ND	0.38	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 14:12	QNW
Thallium	ND	1.9	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 14:12	QNW
Vanadium	31	0.75	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 14:12	QNW
Zinc	44	0.75	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 14:12	QNW

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2010 0-5' Sampled: 10/3/2018 12:00

Sample ID: 18J0650-07

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	87.8		% Wt	1		SM 2540G	10/15/18	10/16/18 14:40	JFC

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2010 5-10' Sampled: 10/3/2018 12:00

Sample ID: 18J0650-08

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	ND	0.20	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 3:08	CDT
Acenaphthylene	ND	0.20	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 3:08	CDT
Acetophenone	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 3:08	CDT
Aniline	ND	0.39	mg/Kg dry	1	V-34	SW-846 8270D	10/16/18	10/19/18 3:08	CDT
Anthracene	ND	0.20	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 3:08	CDT
Benzo(a)anthracene	ND	0.20	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 3:08	CDT
Benzo(a)pyrene	ND	0.20	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 3:08	CDT
Benzo(b)fluoranthene	ND	0.20	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 3:08	CDT
Benzo(g,h,i)perylene	ND	0.20	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 3:08	CDT
Benzo(k)fluoranthene	ND	0.20	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 3:08	CDT
Bis(2-chloroethoxy)methane	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 3:08	CDT
Bis(2-chloroethyl)ether	ND	0.39	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/19/18 3:08	CDT
Bis(2-chloroisopropyl)ether	ND	0.39	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/19/18 3:08	CDT
Bis(2-Ethylhexyl)phthalate	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 3:08	CDT
4-Bromophenylphenylether	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 3:08	CDT
Butylbenzylphthalate	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 3:08	CDT
4-Chloroaniline	ND	0.76	mg/Kg dry	1	V-34	SW-846 8270D	10/16/18	10/19/18 3:08	CDT
2-Chloronaphthalene	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 3:08	CDT
2-Chlorophenol	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 3:08	CDT
Chrysene	ND	0.20	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 3:08	CDT
Dibenz(a,h)anthracene	ND	0.20	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 3:08	CDT
Dibenzofuran	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 3:08	CDT
Di-n-butylphthalate	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 3:08	CDT
1,2-Dichlorobenzene	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 3:08	CDT
1,3-Dichlorobenzene	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 3:08	CDT
1,4-Dichlorobenzene	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 3:08	CDT
3,3-Dichlorobenzidine	ND	0.20	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 3:08	CDT
2,4-Dichlorophenol	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 3:08	CDT
Diethylphthalate	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 3:08	CDT
2,4-Dimethylphenol	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 3:08	CDT
Dimethylphthalate	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 3:08	CDT
2,4-Dinitrophenol	ND	0.76	mg/Kg dry	1	V-19	SW-846 8270D	10/16/18	10/19/18 3:08	CDT
2,4-Dinitrotoluene	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 3:08	CDT
2,6-Dinitrotoluene	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 3:08	CDT
Di-n-octylphthalate	ND	0.39	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/19/18 3:08	CDT
1,2-Diphenylhydrazine (as Azobenzene)	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 3:08	CDT
Fluoranthene	ND	0.20	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 3:08	CDT
Fluorene	ND	0.20	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 3:08	CDT
Hexachlorobenzene	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 3:08	CDT
Hexachlorobutadiene	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 3:08	CDT
Hexachloroethane	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 3:08	CDT
Indeno(1,2,3-cd)pyrene	ND	0.20	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 3:08	CDT
Isophorone	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 3:08	CDT
2-Methylnaphthalene	ND	0.20	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 3:08	CDT

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2010 5-10' Sampled: 10/3/2018 12:00

Sample ID: 18J0650-08

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
2-Methylphenol	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 3:08	CDT
3/4-Methylphenol	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 3:08	CDT
Naphthalene	ND	0.20	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 3:08	CDT
Nitrobenzene	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 3:08	CDT
2-Nitrophenol	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 3:08	CDT
4-Nitrophenol	ND	0.76	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/19/18 3:08	CDT
Pentachlorophenol	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 3:08	CDT
Phenanthrene	ND	0.20	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 3:08	CDT
Phenol	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 3:08	CDT
Pyrene	ND	0.20	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 3:08	CDT
1,2,4-Trichlorobenzene	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 3:08	CDT
2,4,5-Trichlorophenol	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 3:08	CDT
2,4,6-Trichlorophenol	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 3:08	CDT

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2-Fluorophenol	74.5	30-130		10/19/18 3:08
Phenol-d6	80.1	30-130		10/19/18 3:08
Nitrobenzene-d5	84.8	30-130		10/19/18 3:08
2-Fluorobiphenyl	81.2	30-130		10/19/18 3:08
2,4,6-Tribromophenol	82.1	30-130		10/19/18 3:08
p-Terphenyl-d14	93.1	30-130		10/19/18 3:08

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2010 5-10' Sampled: 10/3/2018 12:00

Sample ID: 18J0650-08

Sample Matrix: Soil

Sample Flags: O-32

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.091	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 19:21	TG
Aroclor-1221 [1]	ND	0.091	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 19:21	TG
Aroclor-1232 [1]	ND	0.091	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 19:21	TG
Aroclor-1242 [1]	ND	0.091	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 19:21	TG
Aroclor-1248 [1]	ND	0.091	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 19:21	TG
Aroclor-1254 [1]	ND	0.091	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 19:21	TG
Aroclor-1260 [1]	ND	0.091	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 19:21	TG
Aroclor-1262 [1]	ND	0.091	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 19:21	TG
Aroclor-1268 [1]	ND	0.091	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 19:21	TG

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	63.8	30-150		10/18/18 19:21
Decachlorobiphenyl [2]	61.1	30-150		10/18/18 19:21
Tetrachloro-m-xylene [1]	65.0	30-150		10/18/18 19:21
Tetrachloro-m-xylene [2]	73.8	30-150		10/18/18 19:21

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2010 5-10' Sampled: 10/3/2018 12:00

Sample ID: 18J0650-08

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Antimony	ND	1.9	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:07	QNW
Arsenic	ND	1.9	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:07	QNW
Barium	19	1.9	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:07	QNW
Beryllium	0.25	0.19	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:07	QNW
Cadmium	ND	0.19	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:07	QNW
Chromium	9.9	0.38	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:07	QNW
Lead	7.3	0.57	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:07	QNW
Mercury	0.037	0.028	mg/Kg dry	1		SW-846 7471B	10/16/18	10/17/18 13:39	EJB
Nickel	8.1	0.38	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:07	QNW
Selenium	ND	3.8	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:07	QNW
Silver	ND	0.38	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:07	QNW
Thallium	ND	1.9	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:07	QNW
Vanadium	26	0.75	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:07	QNW
Zinc	26	0.75	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:07	QNW

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA | Sample Description: | Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2010 5-10' | Sampled: 10/3/2018 12:00

Sample ID: 18J0650-08

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	87.1		% Wt	1		SM 2540G	10/15/18	10/16/18 14:40	JFC

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2011 0-5' Sampled: 10/3/2018 13:00

Sample ID: 18J0650-09

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:15	CDT
Acenaphthylene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:15	CDT
Acetophenone	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:15	CDT
Aniline	ND	0.38	mg/Kg dry	1	V-34	SW-846 8270D	10/16/18	10/18/18 21:15	CDT
Anthracene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:15	CDT
Benzo(a)anthracene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:15	CDT
Benzo(a)pyrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:15	CDT
Benzo(b)fluoranthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:15	CDT
Benzo(g,h,i)perylene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:15	CDT
Benzo(k)fluoranthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:15	CDT
Bis(2-chloroethoxy)methane	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:15	CDT
Bis(2-chloroethyl)ether	ND	0.38	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/18/18 21:15	CDT
Bis(2-chloroisopropyl)ether	ND	0.38	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/18/18 21:15	CDT
Bis(2-Ethylhexyl)phthalate	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:15	CDT
4-Bromophenylphenylether	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:15	CDT
Butylbenzylphthalate	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:15	CDT
4-Chloroaniline	ND	0.73	mg/Kg dry	1	V-34	SW-846 8270D	10/16/18	10/18/18 21:15	CDT
2-Chloronaphthalene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:15	CDT
2-Chlorophenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:15	CDT
Chrysene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:15	CDT
Dibenz(a,h)anthracene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:15	CDT
Dibenzofuran	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:15	CDT
Di-n-butylphthalate	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:15	CDT
1,2-Dichlorobenzene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:15	CDT
1,3-Dichlorobenzene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:15	CDT
1,4-Dichlorobenzene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:15	CDT
3,3-Dichlorobenzidine	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:15	CDT
2,4-Dichlorophenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:15	CDT
Diethylphthalate	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:15	CDT
2,4-Dimethylphenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:15	CDT
Dimethylphthalate	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:15	CDT
2,4-Dinitrophenol	ND	0.73	mg/Kg dry	1	V-19	SW-846 8270D	10/16/18	10/18/18 21:15	CDT
2,4-Dinitrotoluene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:15	CDT
2,6-Dinitrotoluene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:15	CDT
Di-n-octylphthalate	ND	0.38	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/18/18 21:15	CDT
1,2-Diphenylhydrazine (as Azobenzene)	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:15	CDT
Fluoranthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:15	CDT
Fluorene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:15	CDT
Hexachlorobenzene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:15	CDT
Hexachlorobutadiene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:15	CDT
Hexachloroethane	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:15	CDT
Indeno(1,2,3-cd)pyrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:15	CDT
Isophorone	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:15	CDT
2-Methylnaphthalene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:15	CDT

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2011 0-5' Sampled: 10/3/2018 13:00

Sample ID: 18J0650-09

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
2-Methylphenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:15	CDT
3/4-Methylphenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:15	CDT
Naphthalene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:15	CDT
Nitrobenzene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:15	CDT
2-Nitrophenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:15	CDT
4-Nitrophenol	ND	0.73	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/18/18 21:15	CDT
Pentachlorophenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:15	CDT
Phenanthrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:15	CDT
Phenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:15	CDT
Pyrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:15	CDT
1,2,4-Trichlorobenzene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:15	CDT
2,4,5-Trichlorophenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:15	CDT
2,4,6-Trichlorophenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:15	CDT

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2-Fluorophenol	72.6	30-130		10/18/18 21:15
Phenol-d6	81.8	30-130		10/18/18 21:15
Nitrobenzene-d5	80.0	30-130		10/18/18 21:15
2-Fluorobiphenyl	82.1	30-130		10/18/18 21:15
2,4,6-Tribromophenol	84.0	30-130		10/18/18 21:15
p-Terphenyl-d14	84.0	30-130		10/18/18 21:15

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2011 0-5' Sampled: 10/3/2018 13:00

Sample ID: 18J0650-09

Sample Matrix: Soil

Sample Flags: O-32

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.087	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 19:39	TG
Aroclor-1221 [1]	ND	0.087	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 19:39	TG
Aroclor-1232 [1]	ND	0.087	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 19:39	TG
Aroclor-1242 [1]	ND	0.087	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 19:39	TG
Aroclor-1248 [1]	ND	0.087	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 19:39	TG
Aroclor-1254 [1]	ND	0.087	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 19:39	TG
Aroclor-1260 [1]	ND	0.087	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 19:39	TG
Aroclor-1262 [1]	ND	0.087	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 19:39	TG
Aroclor-1268 [1]	ND	0.087	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 19:39	TG

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	57.6	30-150		10/18/18 19:39
Decachlorobiphenyl [2]	55.0	30-150		10/18/18 19:39
Tetrachloro-m-xylene [1]	52.8	30-150		10/18/18 19:39
Tetrachloro-m-xylene [2]	60.0	30-150		10/18/18 19:39

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2011 0-5' Sampled: 10/3/2018 13:00

Sample ID: 18J0650-09

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Antimony	ND	1.9	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:12	QNW
Arsenic	ND	1.9	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:12	QNW
Barium	35	1.9	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:12	QNW
Beryllium	0.35	0.19	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:12	QNW
Cadmium	ND	0.19	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:12	QNW
Chromium	10	0.37	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:12	QNW
Lead	8.7	0.56	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:12	QNW
Mercury	0.038	0.028	mg/Kg dry	1		SW-846 7471B	10/16/18	10/17/18 13:41	EJB
Nickel	8.2	0.37	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:12	QNW
Selenium	ND	3.7	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:12	QNW
Silver	ND	0.37	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:12	QNW
Thallium	ND	1.9	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:12	QNW
Vanadium	36	0.75	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:12	QNW
Zinc	35	0.75	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:12	QNW

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2011 0-5' Sampled: 10/3/2018 13:00

Sample ID: 18J0650-09

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	89.4		% Wt	1		SM 2540G	10/15/18	10/16/18 14:41	JFC

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Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2011 5-10' Sampled: 10/3/2018 13:00

Sample ID: 18J0650-10

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:41	CDT
Acenaphthylene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:41	CDT
Acetophenone	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:41	CDT
Aniline	ND	0.37	mg/Kg dry	1	V-34	SW-846 8270D	10/16/18	10/18/18 21:41	CDT
Anthracene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:41	CDT
Benzo(a)anthracene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:41	CDT
Benzo(a)pyrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:41	CDT
Benzo(b)fluoranthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:41	CDT
Benzo(g,h,i)perylene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:41	CDT
Benzo(k)fluoranthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:41	CDT
Bis(2-chloroethoxy)methane	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:41	CDT
Bis(2-chloroethyl)ether	ND	0.37	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/18/18 21:41	CDT
Bis(2-chloroisopropyl)ether	ND	0.37	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/18/18 21:41	CDT
Bis(2-Ethylhexyl)phthalate	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:41	CDT
4-Bromophenylphenylether	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:41	CDT
Butylbenzylphthalate	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:41	CDT
4-Chloroaniline	ND	0.72	mg/Kg dry	1	V-34	SW-846 8270D	10/16/18	10/18/18 21:41	CDT
2-Chloronaphthalene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:41	CDT
2-Chlorophenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:41	CDT
Chrysene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:41	CDT
Dibenz(a,h)anthracene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:41	CDT
Dibenzofuran	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:41	CDT
Di-n-butylphthalate	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:41	CDT
1,2-Dichlorobenzene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:41	CDT
1,3-Dichlorobenzene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:41	CDT
1,4-Dichlorobenzene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:41	CDT
3,3-Dichlorobenzidine	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:41	CDT
2,4-Dichlorophenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:41	CDT
Diethylphthalate	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:41	CDT
2,4-Dimethylphenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:41	CDT
Dimethylphthalate	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:41	CDT
2,4-Dinitrophenol	ND	0.72	mg/Kg dry	1	V-19	SW-846 8270D	10/16/18	10/18/18 21:41	CDT
2,4-Dinitrotoluene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:41	CDT
2,6-Dinitrotoluene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:41	CDT
Di-n-octylphthalate	ND	0.37	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/18/18 21:41	CDT
1,2-Diphenylhydrazine (as Azobenzene)	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:41	CDT
Fluoranthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:41	CDT
Fluorene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:41	CDT
Hexachlorobenzene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:41	CDT
Hexachlorobutadiene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:41	CDT
Hexachloroethane	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:41	CDT
Indeno(1,2,3-cd)pyrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:41	CDT
Isophorone	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:41	CDT
2-Methylnaphthalene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:41	CDT

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2011 5-10' Sampled: 10/3/2018 13:00

Sample ID: 18J0650-10

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
2-Methylphenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:41	CDT
3/4-Methylphenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:41	CDT
Naphthalene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:41	CDT
Nitrobenzene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:41	CDT
2-Nitrophenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:41	CDT
4-Nitrophenol	ND	0.72	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/18/18 21:41	CDT
Pentachlorophenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:41	CDT
Phenanthrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:41	CDT
Phenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:41	CDT
Pyrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:41	CDT
1,2,4-Trichlorobenzene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:41	CDT
2,4,5-Trichlorophenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:41	CDT
2,4,6-Trichlorophenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 21:41	CDT

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2-Fluorophenol	68.9	30-130		10/18/18 21:41
Phenol-d6	74.6	30-130		10/18/18 21:41
Nitrobenzene-d5	78.4	30-130		10/18/18 21:41
2-Fluorobiphenyl	74.8	30-130		10/18/18 21:41
2,4,6-Tribromophenol	75.5	30-130		10/18/18 21:41
p-Terphenyl-d14	91.6	30-130		10/18/18 21:41

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2011 5-10' Sampled: 10/3/2018 13:00

Sample ID: 18J0650-10

Sample Matrix: Soil

Sample Flags: O-32

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.082	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 19:57	TG
Aroclor-1221 [1]	ND	0.082	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 19:57	TG
Aroclor-1232 [1]	ND	0.082	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 19:57	TG
Aroclor-1242 [1]	ND	0.082	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 19:57	TG
Aroclor-1248 [1]	ND	0.082	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 19:57	TG
Aroclor-1254 [1]	ND	0.082	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 19:57	TG
Aroclor-1260 [1]	ND	0.082	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 19:57	TG
Aroclor-1262 [1]	ND	0.082	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 19:57	TG
Aroclor-1268 [1]	ND	0.082	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 19:57	TG

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	67.8	30-150		10/18/18 19:57
Decachlorobiphenyl [2]	63.6	30-150		10/18/18 19:57
Tetrachloro-m-xylene [1]	64.6	30-150		10/18/18 19:57
Tetrachloro-m-xylene [2]	73.0	30-150		10/18/18 19:57

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2011 5-10' Sampled: 10/3/2018 13:00

Sample ID: 18J0650-10

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Antimony	ND	1.9	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:17	QNW
Arsenic	ND	1.9	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:17	QNW
Barium	43	1.9	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:17	QNW
Beryllium	0.36	0.19	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:17	QNW
Cadmium	ND	0.19	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:17	QNW
Chromium	12	0.37	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:17	QNW
Lead	9.8	0.56	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:17	QNW
Mercury	0.034	0.029	mg/Kg dry	1		SW-846 7471B	10/16/18	10/17/18 13:42	EJB
Nickel	9.3	0.37	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:17	QNW
Selenium	ND	3.7	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:17	QNW
Silver	ND	0.37	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:17	QNW
Thallium	ND	1.9	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:17	QNW
Vanadium	30	0.74	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:17	QNW
Zinc	37	0.74	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:17	QNW

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA | Sample Description: | Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2011 5-10' | Sampled: 10/3/2018 13:00

Sample ID: 18J0650-10

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	90.6		% Wt	1		SM 2540G	10/15/18	10/16/18 14:41	JFC

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2012 0-5' Sampled: 10/3/2018 14:00

Sample ID: 18J0650-11

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:10	CDT
Acenaphthylene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:10	CDT
Acetophenone	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:10	CDT
Aniline	ND	0.38	mg/Kg dry	1	V-34	SW-846 8270D	10/16/18	10/18/18 22:10	CDT
Anthracene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:10	CDT
Benzo(a)anthracene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:10	CDT
Benzo(a)pyrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:10	CDT
Benzo(b)fluoranthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:10	CDT
Benzo(g,h,i)perylene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:10	CDT
Benzo(k)fluoranthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:10	CDT
Bis(2-chloroethoxy)methane	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:10	CDT
Bis(2-chloroethyl)ether	ND	0.38	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/18/18 22:10	CDT
Bis(2-chloroisopropyl)ether	ND	0.38	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/18/18 22:10	CDT
Bis(2-Ethylhexyl)phthalate	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:10	CDT
4-Bromophenylphenylether	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:10	CDT
Butylbenzylphthalate	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:10	CDT
4-Chloroaniline	ND	0.73	mg/Kg dry	1	V-34	SW-846 8270D	10/16/18	10/18/18 22:10	CDT
2-Chloronaphthalene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:10	CDT
2-Chlorophenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:10	CDT
Chrysene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:10	CDT
Dibenz(a,h)anthracene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:10	CDT
Dibenzofuran	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:10	CDT
Di-n-butylphthalate	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:10	CDT
1,2-Dichlorobenzene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:10	CDT
1,3-Dichlorobenzene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:10	CDT
1,4-Dichlorobenzene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:10	CDT
3,3-Dichlorobenzidine	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:10	CDT
2,4-Dichlorophenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:10	CDT
Diethylphthalate	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:10	CDT
2,4-Dimethylphenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:10	CDT
Dimethylphthalate	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:10	CDT
2,4-Dinitrophenol	ND	0.73	mg/Kg dry	1	V-19	SW-846 8270D	10/16/18	10/18/18 22:10	CDT
2,4-Dinitrotoluene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:10	CDT
2,6-Dinitrotoluene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:10	CDT
Di-n-octylphthalate	ND	0.38	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/18/18 22:10	CDT
1,2-Diphenylhydrazine (as Azobenzene)	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:10	CDT
Fluoranthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:10	CDT
Fluorene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:10	CDT
Hexachlorobenzene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:10	CDT
Hexachlorobutadiene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:10	CDT
Hexachloroethane	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:10	CDT
Indeno(1,2,3-cd)pyrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:10	CDT
Isophorone	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:10	CDT
2-Methylnaphthalene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:10	CDT

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2012 0-5' Sampled: 10/3/2018 14:00

Sample ID: 18J0650-11

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
2-Methylphenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:10	CDT
3/4-Methylphenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:10	CDT
Naphthalene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:10	CDT
Nitrobenzene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:10	CDT
2-Nitrophenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:10	CDT
4-Nitrophenol	ND	0.73	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/18/18 22:10	CDT
Pentachlorophenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:10	CDT
Phenanthrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:10	CDT
Phenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:10	CDT
Pyrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:10	CDT
1,2,4-Trichlorobenzene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:10	CDT
2,4,5-Trichlorophenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:10	CDT
2,4,6-Trichlorophenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:10	CDT

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2-Fluorophenol	74.5	30-130		10/18/18 22:10
Phenol-d6	81.9	30-130		10/18/18 22:10
Nitrobenzene-d5	86.7	30-130		10/18/18 22:10
2-Fluorobiphenyl	84.3	30-130		10/18/18 22:10
2,4,6-Tribromophenol	81.6	30-130		10/18/18 22:10
p-Terphenyl-d14	96.0	30-130		10/18/18 22:10

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2012 0-5' Sampled: 10/3/2018 14:00

Sample ID: 18J0650-11

Sample Matrix: Soil

Sample Flags: O-32

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.088	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 21:21	TG
Aroclor-1221 [1]	ND	0.088	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 21:21	TG
Aroclor-1232 [1]	ND	0.088	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 21:21	TG
Aroclor-1242 [1]	ND	0.088	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 21:21	TG
Aroclor-1248 [1]	ND	0.088	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 21:21	TG
Aroclor-1254 [1]	ND	0.088	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 21:21	TG
Aroclor-1260 [1]	ND	0.088	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 21:21	TG
Aroclor-1262 [1]	ND	0.088	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 21:21	TG
Aroclor-1268 [1]	ND	0.088	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 21:21	TG

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	72.2	30-150		10/18/18 21:21
Decachlorobiphenyl [2]	67.1	30-150		10/18/18 21:21
Tetrachloro-m-xylene [1]	60.6	30-150		10/18/18 21:21
Tetrachloro-m-xylene [2]	67.4	30-150		10/18/18 21:21

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2012 0-5' Sampled: 10/3/2018 14:00

Sample ID: 18J0650-11

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Antimony	ND	1.9	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:21	QNW
Arsenic	ND	1.9	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:21	QNW
Barium	60	1.9	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:21	QNW
Beryllium	0.45	0.19	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:21	QNW
Cadmium	ND	0.19	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:21	QNW
Chromium	12	0.38	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:21	QNW
Lead	7.4	0.56	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:21	QNW
Mercury	ND	0.027	mg/Kg dry	1		SW-846 7471B	10/16/18	10/17/18 13:44	EJB
Nickel	9.6	0.38	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:21	QNW
Selenium	ND	3.8	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:21	QNW
Silver	ND	0.38	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:21	QNW
Thallium	ND	1.9	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:21	QNW
Vanadium	42	0.75	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:21	QNW
Zinc	45	0.75	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:21	QNW

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2012 0-5' Sampled: 10/3/2018 14:00

Sample ID: 18J0650-11

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	89.3		% Wt	1		SM 2540G	10/15/18	10/16/18 14:41	JFC

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2012 5-10' Sampled: 10/3/2018 14:00

Sample ID: 18J0650-12

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:36	CDT
Acenaphthylene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:36	CDT
Acetophenone	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:36	CDT
Aniline	ND	0.37	mg/Kg dry	1	V-34	SW-846 8270D	10/16/18	10/18/18 22:36	CDT
Anthracene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:36	CDT
Benzo(a)anthracene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:36	CDT
Benzo(a)pyrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:36	CDT
Benzo(b)fluoranthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:36	CDT
Benzo(g,h,i)perylene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:36	CDT
Benzo(k)fluoranthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:36	CDT
Bis(2-chloroethoxy)methane	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:36	CDT
Bis(2-chloroethyl)ether	ND	0.37	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/18/18 22:36	CDT
Bis(2-chloroisopropyl)ether	ND	0.37	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/18/18 22:36	CDT
Bis(2-Ethylhexyl)phthalate	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:36	CDT
4-Bromophenylphenylether	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:36	CDT
Butylbenzylphthalate	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:36	CDT
4-Chloroaniline	ND	0.72	mg/Kg dry	1	V-34	SW-846 8270D	10/16/18	10/18/18 22:36	CDT
2-Chloronaphthalene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:36	CDT
2-Chlorophenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:36	CDT
Chrysene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:36	CDT
Dibenz(a,h)anthracene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:36	CDT
Dibenzofuran	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:36	CDT
Di-n-butylphthalate	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:36	CDT
1,2-Dichlorobenzene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:36	CDT
1,3-Dichlorobenzene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:36	CDT
1,4-Dichlorobenzene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:36	CDT
3,3-Dichlorobenzidine	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:36	CDT
2,4-Dichlorophenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:36	CDT
Diethylphthalate	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:36	CDT
2,4-Dimethylphenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:36	CDT
Dimethylphthalate	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:36	CDT
2,4-Dinitrophenol	ND	0.72	mg/Kg dry	1	V-19	SW-846 8270D	10/16/18	10/18/18 22:36	CDT
2,4-Dinitrotoluene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:36	CDT
2,6-Dinitrotoluene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:36	CDT
Di-n-octylphthalate	ND	0.37	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/18/18 22:36	CDT
1,2-Diphenylhydrazine (as Azobenzene)	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:36	CDT
Fluoranthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:36	CDT
Fluorene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:36	CDT
Hexachlorobenzene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:36	CDT
Hexachlorobutadiene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:36	CDT
Hexachloroethane	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:36	CDT
Indeno(1,2,3-cd)pyrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:36	CDT
Isophorone	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:36	CDT
2-Methylnaphthalene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:36	CDT

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2012 5-10' Sampled: 10/3/2018 14:00

Sample ID: 18J0650-12

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
2-Methylphenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:36	CDT
3/4-Methylphenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:36	CDT
Naphthalene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:36	CDT
Nitrobenzene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:36	CDT
2-Nitrophenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:36	CDT
4-Nitrophenol	ND	0.72	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/18/18 22:36	CDT
Pentachlorophenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:36	CDT
Phenanthrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:36	CDT
Phenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:36	CDT
Pyrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:36	CDT
1,2,4-Trichlorobenzene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:36	CDT
2,4,5-Trichlorophenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:36	CDT
2,4,6-Trichlorophenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 22:36	CDT

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2-Fluorophenol	76.6	30-130		10/18/18 22:36
Phenol-d6	84.5	30-130		10/18/18 22:36
Nitrobenzene-d5	87.9	30-130		10/18/18 22:36
2-Fluorobiphenyl	84.7	30-130		10/18/18 22:36
2,4,6-Tribromophenol	88.3	30-130		10/18/18 22:36
p-Terphenyl-d14	101	30-130		10/18/18 22:36

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2012 5-10' Sampled: 10/3/2018 14:00

Sample ID: 18J0650-12

Sample Matrix: Soil

Sample Flags: O-32

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.086	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 21:38	TG
Aroclor-1221 [1]	ND	0.086	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 21:38	TG
Aroclor-1232 [1]	ND	0.086	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 21:38	TG
Aroclor-1242 [1]	ND	0.086	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 21:38	TG
Aroclor-1248 [1]	ND	0.086	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 21:38	TG
Aroclor-1254 [1]	ND	0.086	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 21:38	TG
Aroclor-1260 [1]	ND	0.086	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 21:38	TG
Aroclor-1262 [1]	ND	0.086	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 21:38	TG
Aroclor-1268 [1]	ND	0.086	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 21:38	TG

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	74.1	30-150		10/18/18 21:38
Decachlorobiphenyl [2]	68.6	30-150		10/18/18 21:38
Tetrachloro-m-xylene [1]	62.4	30-150		10/18/18 21:38
Tetrachloro-m-xylene [2]	70.3	30-150		10/18/18 21:38

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2012 5-10' Sampled: 10/3/2018 14:00

Sample ID: 18J0650-12

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Antimony	ND	1.8	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:26	QNW
Arsenic	ND	1.8	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:26	QNW
Barium	45	1.8	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:26	QNW
Beryllium	0.33	0.18	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:26	QNW
Cadmium	ND	0.18	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:26	QNW
Chromium	12	0.36	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:26	QNW
Lead	6.0	0.54	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:26	QNW
Mercury	ND	0.028	mg/Kg dry	1		SW-846 7471B	10/16/18	10/17/18 13:50	EJB
Nickel	9.0	0.36	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:26	QNW
Selenium	ND	3.6	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:26	QNW
Silver	ND	0.36	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:26	QNW
Thallium	ND	1.8	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:26	QNW
Vanadium	36	0.72	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:26	QNW
Zinc	36	0.72	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:26	QNW

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA | Sample Description: | Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2012 5-10' | Sampled: 10/3/2018 14:00

Sample ID: 18J0650-12

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	90.8		% Wt	1		SM 2540G	10/15/18	10/16/18 14:41	JFC

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2017 0-5' Sampled: 10/4/2018 11:20

Sample ID: 18J0650-13

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:02	CDT
Acenaphthylene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:02	CDT
Acetophenone	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:02	CDT
Aniline	ND	0.37	mg/Kg dry	1	V-34	SW-846 8270D	10/16/18	10/18/18 23:02	CDT
Anthracene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:02	CDT
Benzo(a)anthracene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:02	CDT
Benzo(a)pyrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:02	CDT
Benzo(b)fluoranthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:02	CDT
Benzo(g,h,i)perylene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:02	CDT
Benzo(k)fluoranthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:02	CDT
Bis(2-chloroethoxy)methane	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:02	CDT
Bis(2-chloroethyl)ether	ND	0.37	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/18/18 23:02	CDT
Bis(2-chloroisopropyl)ether	ND	0.37	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/18/18 23:02	CDT
Bis(2-Ethylhexyl)phthalate	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:02	CDT
4-Bromophenylphenylether	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:02	CDT
Butylbenzylphthalate	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:02	CDT
4-Chloroaniline	ND	0.72	mg/Kg dry	1	V-34	SW-846 8270D	10/16/18	10/18/18 23:02	CDT
2-Chloronaphthalene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:02	CDT
2-Chlorophenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:02	CDT
Chrysene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:02	CDT
Dibenz(a,h)anthracene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:02	CDT
Dibenzofuran	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:02	CDT
Di-n-butylphthalate	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:02	CDT
1,2-Dichlorobenzene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:02	CDT
1,3-Dichlorobenzene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:02	CDT
1,4-Dichlorobenzene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:02	CDT
3,3-Dichlorobenzidine	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:02	CDT
2,4-Dichlorophenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:02	CDT
Diethylphthalate	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:02	CDT
2,4-Dimethylphenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:02	CDT
Dimethylphthalate	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:02	CDT
2,4-Dinitrophenol	ND	0.72	mg/Kg dry	1	V-19	SW-846 8270D	10/16/18	10/18/18 23:02	CDT
2,4-Dinitrotoluene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:02	CDT
2,6-Dinitrotoluene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:02	CDT
Di-n-octylphthalate	ND	0.37	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/18/18 23:02	CDT
1,2-Diphenylhydrazine (as Azobenzene)	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:02	CDT
Fluoranthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:02	CDT
Fluorene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:02	CDT
Hexachlorobenzene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:02	CDT
Hexachlorobutadiene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:02	CDT
Hexachloroethane	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:02	CDT
Indeno(1,2,3-cd)pyrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:02	CDT
Isophorone	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:02	CDT
2-Methylnaphthalene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:02	CDT

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2017 0-5' Sampled: 10/4/2018 11:20

Sample ID: 18J0650-13

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
2-Methylphenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:02	CDT
3/4-Methylphenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:02	CDT
Naphthalene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:02	CDT
Nitrobenzene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:02	CDT
2-Nitrophenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:02	CDT
4-Nitrophenol	ND	0.72	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/18/18 23:02	CDT
Pentachlorophenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:02	CDT
Phenanthrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:02	CDT
Phenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:02	CDT
Pyrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:02	CDT
1,2,4-Trichlorobenzene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:02	CDT
2,4,5-Trichlorophenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:02	CDT
2,4,6-Trichlorophenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:02	CDT

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2-Fluorophenol	60.9	30-130		10/18/18 23:02
Phenol-d6	76.0	30-130		10/18/18 23:02
Nitrobenzene-d5	86.8	30-130		10/18/18 23:02
2-Fluorobiphenyl	85.6	30-130		10/18/18 23:02
2,4,6-Tribromophenol	61.6	30-130		10/18/18 23:02
p-Terphenyl-d14	106	30-130		10/18/18 23:02

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2017 0-5' Sampled: 10/4/2018 11:20

Sample ID: 18J0650-13

Sample Matrix: Soil

Sample Flags: O-32

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.087	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 21:56	TG
Aroclor-1221 [1]	ND	0.087	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 21:56	TG
Aroclor-1232 [1]	ND	0.087	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 21:56	TG
Aroclor-1242 [1]	ND	0.087	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 21:56	TG
Aroclor-1248 [1]	ND	0.087	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 21:56	TG
Aroclor-1254 [1]	ND	0.087	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 21:56	TG
Aroclor-1260 [1]	ND	0.087	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 21:56	TG
Aroclor-1262 [1]	ND	0.087	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 21:56	TG
Aroclor-1268 [1]	ND	0.087	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 21:56	TG

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	65.6	30-150		10/18/18 21:56
Decachlorobiphenyl [2]	60.6	30-150		10/18/18 21:56
Tetrachloro-m-xylene [1]	59.9	30-150		10/18/18 21:56
Tetrachloro-m-xylene [2]	68.1	30-150		10/18/18 21:56

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2017 0-5' Sampled: 10/4/2018 11:20

Sample ID: 18J0650-13

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Antimony	ND	1.8	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:42	QNW
Arsenic	ND	1.8	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:42	QNW
Barium	46	1.8	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:42	QNW
Beryllium	0.41	0.18	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:42	QNW
Cadmium	ND	0.18	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:42	QNW
Chromium	12	0.36	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:42	QNW
Lead	9.2	0.54	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:42	QNW
Mercury	ND	0.027	mg/Kg dry	1		SW-846 7471B	10/16/18	10/17/18 13:51	EJB
Nickel	9.2	0.36	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:42	QNW
Selenium	ND	3.6	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:42	QNW
Silver	ND	0.36	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:42	QNW
Thallium	ND	1.8	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:42	QNW
Vanadium	36	0.72	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:42	QNW
Zinc	42	0.72	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:42	QNW

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2017 0-5' Sampled: 10/4/2018 11:20

Sample ID: 18J0650-13

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	91.2		% Wt	1		SM 2540G	10/15/18	10/16/18 14:41	JFC

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Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2017 5-9' Sampled: 10/4/2018 11:20

Sample ID: 18J0650-14

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	ND	0.20	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:30	CDT
Acenaphthylene	ND	0.20	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:30	CDT
Acetophenone	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:30	CDT
Aniline	ND	0.39	mg/Kg dry	1	V-34	SW-846 8270D	10/16/18	10/18/18 23:30	CDT
Anthracene	ND	0.20	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:30	CDT
Benzo(a)anthracene	ND	0.20	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:30	CDT
Benzo(a)pyrene	ND	0.20	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:30	CDT
Benzo(b)fluoranthene	ND	0.20	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:30	CDT
Benzo(g,h,i)perylene	ND	0.20	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:30	CDT
Benzo(k)fluoranthene	ND	0.20	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:30	CDT
Bis(2-chloroethoxy)methane	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:30	CDT
Bis(2-chloroethyl)ether	ND	0.39	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/18/18 23:30	CDT
Bis(2-chloroisopropyl)ether	ND	0.39	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/18/18 23:30	CDT
Bis(2-Ethylhexyl)phthalate	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:30	CDT
4-Bromophenylphenylether	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:30	CDT
Butylbenzylphthalate	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:30	CDT
4-Chloroaniline	ND	0.76	mg/Kg dry	1	V-34	SW-846 8270D	10/16/18	10/18/18 23:30	CDT
2-Chloronaphthalene	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:30	CDT
2-Chlorophenol	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:30	CDT
Chrysene	ND	0.20	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:30	CDT
Dibenz(a,h)anthracene	ND	0.20	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:30	CDT
Dibenzofuran	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:30	CDT
Di-n-butylphthalate	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:30	CDT
1,2-Dichlorobenzene	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:30	CDT
1,3-Dichlorobenzene	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:30	CDT
1,4-Dichlorobenzene	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:30	CDT
3,3-Dichlorobenzidine	ND	0.20	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:30	CDT
2,4-Dichlorophenol	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:30	CDT
Diethylphthalate	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:30	CDT
2,4-Dimethylphenol	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:30	CDT
Dimethylphthalate	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:30	CDT
2,4-Dinitrophenol	ND	0.76	mg/Kg dry	1	V-19	SW-846 8270D	10/16/18	10/18/18 23:30	CDT
2,4-Dinitrotoluene	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:30	CDT
2,6-Dinitrotoluene	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:30	CDT
Di-n-octylphthalate	ND	0.39	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/18/18 23:30	CDT
1,2-Diphenylhydrazine (as Azobenzene)	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:30	CDT
Fluoranthene	ND	0.20	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:30	CDT
Fluorene	ND	0.20	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:30	CDT
Hexachlorobenzene	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:30	CDT
Hexachlorobutadiene	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:30	CDT
Hexachloroethane	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:30	CDT
Indeno(1,2,3-cd)pyrene	ND	0.20	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:30	CDT
Isophorone	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:30	CDT
2-Methylnaphthalene	ND	0.20	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:30	CDT

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2017 5-9' Sampled: 10/4/2018 11:20

Sample ID: 18J0650-14

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
2-Methylphenol	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:30	CDT
3/4-Methylphenol	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:30	CDT
Naphthalene	ND	0.20	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:30	CDT
Nitrobenzene	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:30	CDT
2-Nitrophenol	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:30	CDT
4-Nitrophenol	ND	0.76	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/18/18 23:30	CDT
Pentachlorophenol	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:30	CDT
Phenanthrene	ND	0.20	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:30	CDT
Phenol	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:30	CDT
Pyrene	ND	0.20	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:30	CDT
1,2,4-Trichlorobenzene	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:30	CDT
2,4,5-Trichlorophenol	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:30	CDT
2,4,6-Trichlorophenol	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:30	CDT

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2-Fluorophenol	74.5	30-130		10/18/18 23:30
Phenol-d6	81.9	30-130		10/18/18 23:30
Nitrobenzene-d5	85.2	30-130		10/18/18 23:30
2-Fluorobiphenyl	80.6	30-130		10/18/18 23:30
2,4,6-Tribromophenol	90.5	30-130		10/18/18 23:30
p-Terphenyl-d14	95.9	30-130		10/18/18 23:30

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2017 5-9' Sampled: 10/4/2018 11:20

Sample ID: 18J0650-14

Sample Matrix: Soil

Sample Flags: O-32

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.089	mg/Kg dry	4		SW-846 8082A	10/16/18	10/19/18 9:13	TG
Aroclor-1221 [1]	ND	0.089	mg/Kg dry	4		SW-846 8082A	10/16/18	10/19/18 9:13	TG
Aroclor-1232 [1]	ND	0.089	mg/Kg dry	4		SW-846 8082A	10/16/18	10/19/18 9:13	TG
Aroclor-1242 [1]	ND	0.089	mg/Kg dry	4		SW-846 8082A	10/16/18	10/19/18 9:13	TG
Aroclor-1248 [1]	ND	0.089	mg/Kg dry	4		SW-846 8082A	10/16/18	10/19/18 9:13	TG
Aroclor-1254 [1]	ND	0.089	mg/Kg dry	4		SW-846 8082A	10/16/18	10/19/18 9:13	TG
Aroclor-1260 [1]	ND	0.089	mg/Kg dry	4		SW-846 8082A	10/16/18	10/19/18 9:13	TG
Aroclor-1262 [1]	ND	0.089	mg/Kg dry	4		SW-846 8082A	10/16/18	10/19/18 9:13	TG
Aroclor-1268 [1]	ND	0.089	mg/Kg dry	4		SW-846 8082A	10/16/18	10/19/18 9:13	TG

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	63.3	30-150		10/19/18 9:13
Decachlorobiphenyl [2]	57.5	30-150		10/19/18 9:13
Tetrachloro-m-xylene [1]	42.6	30-150		10/19/18 9:13
Tetrachloro-m-xylene [2]	48.4	30-150		10/19/18 9:13

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2017 5-9' Sampled: 10/4/2018 11:20

Sample ID: 18J0650-14

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Antimony	ND	1.9	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:47	QNW
Arsenic	ND	1.9	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:47	QNW
Barium	42	1.9	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:47	QNW
Beryllium	0.42	0.19	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:47	QNW
Cadmium	ND	0.19	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:47	QNW
Chromium	13	0.38	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:47	QNW
Lead	13	0.56	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:47	QNW
Mercury	0.057	0.028	mg/Kg dry	1		SW-846 7471B	10/16/18	10/17/18 13:53	EJB
Nickel	11	0.38	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:47	QNW
Selenium	ND	3.8	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:47	QNW
Silver	ND	0.38	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:47	QNW
Thallium	ND	1.9	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:47	QNW
Vanadium	47	0.75	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:47	QNW
Zinc	44	0.75	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:47	QNW

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2017 5-9' Sampled: 10/4/2018 11:20

Sample ID: 18J0650-14

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	86.5		% Wt	1		SM 2540G	10/15/18	10/16/18 14:41	JFC

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2019 0-5' Sampled: 10/4/2018 13:10

Sample ID: 18J0650-15

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	ND	0.22	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:57	CDT
Acenaphthylene	ND	0.22	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:57	CDT
Acetophenone	ND	0.44	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:57	CDT
Aniline	ND	0.44	mg/Kg dry	1	V-34	SW-846 8270D	10/16/18	10/18/18 23:57	CDT
Anthracene	ND	0.22	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:57	CDT
Benzo(a)anthracene	ND	0.22	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:57	CDT
Benzo(a)pyrene	ND	0.22	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:57	CDT
Benzo(b)fluoranthene	0.25	0.22	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:57	CDT
Benzo(g,h,i)perylene	ND	0.22	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:57	CDT
Benzo(k)fluoranthene	ND	0.22	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:57	CDT
Bis(2-chloroethoxy)methane	ND	0.44	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:57	CDT
Bis(2-chloroethyl)ether	ND	0.44	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/18/18 23:57	CDT
Bis(2-chloroisopropyl)ether	ND	0.44	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/18/18 23:57	CDT
Bis(2-Ethylhexyl)phthalate	ND	0.44	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:57	CDT
4-Bromophenylphenylether	ND	0.44	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:57	CDT
Butylbenzylphthalate	ND	0.44	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:57	CDT
4-Chloroaniline	ND	0.86	mg/Kg dry	1	V-34	SW-846 8270D	10/16/18	10/18/18 23:57	CDT
2-Chloronaphthalene	ND	0.44	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:57	CDT
2-Chlorophenol	ND	0.44	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:57	CDT
Chrysene	ND	0.22	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:57	CDT
Dibenz(a,h)anthracene	ND	0.22	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:57	CDT
Dibenzofuran	ND	0.44	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:57	CDT
Di-n-butylphthalate	ND	0.44	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:57	CDT
1,2-Dichlorobenzene	ND	0.44	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:57	CDT
1,3-Dichlorobenzene	ND	0.44	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:57	CDT
1,4-Dichlorobenzene	ND	0.44	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:57	CDT
3,3-Dichlorobenzidine	ND	0.22	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:57	CDT
2,4-Dichlorophenol	ND	0.44	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:57	CDT
Diethylphthalate	ND	0.44	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:57	CDT
2,4-Dimethylphenol	ND	0.44	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:57	CDT
Dimethylphthalate	ND	0.44	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:57	CDT
2,4-Dinitrophenol	ND	0.86	mg/Kg dry	1	V-19	SW-846 8270D	10/16/18	10/18/18 23:57	CDT
2,4-Dinitrotoluene	ND	0.44	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:57	CDT
2,6-Dinitrotoluene	ND	0.44	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:57	CDT
Di-n-octylphthalate	ND	0.44	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/18/18 23:57	CDT
1,2-Diphenylhydrazine (as Azobenzene)	ND	0.44	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:57	CDT
Fluoranthene	0.40	0.22	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:57	CDT
Fluorene	ND	0.22	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:57	CDT
Hexachlorobenzene	ND	0.44	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:57	CDT
Hexachlorobutadiene	ND	0.44	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:57	CDT
Hexachloroethane	ND	0.44	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:57	CDT
Indeno(1,2,3-cd)pyrene	ND	0.22	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:57	CDT
Isophorone	ND	0.44	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:57	CDT
2-Methylnaphthalene	ND	0.22	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:57	CDT

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2019 0-5' Sampled: 10/4/2018 13:10

Sample ID: 18J0650-15

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
2-Methylphenol	ND	0.44	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:57	CDT
3/4-Methylphenol	ND	0.44	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:57	CDT
Naphthalene	ND	0.22	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:57	CDT
Nitrobenzene	ND	0.44	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:57	CDT
2-Nitrophenol	ND	0.44	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:57	CDT
4-Nitrophenol	ND	0.86	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/18/18 23:57	CDT
Pentachlorophenol	ND	0.44	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:57	CDT
Phenanthrene	ND	0.22	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:57	CDT
Phenol	ND	0.44	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:57	CDT
Pyrene	0.38	0.22	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:57	CDT
1,2,4-Trichlorobenzene	ND	0.44	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:57	CDT
2,4,5-Trichlorophenol	ND	0.44	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:57	CDT
2,4,6-Trichlorophenol	ND	0.44	mg/Kg dry	1		SW-846 8270D	10/16/18	10/18/18 23:57	CDT

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2-Fluorophenol	74.3	30-130		10/18/18 23:57
Phenol-d6	79.4	30-130		10/18/18 23:57
Nitrobenzene-d5	81.0	30-130		10/18/18 23:57
2-Fluorobiphenyl	79.2	30-130		10/18/18 23:57
2,4,6-Tribromophenol	85.2	30-130		10/18/18 23:57
p-Terphenyl-d14	88.8	30-130		10/18/18 23:57

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2019 0-5' Sampled: 10/4/2018 13:10

Sample ID: 18J0650-15

Sample Matrix: Soil

Sample Flags: O-32

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.10	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 22:32	TG
Aroclor-1221 [1]	ND	0.10	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 22:32	TG
Aroclor-1232 [1]	ND	0.10	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 22:32	TG
Aroclor-1242 [1]	ND	0.10	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 22:32	TG
Aroclor-1248 [1]	ND	0.10	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 22:32	TG
Aroclor-1254 [1]	ND	0.10	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 22:32	TG
Aroclor-1260 [1]	ND	0.10	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 22:32	TG
Aroclor-1262 [1]	ND	0.10	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 22:32	TG
Aroclor-1268 [1]	ND	0.10	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 22:32	TG

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	69.3	30-150		10/18/18 22:32
Decachlorobiphenyl [2]	64.0	30-150		10/18/18 22:32
Tetrachloro-m-xylene [1]	58.3	30-150		10/18/18 22:32
Tetrachloro-m-xylene [2]	64.9	30-150		10/18/18 22:32

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2019 0-5' Sampled: 10/4/2018 13:10

Sample ID: 18J0650-15

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Antimony	ND	2.2	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:52	QNW
Arsenic	ND	2.2	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:52	QNW
Barium	47	2.2	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:52	QNW
Beryllium	0.44	0.22	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:52	QNW
Cadmium	ND	0.22	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:52	QNW
Chromium	15	0.44	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:52	QNW
Lead	12	0.65	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:52	QNW
Mercury	0.060	0.034	mg/Kg dry	1		SW-846 7471B	10/16/18	10/17/18 13:54	EJB
Nickel	10	0.44	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:52	QNW
Selenium	ND	4.4	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:52	QNW
Silver	ND	0.44	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:52	QNW
Thallium	ND	2.2	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:52	QNW
Vanadium	33	0.87	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:52	QNW
Zinc	37	0.87	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:52	QNW

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2019 0-5' Sampled: 10/4/2018 13:10

Sample ID: 18J0650-15

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	76.6		% Wt	1		SM 2540G	10/15/18	10/16/18 14:41	JFC

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Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2019 5-10' Sampled: 10/4/2018 13:10

Sample ID: 18J0650-16

Sample Matrix: Soil

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acetone	ND	3.3	mg/Kg dry	1	R-05	SW-846 8260C	10/15/18	10/15/18 13:45	EEH
tert-Amyl Methyl Ether (TAME)	ND	0.033	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
Benzene	ND	0.066	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
Bromobenzene	ND	0.066	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
Bromochloromethane	ND	0.066	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
Bromodichloromethane	ND	0.066	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
Bromoform	ND	0.13	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
Bromomethane	ND	0.13	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
2-Butanone (MEK)	ND	1.3	mg/Kg dry	1	R-05	SW-846 8260C	10/15/18	10/15/18 13:45	EEH
n-Butylbenzene	ND	0.066	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
sec-Butylbenzene	ND	0.066	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
tert-Butylbenzene	ND	0.066	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
tert-Butyl Ethyl Ether (TBEE)	ND	0.033	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
Carbon Disulfide	ND	0.66	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
Carbon Tetrachloride	ND	0.066	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
Chlorobenzene	ND	0.066	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
Chlorodibromomethane	ND	0.033	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
Chloroethane	ND	0.13	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
Chloroform	ND	0.13	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
Chloromethane	ND	0.13	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
2-Chlorotoluene	ND	0.066	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
4-Chlorotoluene	ND	0.066	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.26	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
1,2-Dibromoethane (EDB)	ND	0.033	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
Dibromomethane	ND	0.066	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
1,2-Dichlorobenzene	ND	0.066	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
1,3-Dichlorobenzene	ND	0.066	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
1,4-Dichlorobenzene	ND	0.066	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
Dichlorodifluoromethane (Freon 12)	ND	0.13	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
1,1-Dichloroethane	ND	0.066	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
1,2-Dichloroethane	ND	0.066	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
1,1-Dichloroethylene	ND	0.066	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
cis-1,2-Dichloroethylene	ND	0.066	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
trans-1,2-Dichloroethylene	ND	0.066	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
1,2-Dichloropropane	ND	0.066	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
1,3-Dichloropropane	ND	0.033	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
2,2-Dichloropropane	ND	0.066	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
1,1-Dichloropropene	ND	0.13	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
cis-1,3-Dichloropropene	ND	0.033	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
trans-1,3-Dichloropropene	ND	0.033	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
Diethyl Ether	ND	0.13	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
Diisopropyl Ether (DIPE)	ND	0.033	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
1,4-Dioxane	ND	3.3	mg/Kg dry	1	V-16	SW-846 8260C	10/15/18	10/15/18 13:45	EEH
Ethylbenzene	ND	0.066	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2019 5-10' Sampled: 10/4/2018 13:10

Sample ID: 18J0650-16

Sample Matrix: Soil

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Hexachlorobutadiene	ND	0.066	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
2-Hexanone (MBK)	ND	0.66	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
Isopropylbenzene (Cumene)	ND	0.066	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
p-Isopropyltoluene (p-Cymene)	ND	0.066	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
Methyl tert-Butyl Ether (MTBE)	ND	0.066	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
Methylene Chloride	ND	0.33	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
4-Methyl-2-pentanone (MIBK)	ND	0.66	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
Naphthalene	ND	0.13	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
n-Propylbenzene	ND	0.066	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
Styrene	ND	0.066	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
1,1,1,2-Tetrachloroethane	ND	0.066	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
1,1,2,2-Tetrachloroethane	ND	0.033	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
Tetrachloroethylene	ND	0.066	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
Tetrahydrofuran	ND	0.26	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
Toluene	ND	0.066	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
1,2,3-Trichlorobenzene	ND	0.26	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
1,2,4-Trichlorobenzene	ND	0.066	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
1,1,1-Trichloroethane	ND	0.066	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
1,1,2-Trichloroethane	ND	0.066	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
Trichloroethylene	ND	0.066	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
Trichlorofluoromethane (Freon 11)	ND	0.13	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
1,2,3-Trichloropropane	ND	0.13	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
1,2,4-Trimethylbenzene	ND	0.066	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
1,3,5-Trimethylbenzene	ND	0.066	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
Vinyl Chloride	ND	0.13	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
m+p Xylene	ND	0.13	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH
o-Xylene	ND	0.066	mg/Kg dry	1		SW-846 8260C	10/15/18	10/15/18 13:45	EEH

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
1,2-Dichloroethane-d4	78.9	70-130		10/15/18 13:45
Toluene-d8	102	70-130		10/15/18 13:45
4-Bromofluorobenzene	99.0	70-130		10/15/18 13:45

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2019 5-10' Sampled: 10/4/2018 13:10

Sample ID: 18J0650-16

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:24	CDT
Acenaphthylene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:24	CDT
Acetophenone	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:24	CDT
Aniline	ND	0.38	mg/Kg dry	1	V-34	SW-846 8270D	10/16/18	10/19/18 0:24	CDT
Anthracene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:24	CDT
Benzo(a)anthracene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:24	CDT
Benzo(a)pyrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:24	CDT
Benzo(b)fluoranthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:24	CDT
Benzo(g,h,i)perylene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:24	CDT
Benzo(k)fluoranthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:24	CDT
Bis(2-chloroethoxy)methane	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:24	CDT
Bis(2-chloroethyl)ether	ND	0.38	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/19/18 0:24	CDT
Bis(2-chloroisopropyl)ether	ND	0.38	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/19/18 0:24	CDT
Bis(2-Ethylhexyl)phthalate	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:24	CDT
4-Bromophenylphenylether	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:24	CDT
Butylbenzylphthalate	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:24	CDT
4-Chloroaniline	ND	0.73	mg/Kg dry	1	V-34	SW-846 8270D	10/16/18	10/19/18 0:24	CDT
2-Chloronaphthalene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:24	CDT
2-Chlorophenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:24	CDT
Chrysene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:24	CDT
Dibenz(a,h)anthracene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:24	CDT
Dibenzofuran	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:24	CDT
Di-n-butylphthalate	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:24	CDT
1,2-Dichlorobenzene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:24	CDT
1,3-Dichlorobenzene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:24	CDT
1,4-Dichlorobenzene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:24	CDT
3,3-Dichlorobenzidine	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:24	CDT
2,4-Dichlorophenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:24	CDT
Diethylphthalate	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:24	CDT
2,4-Dimethylphenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:24	CDT
Dimethylphthalate	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:24	CDT
2,4-Dinitrophenol	ND	0.73	mg/Kg dry	1	V-19	SW-846 8270D	10/16/18	10/19/18 0:24	CDT
2,4-Dinitrotoluene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:24	CDT
2,6-Dinitrotoluene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:24	CDT
Di-n-octylphthalate	ND	0.38	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/19/18 0:24	CDT
1,2-Diphenylhydrazine (as Azobenzene)	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:24	CDT
Fluoranthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:24	CDT
Fluorene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:24	CDT
Hexachlorobenzene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:24	CDT
Hexachlorobutadiene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:24	CDT
Hexachloroethane	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:24	CDT
Indeno(1,2,3-cd)pyrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:24	CDT
Isophorone	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:24	CDT
2-Methylnaphthalene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:24	CDT

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2019 5-10' Sampled: 10/4/2018 13:10

Sample ID: 18J0650-16

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
2-Methylphenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:24	CDT
3/4-Methylphenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:24	CDT
Naphthalene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:24	CDT
Nitrobenzene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:24	CDT
2-Nitrophenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:24	CDT
4-Nitrophenol	ND	0.73	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/19/18 0:24	CDT
Pentachlorophenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:24	CDT
Phenanthrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:24	CDT
Phenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:24	CDT
Pyrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:24	CDT
1,2,4-Trichlorobenzene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:24	CDT
2,4,5-Trichlorophenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:24	CDT
2,4,6-Trichlorophenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:24	CDT

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2-Fluorophenol	68.1	30-130		10/19/18 0:24
Phenol-d6	76.1	30-130		10/19/18 0:24
Nitrobenzene-d5	78.2	30-130		10/19/18 0:24
2-Fluorobiphenyl	82.1	30-130		10/19/18 0:24
2,4,6-Tribromophenol	94.1	30-130		10/19/18 0:24
p-Terphenyl-d14	86.0	30-130		10/19/18 0:24

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2019 5-10' Sampled: 10/4/2018 13:10

Sample ID: 18J0650-16

Sample Matrix: Soil

Sample Flags: O-32

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.087	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 22:49	TG
Aroclor-1221 [1]	ND	0.087	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 22:49	TG
Aroclor-1232 [1]	ND	0.087	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 22:49	TG
Aroclor-1242 [1]	ND	0.087	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 22:49	TG
Aroclor-1248 [1]	ND	0.087	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 22:49	TG
Aroclor-1254 [1]	ND	0.087	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 22:49	TG
Aroclor-1260 [1]	ND	0.087	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 22:49	TG
Aroclor-1262 [1]	ND	0.087	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 22:49	TG
Aroclor-1268 [1]	ND	0.087	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 22:49	TG

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	71.6	30-150		10/18/18 22:49
Decachlorobiphenyl [2]	66.0	30-150		10/18/18 22:49
Tetrachloro-m-xylene [1]	62.5	30-150		10/18/18 22:49
Tetrachloro-m-xylene [2]	70.4	30-150		10/18/18 22:49

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Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2019 5-10' Sampled: 10/4/2018 13:10

Sample ID: 18J0650-16

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	ND	11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/16/18	10/19/18 10:32	KLB
C19-C36 Aliphatics	ND	11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/16/18	10/19/18 10:32	KLB
Unadjusted C11-C22 Aromatics	ND	11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/16/18	10/19/18 10:32	KLB
C11-C22 Aromatics	ND	11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/16/18	10/19/18 10:32	KLB
Acenaphthene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/16/18	10/19/18 10:32	KLB
Acenaphthylene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/16/18	10/19/18 10:32	KLB
Anthracene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/16/18	10/19/18 10:32	KLB
Benzo(a)anthracene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/16/18	10/19/18 10:32	KLB
Benzo(a)pyrene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/16/18	10/19/18 10:32	KLB
Benzo(b)fluoranthene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/16/18	10/19/18 10:32	KLB
Benzo(g,h,i)perylene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/16/18	10/19/18 10:32	KLB
Benzo(k)fluoranthene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/16/18	10/19/18 10:32	KLB
Chrysene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/16/18	10/19/18 10:32	KLB
Dibenz(a,h)anthracene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/16/18	10/19/18 10:32	KLB
Fluoranthene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/16/18	10/19/18 10:32	KLB
Fluorene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/16/18	10/19/18 10:32	KLB
Indeno(1,2,3-cd)pyrene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/16/18	10/19/18 10:32	KLB
2-Methylnaphthalene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/16/18	10/19/18 10:32	KLB
Naphthalene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/16/18	10/19/18 10:32	KLB
Phenanthrene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/16/18	10/19/18 10:32	KLB
Pyrene	ND	0.11	mg/Kg dry	1		MADEP-EPH-04-1.1	10/16/18	10/19/18 10:32	KLB

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	87.5	40-140		10/19/18 10:32
o-Terphenyl (OTP)	83.8	40-140		10/19/18 10:32
2-Bromonaphthalene	93.2	40-140		10/19/18 10:32
2-Fluorobiphenyl	103	40-140		10/19/18 10:32

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2019 5-10' Sampled: 10/4/2018 13:10

Sample ID: 18J0650-16

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - VPH

Soil/Methanol Preservation Ratio: 0.90

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Unadjusted C5-C8 Aliphatics	ND	14	mg/Kg dry	1		MADEP-VPH-Feb 2018 Rev 2.1	10/17/18	10/17/18 17:49	EEH
C5-C8 Aliphatics	ND	14	mg/Kg dry	1		MADEP-VPH-Feb 2018 Rev 2.1	10/17/18	10/17/18 17:49	EEH
Unadjusted C9-C12 Aliphatics	ND	14	mg/Kg dry	1		MADEP-VPH-Feb 2018 Rev 2.1	10/17/18	10/17/18 17:49	EEH
C9-C12 Aliphatics	ND	14	mg/Kg dry	1		MADEP-VPH-Feb 2018 Rev 2.1	10/17/18	10/17/18 17:49	EEH
C9-C10 Aromatics	ND	14	mg/Kg dry	1		MADEP-VPH-Feb 2018 Rev 2.1	10/17/18	10/17/18 17:49	EEH
Benzene	ND	0.068	mg/Kg dry	1		MADEP-VPH-Feb 2018 Rev 2.1	10/17/18	10/17/18 17:49	EEH
Ethylbenzene	ND	0.068	mg/Kg dry	1		MADEP-VPH-Feb 2018 Rev 2.1	10/17/18	10/17/18 17:49	EEH
Methyl tert-Butyl Ether (MTBE)	ND	0.068	mg/Kg dry	1		MADEP-VPH-Feb 2018 Rev 2.1	10/17/18	10/17/18 17:49	EEH
Naphthalene	ND	0.34	mg/Kg dry	1		MADEP-VPH-Feb 2018 Rev 2.1	10/17/18	10/17/18 17:49	EEH
Toluene	ND	0.068	mg/Kg dry	1		MADEP-VPH-Feb 2018 Rev 2.1	10/17/18	10/17/18 17:49	EEH
m+p Xylene	ND	0.14	mg/Kg dry	1		MADEP-VPH-Feb 2018 Rev 2.1	10/17/18	10/17/18 17:49	EEH
o-Xylene	ND	0.068	mg/Kg dry	1		MADEP-VPH-Feb 2018 Rev 2.1	10/17/18	10/17/18 17:49	EEH

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2,5-Dibromotoluene (FID)	106	70-130		10/17/18 17:49
2,5-Dibromotoluene (PID)	90.3	70-130		10/17/18 17:49

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2019 5-10' Sampled: 10/4/2018 13:10

Sample ID: 18J0650-16

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Antimony	ND	1.9	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:56	QNW
Arsenic	ND	1.9	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:56	QNW
Barium	47	1.9	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:56	QNW
Beryllium	0.31	0.19	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:56	QNW
Cadmium	ND	0.19	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:56	QNW
Chromium	15	0.37	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:56	QNW
Lead	4.8	0.56	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:56	QNW
Mercury	ND	0.028	mg/Kg dry	1		SW-846 7471B	10/16/18	10/17/18 13:56	EJB
Nickel	9.3	0.37	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:56	QNW
Selenium	ND	3.7	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:56	QNW
Silver	ND	0.37	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:56	QNW
Thallium	ND	1.9	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:56	QNW
Vanadium	27	0.74	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:56	QNW
Zinc	29	0.74	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 20:56	QNW

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2019 5-10' Sampled: 10/4/2018 13:10

Sample ID: 18J0650-16

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	89.7		% Wt	1		SM 2540G	10/15/18	10/16/18 14:42	JFC

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Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2020 0-5' Sampled: 10/4/2018 15:00

Sample ID: 18J0650-18

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:52	CDT
Acenaphthylene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:52	CDT
Acetophenone	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:52	CDT
Aniline	ND	0.38	mg/Kg dry	1	V-34	SW-846 8270D	10/16/18	10/19/18 0:52	CDT
Anthracene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:52	CDT
Benzo(a)anthracene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:52	CDT
Benzo(a)pyrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:52	CDT
Benzo(b)fluoranthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:52	CDT
Benzo(g,h,i)perylene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:52	CDT
Benzo(k)fluoranthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:52	CDT
Bis(2-chloroethoxy)methane	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:52	CDT
Bis(2-chloroethyl)ether	ND	0.38	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/19/18 0:52	CDT
Bis(2-chloroisopropyl)ether	ND	0.38	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/19/18 0:52	CDT
Bis(2-Ethylhexyl)phthalate	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:52	CDT
4-Bromophenylphenylether	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:52	CDT
Butylbenzylphthalate	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:52	CDT
4-Chloroaniline	ND	0.74	mg/Kg dry	1	V-34	SW-846 8270D	10/16/18	10/19/18 0:52	CDT
2-Chloronaphthalene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:52	CDT
2-Chlorophenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:52	CDT
Chrysene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:52	CDT
Dibenz(a,h)anthracene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:52	CDT
Dibenzofuran	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:52	CDT
Di-n-butylphthalate	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:52	CDT
1,2-Dichlorobenzene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:52	CDT
1,3-Dichlorobenzene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:52	CDT
1,4-Dichlorobenzene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:52	CDT
3,3-Dichlorobenzidine	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:52	CDT
2,4-Dichlorophenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:52	CDT
Diethylphthalate	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:52	CDT
2,4-Dimethylphenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:52	CDT
Dimethylphthalate	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:52	CDT
2,4-Dinitrophenol	ND	0.74	mg/Kg dry	1	V-19	SW-846 8270D	10/16/18	10/19/18 0:52	CDT
2,4-Dinitrotoluene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:52	CDT
2,6-Dinitrotoluene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:52	CDT
Di-n-octylphthalate	ND	0.38	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/19/18 0:52	CDT
1,2-Diphenylhydrazine (as Azobenzene)	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:52	CDT
Fluoranthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:52	CDT
Fluorene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:52	CDT
Hexachlorobenzene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:52	CDT
Hexachlorobutadiene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:52	CDT
Hexachloroethane	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:52	CDT
Indeno(1,2,3-cd)pyrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:52	CDT
Isophorone	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:52	CDT
2-Methylnaphthalene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:52	CDT

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2020 0-5' Sampled: 10/4/2018 15:00

Sample ID: 18J0650-18

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
2-Methylphenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:52	CDT
3/4-Methylphenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:52	CDT
Naphthalene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:52	CDT
Nitrobenzene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:52	CDT
2-Nitrophenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:52	CDT
4-Nitrophenol	ND	0.74	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/19/18 0:52	CDT
Pentachlorophenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:52	CDT
Phenanthrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:52	CDT
Phenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:52	CDT
Pyrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:52	CDT
1,2,4-Trichlorobenzene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:52	CDT
2,4,5-Trichlorophenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:52	CDT
2,4,6-Trichlorophenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 0:52	CDT

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2-Fluorophenol	74.9	30-130		10/19/18 0:52
Phenol-d6	83.6	30-130		10/19/18 0:52
Nitrobenzene-d5	86.3	30-130		10/19/18 0:52
2-Fluorobiphenyl	86.0	30-130		10/19/18 0:52
2,4,6-Tribromophenol	94.5	30-130		10/19/18 0:52
p-Terphenyl-d14	104	30-130		10/19/18 0:52

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2020 0-5' Sampled: 10/4/2018 15:00

Sample ID: 18J0650-18

Sample Matrix: Soil

Sample Flags: O-32

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.084	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 23:07	TG
Aroclor-1221 [1]	ND	0.084	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 23:07	TG
Aroclor-1232 [1]	ND	0.084	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 23:07	TG
Aroclor-1242 [1]	ND	0.084	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 23:07	TG
Aroclor-1248 [1]	ND	0.084	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 23:07	TG
Aroclor-1254 [1]	ND	0.084	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 23:07	TG
Aroclor-1260 [1]	ND	0.084	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 23:07	TG
Aroclor-1262 [1]	ND	0.084	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 23:07	TG
Aroclor-1268 [1]	ND	0.084	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 23:07	TG

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	63.4	30-150		10/18/18 23:07
Decachlorobiphenyl [2]	57.9	30-150		10/18/18 23:07
Tetrachloro-m-xylene [1]	58.6	30-150		10/18/18 23:07
Tetrachloro-m-xylene [2]	65.3	30-150		10/18/18 23:07

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2020 0-5' Sampled: 10/4/2018 15:00

Sample ID: 18J0650-18

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Antimony	ND	1.8	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 21:00	QNW
Arsenic	ND	1.8	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 21:00	QNW
Barium	40	1.8	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 21:00	QNW
Beryllium	0.42	0.18	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 21:00	QNW
Cadmium	ND	0.18	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 21:00	QNW
Chromium	13	0.37	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 21:00	QNW
Lead	11	0.55	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 21:00	QNW
Mercury	0.031	0.027	mg/Kg dry	1		SW-846 7471B	10/16/18	10/17/18 13:58	EJB
Nickel	10	0.37	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 21:00	QNW
Selenium	ND	3.7	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 21:00	QNW
Silver	ND	0.37	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 21:00	QNW
Thallium	ND	1.8	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 21:00	QNW
Vanadium	44	0.73	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 21:00	QNW
Zinc	45	0.73	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 21:00	QNW

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Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2020 0-5' Sampled: 10/4/2018 15:00

Sample ID: 18J0650-18

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	89.1		% Wt	1		SM 2540G	10/15/18	10/16/18 14:42	JFC

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Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2020 5-10' Sampled: 10/4/2018 15:00

Sample ID: 18J0650-19

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:19	CDT
Acenaphthylene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:19	CDT
Acetophenone	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:19	CDT
Aniline	ND	0.37	mg/Kg dry	1	V-34	SW-846 8270D	10/16/18	10/19/18 1:19	CDT
Anthracene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:19	CDT
Benzo(a)anthracene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:19	CDT
Benzo(a)pyrene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:19	CDT
Benzo(b)fluoranthene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:19	CDT
Benzo(g,h,i)perylene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:19	CDT
Benzo(k)fluoranthene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:19	CDT
Bis(2-chloroethoxy)methane	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:19	CDT
Bis(2-chloroethyl)ether	ND	0.37	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/19/18 1:19	CDT
Bis(2-chloroisopropyl)ether	ND	0.37	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/19/18 1:19	CDT
Bis(2-Ethylhexyl)phthalate	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:19	CDT
4-Bromophenylphenylether	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:19	CDT
Butylbenzylphthalate	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:19	CDT
4-Chloroaniline	ND	0.71	mg/Kg dry	1	V-34	SW-846 8270D	10/16/18	10/19/18 1:19	CDT
2-Chloronaphthalene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:19	CDT
2-Chlorophenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:19	CDT
Chrysene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:19	CDT
Dibenz(a,h)anthracene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:19	CDT
Dibenzofuran	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:19	CDT
Di-n-butylphthalate	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:19	CDT
1,2-Dichlorobenzene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:19	CDT
1,3-Dichlorobenzene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:19	CDT
1,4-Dichlorobenzene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:19	CDT
3,3-Dichlorobenzidine	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:19	CDT
2,4-Dichlorophenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:19	CDT
Diethylphthalate	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:19	CDT
2,4-Dimethylphenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:19	CDT
Dimethylphthalate	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:19	CDT
2,4-Dinitrophenol	ND	0.71	mg/Kg dry	1	V-19	SW-846 8270D	10/16/18	10/19/18 1:19	CDT
2,4-Dinitrotoluene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:19	CDT
2,6-Dinitrotoluene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:19	CDT
Di-n-octylphthalate	ND	0.37	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/19/18 1:19	CDT
1,2-Diphenylhydrazine (as Azobenzene)	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:19	CDT
Fluoranthene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:19	CDT
Fluorene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:19	CDT
Hexachlorobenzene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:19	CDT
Hexachlorobutadiene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:19	CDT
Hexachloroethane	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:19	CDT
Indeno(1,2,3-cd)pyrene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:19	CDT
Isophorone	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:19	CDT
2-Methylnaphthalene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:19	CDT

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2020 5-10' Sampled: 10/4/2018 15:00

Sample ID: 18J0650-19

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
2-Methylphenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:19	CDT
3/4-Methylphenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:19	CDT
Naphthalene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:19	CDT
Nitrobenzene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:19	CDT
2-Nitrophenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:19	CDT
4-Nitrophenol	ND	0.71	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/19/18 1:19	CDT
Pentachlorophenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:19	CDT
Phenanthrene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:19	CDT
Phenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:19	CDT
Pyrene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:19	CDT
1,2,4-Trichlorobenzene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:19	CDT
2,4,5-Trichlorophenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:19	CDT
2,4,6-Trichlorophenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:19	CDT

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2-Fluorophenol	56.8	30-130		10/19/18 1:19
Phenol-d6	72.8	30-130		10/19/18 1:19
Nitrobenzene-d5	86.0	30-130		10/19/18 1:19
2-Fluorobiphenyl	84.9	30-130		10/19/18 1:19
2,4,6-Tribromophenol	57.7	30-130		10/19/18 1:19
p-Terphenyl-d14	101	30-130		10/19/18 1:19

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA | Sample Description: | Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2020 5-10' | Sampled: 10/4/2018 15:00

Sample ID: 18J0650-19

Sample Matrix: Soil

Sample Flags: O-32

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.085	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 23:25	TG
Aroclor-1221 [1]	ND	0.085	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 23:25	TG
Aroclor-1232 [1]	ND	0.085	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 23:25	TG
Aroclor-1242 [1]	ND	0.085	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 23:25	TG
Aroclor-1248 [1]	ND	0.085	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 23:25	TG
Aroclor-1254 [1]	ND	0.085	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 23:25	TG
Aroclor-1260 [1]	ND	0.085	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 23:25	TG
Aroclor-1262 [1]	ND	0.085	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 23:25	TG
Aroclor-1268 [1]	ND	0.085	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 23:25	TG

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	68.5	30-150		10/18/18 23:25
Decachlorobiphenyl [2]	62.8	30-150		10/18/18 23:25
Tetrachloro-m-xylene [1]	61.4	30-150		10/18/18 23:25
Tetrachloro-m-xylene [2]	69.2	30-150		10/18/18 23:25

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2020 5-10' Sampled: 10/4/2018 15:00

Sample ID: 18J0650-19

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Antimony	ND	1.8	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 18:07	QNW
Arsenic	ND	1.8	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 18:07	QNW
Barium	67	1.8	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 18:07	QNW
Beryllium	0.67	0.18	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 18:07	QNW
Cadmium	ND	0.18	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 18:07	QNW
Chromium	7.7	0.36	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 18:07	QNW
Lead	21	0.55	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 18:07	QNW
Mercury	ND	0.027	mg/Kg dry	1		SW-846 7471B	10/16/18	10/17/18 13:59	EJB
Nickel	9.0	0.36	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 18:07	QNW
Selenium	ND	3.6	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 18:07	QNW
Silver	ND	0.36	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 18:07	QNW
Thallium	ND	1.8	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 18:07	QNW
Vanadium	45	0.73	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 18:07	QNW
Zinc	46	0.73	mg/Kg dry	1		SW-846 6010D	10/16/18	10/18/18 18:07	QNW

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2020 5-10' Sampled: 10/4/2018 15:00

Sample ID: 18J0650-19

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	91.4		% Wt	1		SM 2540G	10/16/18	10/17/18 10:56	JFC

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2023 0-5' Sampled: 10/4/2018 17:00

Sample ID: 18J0650-20

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:46	CDT
Acenaphthylene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:46	CDT
Acetophenone	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:46	CDT
Aniline	ND	0.39	mg/Kg dry	1	V-34	SW-846 8270D	10/16/18	10/19/18 1:46	CDT
Anthracene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:46	CDT
Benzo(a)anthracene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:46	CDT
Benzo(a)pyrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:46	CDT
Benzo(b)fluoranthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:46	CDT
Benzo(g,h,i)perylene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:46	CDT
Benzo(k)fluoranthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:46	CDT
Bis(2-chloroethoxy)methane	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:46	CDT
Bis(2-chloroethyl)ether	ND	0.39	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/19/18 1:46	CDT
Bis(2-chloroisopropyl)ether	ND	0.39	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/19/18 1:46	CDT
Bis(2-Ethylhexyl)phthalate	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:46	CDT
4-Bromophenylphenylether	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:46	CDT
Butylbenzylphthalate	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:46	CDT
4-Chloroaniline	ND	0.76	mg/Kg dry	1	V-34	SW-846 8270D	10/16/18	10/19/18 1:46	CDT
2-Chloronaphthalene	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:46	CDT
2-Chlorophenol	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:46	CDT
Chrysene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:46	CDT
Dibenz(a,h)anthracene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:46	CDT
Dibenzofuran	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:46	CDT
Di-n-butylphthalate	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:46	CDT
1,2-Dichlorobenzene	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:46	CDT
1,3-Dichlorobenzene	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:46	CDT
1,4-Dichlorobenzene	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:46	CDT
3,3-Dichlorobenzidine	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:46	CDT
2,4-Dichlorophenol	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:46	CDT
Diethylphthalate	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:46	CDT
2,4-Dimethylphenol	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:46	CDT
Dimethylphthalate	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:46	CDT
2,4-Dinitrophenol	ND	0.76	mg/Kg dry	1	V-19	SW-846 8270D	10/16/18	10/19/18 1:46	CDT
2,4-Dinitrotoluene	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:46	CDT
2,6-Dinitrotoluene	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:46	CDT
Di-n-octylphthalate	ND	0.39	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/19/18 1:46	CDT
1,2-Diphenylhydrazine (as Azobenzene)	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:46	CDT
Fluoranthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:46	CDT
Fluorene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:46	CDT
Hexachlorobenzene	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:46	CDT
Hexachlorobutadiene	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:46	CDT
Hexachloroethane	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:46	CDT
Indeno(1,2,3-cd)pyrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:46	CDT
Isophorone	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:46	CDT
2-Methylnaphthalene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:46	CDT

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2023 0-5' Sampled: 10/4/2018 17:00

Sample ID: 18J0650-20

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
2-Methylphenol	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:46	CDT
3/4-Methylphenol	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:46	CDT
Naphthalene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:46	CDT
Nitrobenzene	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:46	CDT
2-Nitrophenol	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:46	CDT
4-Nitrophenol	ND	0.76	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/19/18 1:46	CDT
Pentachlorophenol	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:46	CDT
Phenanthrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:46	CDT
Phenol	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:46	CDT
Pyrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:46	CDT
1,2,4-Trichlorobenzene	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:46	CDT
2,4,5-Trichlorophenol	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:46	CDT
2,4,6-Trichlorophenol	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 1:46	CDT

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2-Fluorophenol	74.8	30-130		10/19/18 1:46
Phenol-d6	81.7	30-130		10/19/18 1:46
Nitrobenzene-d5	84.1	30-130		10/19/18 1:46
2-Fluorobiphenyl	84.7	30-130		10/19/18 1:46
2,4,6-Tribromophenol	91.6	30-130		10/19/18 1:46
p-Terphenyl-d14	101	30-130		10/19/18 1:46

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2023 0-5' Sampled: 10/4/2018 17:00

Sample ID: 18J0650-20

Sample Matrix: Soil

Sample Flags: O-32

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.092	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 23:43	TG
Aroclor-1221 [1]	ND	0.092	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 23:43	TG
Aroclor-1232 [1]	ND	0.092	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 23:43	TG
Aroclor-1242 [1]	ND	0.092	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 23:43	TG
Aroclor-1248 [1]	ND	0.092	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 23:43	TG
Aroclor-1254 [2]	ND	0.092	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 23:43	TG
Aroclor-1260 [1]	ND	0.092	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 23:43	TG
Aroclor-1262 [1]	ND	0.092	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 23:43	TG
Aroclor-1268 [1]	ND	0.092	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 23:43	TG

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	66.1	30-150		10/18/18 23:43
Decachlorobiphenyl [2]	61.1	30-150		10/18/18 23:43
Tetrachloro-m-xylene [1]	59.8	30-150		10/18/18 23:43
Tetrachloro-m-xylene [2]	67.7	30-150		10/18/18 23:43

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2023 0-5' Sampled: 10/4/2018 17:00

Sample ID: 18J0650-20

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Antimony	ND	1.9	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:02	QNW
Arsenic	2.5	1.9	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:02	QNW
Barium	33	1.9	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:02	QNW
Beryllium	0.37	0.19	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:02	QNW
Cadmium	0.22	0.19	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:02	QNW
Chromium	12	0.38	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:02	QNW
Lead	33	0.57	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:02	QNW
Mercury	0.055	0.030	mg/Kg dry	1		SW-846 7471B	10/17/18	10/18/18 11:44	EJB
Nickel	7.9	0.38	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:02	QNW
Selenium	ND	3.8	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:02	QNW
Silver	ND	0.38	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:02	QNW
Thallium	ND	1.9	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:02	QNW
Vanadium	23	0.76	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:02	QNW
Zinc	41	0.76	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:02	QNW

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA | Sample Description: | Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2023 0-5' | Sampled: 10/4/2018 17:00

Sample ID: 18J0650-20

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	85.8		% Wt	1		SM 2540G	10/15/18	10/16/18 14:42	JFC

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Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2023 5-10' Sampled: 10/4/2018 17:00

Sample ID: 18J0650-21

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:14	CDT
Acenaphthylene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:14	CDT
Acetophenone	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:14	CDT
Aniline	ND	0.37	mg/Kg dry	1	V-34	SW-846 8270D	10/16/18	10/19/18 2:14	CDT
Anthracene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:14	CDT
Benzo(a)anthracene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:14	CDT
Benzo(a)pyrene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:14	CDT
Benzo(b)fluoranthene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:14	CDT
Benzo(g,h,i)perylene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:14	CDT
Benzo(k)fluoranthene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:14	CDT
Bis(2-chloroethoxy)methane	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:14	CDT
Bis(2-chloroethyl)ether	ND	0.37	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/19/18 2:14	CDT
Bis(2-chloroisopropyl)ether	ND	0.37	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/19/18 2:14	CDT
Bis(2-Ethylhexyl)phthalate	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:14	CDT
4-Bromophenylphenylether	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:14	CDT
Butylbenzylphthalate	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:14	CDT
4-Chloroaniline	ND	0.71	mg/Kg dry	1	V-34	SW-846 8270D	10/16/18	10/19/18 2:14	CDT
2-Chloronaphthalene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:14	CDT
2-Chlorophenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:14	CDT
Chrysene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:14	CDT
Dibenz(a,h)anthracene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:14	CDT
Dibenzofuran	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:14	CDT
Di-n-butylphthalate	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:14	CDT
1,2-Dichlorobenzene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:14	CDT
1,3-Dichlorobenzene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:14	CDT
1,4-Dichlorobenzene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:14	CDT
3,3-Dichlorobenzidine	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:14	CDT
2,4-Dichlorophenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:14	CDT
Diethylphthalate	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:14	CDT
2,4-Dimethylphenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:14	CDT
Dimethylphthalate	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:14	CDT
2,4-Dinitrophenol	ND	0.71	mg/Kg dry	1	V-19	SW-846 8270D	10/16/18	10/19/18 2:14	CDT
2,4-Dinitrotoluene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:14	CDT
2,6-Dinitrotoluene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:14	CDT
Di-n-octylphthalate	ND	0.37	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/19/18 2:14	CDT
1,2-Diphenylhydrazine (as Azobenzene)	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:14	CDT
Fluoranthene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:14	CDT
Fluorene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:14	CDT
Hexachlorobenzene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:14	CDT
Hexachlorobutadiene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:14	CDT
Hexachloroethane	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:14	CDT
Indeno(1,2,3-cd)pyrene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:14	CDT
Isophorone	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:14	CDT
2-Methylnaphthalene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:14	CDT

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Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2023 5-10' Sampled: 10/4/2018 17:00

Sample ID: 18J0650-21

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
2-Methylphenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:14	CDT
3/4-Methylphenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:14	CDT
Naphthalene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:14	CDT
Nitrobenzene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:14	CDT
2-Nitrophenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:14	CDT
4-Nitrophenol	ND	0.71	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/19/18 2:14	CDT
Pentachlorophenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:14	CDT
Phenanthrene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:14	CDT
Phenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:14	CDT
Pyrene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:14	CDT
1,2,4-Trichlorobenzene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:14	CDT
2,4,5-Trichlorophenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:14	CDT
2,4,6-Trichlorophenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/19/18 2:14	CDT

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2-Fluorophenol	74.0	30-130		10/19/18 2:14
Phenol-d6	82.5	30-130		10/19/18 2:14
Nitrobenzene-d5	84.0	30-130		10/19/18 2:14
2-Fluorobiphenyl	82.1	30-130		10/19/18 2:14
2,4,6-Tribromophenol	96.1	30-130		10/19/18 2:14
p-Terphenyl-d14	104	30-130		10/19/18 2:14

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Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2023 5-10' Sampled: 10/4/2018 17:00

Sample ID: 18J0650-21

Sample Matrix: Soil

Sample Flags: O-32

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.082	mg/Kg dry	4		SW-846 8082A	10/16/18	10/19/18 0:00	TG
Aroclor-1221 [1]	ND	0.082	mg/Kg dry	4		SW-846 8082A	10/16/18	10/19/18 0:00	TG
Aroclor-1232 [1]	ND	0.082	mg/Kg dry	4		SW-846 8082A	10/16/18	10/19/18 0:00	TG
Aroclor-1242 [1]	ND	0.082	mg/Kg dry	4		SW-846 8082A	10/16/18	10/19/18 0:00	TG
Aroclor-1248 [1]	ND	0.082	mg/Kg dry	4		SW-846 8082A	10/16/18	10/19/18 0:00	TG
Aroclor-1254 [1]	ND	0.082	mg/Kg dry	4		SW-846 8082A	10/16/18	10/19/18 0:00	TG
Aroclor-1260 [1]	ND	0.082	mg/Kg dry	4		SW-846 8082A	10/16/18	10/19/18 0:00	TG
Aroclor-1262 [1]	ND	0.082	mg/Kg dry	4		SW-846 8082A	10/16/18	10/19/18 0:00	TG
Aroclor-1268 [1]	ND	0.082	mg/Kg dry	4		SW-846 8082A	10/16/18	10/19/18 0:00	TG

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	72.6	30-150		10/19/18 0:00
Decachlorobiphenyl [2]	66.5	30-150		10/19/18 0:00
Tetrachloro-m-xylene [1]	65.6	30-150		10/19/18 0:00
Tetrachloro-m-xylene [2]	73.7	30-150		10/19/18 0:00

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2023 5-10' Sampled: 10/4/2018 17:00

Sample ID: 18J0650-21

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Antimony	ND	1.8	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:07	QNW
Arsenic	ND	1.8	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:07	QNW
Barium	24	1.8	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:07	QNW
Beryllium	0.22	0.18	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:07	QNW
Cadmium	ND	0.18	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:07	QNW
Chromium	10	0.36	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:07	QNW
Lead	6.4	0.54	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:07	QNW
Mercury	ND	0.028	mg/Kg dry	1		SW-846 7471B	10/17/18	10/18/18 11:46	EJB
Nickel	7.5	0.36	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:07	QNW
Selenium	ND	3.6	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:07	QNW
Silver	ND	0.36	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:07	QNW
Thallium	ND	1.8	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:07	QNW
Vanadium	25	0.72	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:07	QNW
Zinc	28	0.72	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:07	QNW

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2023 5-10' Sampled: 10/4/2018 17:00

Sample ID: 18J0650-21

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	91.7		% Wt	1		SM 2540G	10/15/18	10/16/18 14:42	JFC

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Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2024 0-5' Sampled: 10/4/2018 17:30

Sample ID: 18J0650-22

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
Acenaphthylene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
Acetophenone	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
Aniline	ND	0.38	mg/Kg dry	1	V-34	SW-846 8270D	10/16/18	10/17/18 18:07	BGL
Anthracene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
Benzo(a)anthracene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
Benzo(a)pyrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
Benzo(b)fluoranthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
Benzo(g,h,i)perylene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
Benzo(k)fluoranthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
Bis(2-chloroethoxy)methane	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
Bis(2-chloroethyl)ether	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
Bis(2-chloroisopropyl)ether	ND	0.38	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/17/18 18:07	BGL
Bis(2-Ethylhexyl)phthalate	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
4-Bromophenylphenylether	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
Butylbenzylphthalate	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
4-Chloroaniline	ND	0.73	mg/Kg dry	1	V-34	SW-846 8270D	10/16/18	10/17/18 18:07	BGL
2-Chloronaphthalene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
2-Chlorophenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
Chrysene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
Dibenz(a,h)anthracene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
Dibenzofuran	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
Di-n-butylphthalate	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
1,2-Dichlorobenzene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
1,3-Dichlorobenzene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
1,4-Dichlorobenzene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
3,3-Dichlorobenzidine	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
2,4-Dichlorophenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
Diethylphthalate	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
2,4-Dimethylphenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
Dimethylphthalate	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
2,4-Dinitrophenol	ND	0.73	mg/Kg dry	1	V-19	SW-846 8270D	10/16/18	10/17/18 18:07	BGL
2,4-Dinitrotoluene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
2,6-Dinitrotoluene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
Di-n-octylphthalate	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
1,2-Diphenylhydrazine (as Azobenzene)	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
Fluoranthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
Fluorene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
Hexachlorobenzene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
Hexachlorobutadiene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
Hexachloroethane	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
Indeno(1,2,3-cd)pyrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
Isophorone	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
2-Methylnaphthalene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL

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Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2024 0-5' Sampled: 10/4/2018 17:30

Sample ID: 18J0650-22

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
2-Methylphenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
3/4-Methylphenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
Naphthalene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
Nitrobenzene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
2-Nitrophenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
4-Nitrophenol	ND	0.73	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
Pentachlorophenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
Phenanthrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
Phenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
Pyrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
1,2,4-Trichlorobenzene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
2,4,5-Trichlorophenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL
2,4,6-Trichlorophenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:07	BGL

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2-Fluorophenol	76.4	30-130		10/17/18 18:07
Phenol-d6	82.2	30-130		10/17/18 18:07
Nitrobenzene-d5	83.1	30-130		10/17/18 18:07
2-Fluorobiphenyl	79.3	30-130		10/17/18 18:07
2,4,6-Tribromophenol	85.9	30-130		10/17/18 18:07
p-Terphenyl-d14	86.8	30-130		10/17/18 18:07

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA | Sample Description: | Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2024 0-5' | Sampled: 10/4/2018 17:30

Sample ID: 18J0650-22

Sample Matrix: Soil

Sample Flags: O-32

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.086	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 16:48	WAL
Aroclor-1221 [1]	ND	0.086	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 16:48	WAL
Aroclor-1232 [1]	ND	0.086	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 16:48	WAL
Aroclor-1242 [1]	ND	0.086	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 16:48	WAL
Aroclor-1248 [1]	ND	0.086	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 16:48	WAL
Aroclor-1254 [1]	ND	0.086	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 16:48	WAL
Aroclor-1260 [1]	ND	0.086	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 16:48	WAL
Aroclor-1262 [1]	ND	0.086	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 16:48	WAL
Aroclor-1268 [1]	ND	0.086	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 16:48	WAL

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	81.5	30-150		10/18/18 16:48
Decachlorobiphenyl [2]	100	30-150		10/18/18 16:48
Tetrachloro-m-xylene [1]	80.3	30-150		10/18/18 16:48
Tetrachloro-m-xylene [2]	85.6	30-150		10/18/18 16:48

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2024 0-5' Sampled: 10/4/2018 17:30

Sample ID: 18J0650-22

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Antimony	ND	1.9	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:12	QNW
Arsenic	ND	1.9	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:12	QNW
Barium	57	1.9	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:12	QNW
Beryllium	0.35	0.19	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:12	QNW
Cadmium	ND	0.19	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:12	QNW
Chromium	12	0.37	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:12	QNW
Lead	7.1	0.56	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:12	QNW
Mercury	ND	0.026	mg/Kg dry	1		SW-846 7471B	10/17/18	10/18/18 11:47	EJB
Nickel	10	0.37	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:12	QNW
Selenium	ND	3.7	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:12	QNW
Silver	ND	0.37	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:12	QNW
Thallium	ND	1.9	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:12	QNW
Vanadium	36	0.74	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:12	QNW
Zinc	34	0.74	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:12	QNW

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2024 0-5' Sampled: 10/4/2018 17:30

Sample ID: 18J0650-22

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	89.1		% Wt	1		SM 2540G	10/15/18	10/16/18 14:43	JFC

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Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2024 5-10' Sampled: 10/4/2018 17:30

Sample ID: 18J0650-23

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
Acenaphthylene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
Acetophenone	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
Aniline	ND	0.37	mg/Kg dry	1	V-34	SW-846 8270D	10/16/18	10/17/18 18:33	BGL
Anthracene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
Benzo(a)anthracene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
Benzo(a)pyrene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
Benzo(b)fluoranthene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
Benzo(g,h,i)perylene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
Benzo(k)fluoranthene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
Bis(2-chloroethoxy)methane	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
Bis(2-chloroethyl)ether	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
Bis(2-chloroisopropyl)ether	ND	0.37	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/17/18 18:33	BGL
Bis(2-Ethylhexyl)phthalate	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
4-Bromophenylphenylether	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
Butylbenzylphthalate	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
4-Chloroaniline	ND	0.71	mg/Kg dry	1	V-34	SW-846 8270D	10/16/18	10/17/18 18:33	BGL
2-Chloronaphthalene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
2-Chlorophenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
Chrysene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
Dibenz(a,h)anthracene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
Dibenzofuran	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
Di-n-butylphthalate	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
1,2-Dichlorobenzene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
1,3-Dichlorobenzene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
1,4-Dichlorobenzene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
3,3-Dichlorobenzidine	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
2,4-Dichlorophenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
Diethylphthalate	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
2,4-Dimethylphenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
Dimethylphthalate	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
2,4-Dinitrophenol	ND	0.71	mg/Kg dry	1	V-19	SW-846 8270D	10/16/18	10/17/18 18:33	BGL
2,4-Dinitrotoluene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
2,6-Dinitrotoluene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
Di-n-octylphthalate	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
1,2-Diphenylhydrazine (as Azobenzene)	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
Fluoranthene	0.24	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
Fluorene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
Hexachlorobenzene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
Hexachlorobutadiene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
Hexachloroethane	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
Indeno(1,2,3-cd)pyrene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
Isophorone	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
2-Methylnaphthalene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2024 5-10' Sampled: 10/4/2018 17:30

Sample ID: 18J0650-23

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
2-Methylphenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
3/4-Methylphenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
Naphthalene	ND	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
Nitrobenzene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
2-Nitrophenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
4-Nitrophenol	ND	0.71	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
Pentachlorophenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
Phenanthrene	0.19	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
Phenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
Pyrene	0.23	0.18	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
1,2,4-Trichlorobenzene	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
2,4,5-Trichlorophenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL
2,4,6-Trichlorophenol	ND	0.37	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:33	BGL

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2-Fluorophenol	81.0	30-130		10/17/18 18:33
Phenol-d6	86.4	30-130		10/17/18 18:33
Nitrobenzene-d5	89.6	30-130		10/17/18 18:33
2-Fluorobiphenyl	87.4	30-130		10/17/18 18:33
2,4,6-Tribromophenol	91.7	30-130		10/17/18 18:33
p-Terphenyl-d14	90.9	30-130		10/17/18 18:33

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA | Sample Description: | Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2024 5-10' | Sampled: 10/4/2018 17:30

Sample ID: 18J0650-23

Sample Matrix: Soil

Sample Flags: O-32

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.081	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:00	WAL
Aroclor-1221 [1]	ND	0.081	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:00	WAL
Aroclor-1232 [1]	ND	0.081	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:00	WAL
Aroclor-1242 [1]	ND	0.081	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:00	WAL
Aroclor-1248 [1]	ND	0.081	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:00	WAL
Aroclor-1254 [1]	ND	0.081	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:00	WAL
Aroclor-1260 [1]	ND	0.081	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:00	WAL
Aroclor-1262 [1]	ND	0.081	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:00	WAL
Aroclor-1268 [1]	ND	0.081	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:00	WAL

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	84.2	30-150		10/18/18 17:00
Decachlorobiphenyl [2]	99.6	30-150		10/18/18 17:00
Tetrachloro-m-xylene [1]	78.1	30-150		10/18/18 17:00
Tetrachloro-m-xylene [2]	82.6	30-150		10/18/18 17:00

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2024 5-10' Sampled: 10/4/2018 17:30

Sample ID: 18J0650-23

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Antimony	ND	1.8	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:18	QNW
Arsenic	ND	1.8	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:18	QNW
Barium	63	1.8	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:18	QNW
Beryllium	0.38	0.18	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:18	QNW
Cadmium	ND	0.18	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:18	QNW
Chromium	12	0.36	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:18	QNW
Lead	6.7	0.54	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:18	QNW
Mercury	ND	0.027	mg/Kg dry	1		SW-846 7471B	10/17/18	10/18/18 11:49	EJB
Nickel	11	0.36	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:18	QNW
Selenium	ND	3.6	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:18	QNW
Silver	ND	0.36	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:18	QNW
Thallium	ND	1.8	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:18	QNW
Vanadium	38	0.72	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:18	QNW
Zinc	48	0.72	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:18	QNW

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA | Sample Description: | Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: 2024 5-10' | Sampled: 10/4/2018 17:30

Sample ID: 18J0650-23

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	91.2		% Wt	1		SM 2540G	10/15/18	10/16/18 14:43	JFC

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Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: SB/MW-2 0-5' Sampled: 10/3/2018 15:30

Sample ID: 18J0650-24

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
Acenaphthylene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
Acetophenone	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
Aniline	ND	0.38	mg/Kg dry	1	V-34	SW-846 8270D	10/16/18	10/17/18 18:59	BGL
Anthracene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
Benzo(a)anthracene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
Benzo(a)pyrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
Benzo(b)fluoranthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
Benzo(g,h,i)perylene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
Benzo(k)fluoranthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
Bis(2-chloroethoxy)methane	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
Bis(2-chloroethyl)ether	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
Bis(2-chloroisopropyl)ether	ND	0.38	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/17/18 18:59	BGL
Bis(2-Ethylhexyl)phthalate	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
4-Bromophenylphenylether	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
Butylbenzylphthalate	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
4-Chloroaniline	ND	0.73	mg/Kg dry	1	V-34	SW-846 8270D	10/16/18	10/17/18 18:59	BGL
2-Chloronaphthalene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
2-Chlorophenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
Chrysene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
Dibenz(a,h)anthracene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
Dibenzofuran	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
Di-n-butylphthalate	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
1,2-Dichlorobenzene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
1,3-Dichlorobenzene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
1,4-Dichlorobenzene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
3,3-Dichlorobenzidine	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
2,4-Dichlorophenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
Diethylphthalate	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
2,4-Dimethylphenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
Dimethylphthalate	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
2,4-Dinitrophenol	ND	0.73	mg/Kg dry	1	V-19	SW-846 8270D	10/16/18	10/17/18 18:59	BGL
2,4-Dinitrotoluene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
2,6-Dinitrotoluene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
Di-n-octylphthalate	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
1,2-Diphenylhydrazine (as Azobenzene)	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
Fluoranthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
Fluorene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
Hexachlorobenzene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
Hexachlorobutadiene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
Hexachloroethane	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
Indeno(1,2,3-cd)pyrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
Isophorone	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
2-Methylnaphthalene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: SB/MW-2 0-5' Sampled: 10/3/2018 15:30

Sample ID: 18J0650-24

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
2-Methylphenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
3/4-Methylphenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
Naphthalene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
Nitrobenzene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
2-Nitrophenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
4-Nitrophenol	ND	0.73	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
Pentachlorophenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
Phenanthrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
Phenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
Pyrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
1,2,4-Trichlorobenzene	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
2,4,5-Trichlorophenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL
2,4,6-Trichlorophenol	ND	0.38	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 18:59	BGL

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2-Fluorophenol	73.9	30-130		10/17/18 18:59
Phenol-d6	81.4	30-130		10/17/18 18:59
Nitrobenzene-d5	84.3	30-130		10/17/18 18:59
2-Fluorobiphenyl	84.7	30-130		10/17/18 18:59
2,4,6-Tribromophenol	88.4	30-130		10/17/18 18:59
p-Terphenyl-d14	88.1	30-130		10/17/18 18:59

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: SB/MW-2 0-5' Sampled: 10/3/2018 15:30

Sample ID: 18J0650-24

Sample Matrix: Soil

Sample Flags: O-32

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.087	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:13	WAL
Aroclor-1221 [1]	ND	0.087	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:13	WAL
Aroclor-1232 [1]	ND	0.087	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:13	WAL
Aroclor-1242 [1]	ND	0.087	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:13	WAL
Aroclor-1248 [1]	ND	0.087	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:13	WAL
Aroclor-1254 [1]	ND	0.087	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:13	WAL
Aroclor-1260 [1]	ND	0.087	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:13	WAL
Aroclor-1262 [1]	ND	0.087	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:13	WAL
Aroclor-1268 [1]	ND	0.087	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:13	WAL

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	82.2	30-150		10/18/18 17:13
Decachlorobiphenyl [2]	102	30-150		10/18/18 17:13
Tetrachloro-m-xylene [1]	82.7	30-150		10/18/18 17:13
Tetrachloro-m-xylene [2]	87.0	30-150		10/18/18 17:13

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: SB/MW-2 0-5' Sampled: 10/3/2018 15:30

Sample ID: 18J0650-24

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Antimony	ND	1.9	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:23	QNW
Arsenic	ND	1.9	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:23	QNW
Barium	39	1.9	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:23	QNW
Beryllium	0.32	0.19	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:23	QNW
Cadmium	ND	0.19	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:23	QNW
Chromium	8.9	0.37	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:23	QNW
Lead	6.5	0.56	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:23	QNW
Mercury	ND	0.028	mg/Kg dry	1		SW-846 7471B	10/17/18	10/18/18 11:50	EJB
Nickel	7.0	0.37	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:23	QNW
Selenium	ND	3.7	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:23	QNW
Silver	ND	0.37	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:23	QNW
Thallium	ND	1.9	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:23	QNW
Vanadium	26	0.74	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:23	QNW
Zinc	30	0.74	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:23	QNW

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: SB/MW-2 0-5' Sampled: 10/3/2018 15:30

Sample ID: 18J0650-24

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	89.2		% Wt	1		SM 2540G	10/15/18	10/16/18 14:43	JFC

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: SB/MW-2 5-10' Sampled: 10/3/2018 15:30

Sample ID: 18J0650-25

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
Acenaphthylene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
Acetophenone	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
Aniline	ND	0.39	mg/Kg dry	1	V-34	SW-846 8270D	10/16/18	10/17/18 19:26	BGL
Anthracene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
Benzo(a)anthracene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
Benzo(a)pyrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
Benzo(b)fluoranthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
Benzo(g,h,i)perylene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
Benzo(k)fluoranthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
Bis(2-chloroethoxy)methane	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
Bis(2-chloroethyl)ether	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
Bis(2-chloroisopropyl)ether	ND	0.39	mg/Kg dry	1	V-20	SW-846 8270D	10/16/18	10/17/18 19:26	BGL
Bis(2-Ethylhexyl)phthalate	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
4-Bromophenylphenylether	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
Butylbenzylphthalate	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
4-Chloroaniline	ND	0.75	mg/Kg dry	1	V-34	SW-846 8270D	10/16/18	10/17/18 19:26	BGL
2-Chloronaphthalene	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
2-Chlorophenol	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
Chrysene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
Dibenz(a,h)anthracene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
Dibenzofuran	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
Di-n-butylphthalate	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
1,2-Dichlorobenzene	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
1,3-Dichlorobenzene	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
1,4-Dichlorobenzene	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
3,3-Dichlorobenzidine	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
2,4-Dichlorophenol	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
Diethylphthalate	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
2,4-Dimethylphenol	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
Dimethylphthalate	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
2,4-Dinitrophenol	ND	0.75	mg/Kg dry	1	V-19	SW-846 8270D	10/16/18	10/17/18 19:26	BGL
2,4-Dinitrotoluene	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
2,6-Dinitrotoluene	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
Di-n-octylphthalate	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
1,2-Diphenylhydrazine (as Azobenzene)	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
Fluoranthene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
Fluorene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
Hexachlorobenzene	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
Hexachlorobutadiene	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
Hexachloroethane	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
Indeno(1,2,3-cd)pyrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
Isophorone	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
2-Methylnaphthalene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: SB/MW-2 5-10' Sampled: 10/3/2018 15:30

Sample ID: 18J0650-25

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
2-Methylphenol	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
3/4-Methylphenol	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
Naphthalene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
Nitrobenzene	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
2-Nitrophenol	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
4-Nitrophenol	ND	0.75	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
Pentachlorophenol	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
Phenanthrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
Phenol	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
Pyrene	ND	0.19	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
1,2,4-Trichlorobenzene	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
2,4,5-Trichlorophenol	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL
2,4,6-Trichlorophenol	ND	0.39	mg/Kg dry	1		SW-846 8270D	10/16/18	10/17/18 19:26	BGL

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2-Fluorophenol	70.8	30-130		10/17/18 19:26
Phenol-d6	76.6	30-130		10/17/18 19:26
Nitrobenzene-d5	77.2	30-130		10/17/18 19:26
2-Fluorobiphenyl	74.5	30-130		10/17/18 19:26
2,4,6-Tribromophenol	87.4	30-130		10/17/18 19:26
p-Terphenyl-d14	83.7	30-130		10/17/18 19:26

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: SB/MW-2 5-10' Sampled: 10/3/2018 15:30

Sample ID: 18J0650-25

Sample Matrix: Soil

Sample Flags: O-32

Polychlorinated Biphenyls with 3540 Soxhlet Extraction

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.088	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:26	WAL
Aroclor-1221 [1]	ND	0.088	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:26	WAL
Aroclor-1232 [1]	ND	0.088	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:26	WAL
Aroclor-1242 [1]	ND	0.088	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:26	WAL
Aroclor-1248 [1]	ND	0.088	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:26	WAL
Aroclor-1254 [1]	ND	0.088	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:26	WAL
Aroclor-1260 [1]	ND	0.088	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:26	WAL
Aroclor-1262 [1]	ND	0.088	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:26	WAL
Aroclor-1268 [1]	ND	0.088	mg/Kg dry	4		SW-846 8082A	10/16/18	10/18/18 17:26	WAL

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	81.2	30-150		10/18/18 17:26
Decachlorobiphenyl [2]	99.7	30-150		10/18/18 17:26
Tetrachloro-m-xylene [1]	78.6	30-150		10/18/18 17:26
Tetrachloro-m-xylene [2]	83.5	30-150		10/18/18 17:26

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: SB/MW-2 5-10' Sampled: 10/3/2018 15:30

Sample ID: 18J0650-25

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Antimony	ND	1.9	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:27	QNW
Arsenic	ND	1.9	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:27	QNW
Barium	38	1.9	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:27	QNW
Beryllium	0.29	0.19	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:27	QNW
Cadmium	ND	0.19	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:27	QNW
Chromium	11	0.38	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:27	QNW
Lead	4.3	0.56	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:27	QNW
Mercury	ND	0.030	mg/Kg dry	1		SW-846 7471B	10/17/18	10/18/18 11:52	EJB
Nickel	6.7	0.38	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:27	QNW
Selenium	ND	3.8	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:27	QNW
Silver	ND	0.38	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:27	QNW
Thallium	ND	1.9	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:27	QNW
Vanadium	30	0.75	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:27	QNW
Zinc	23	0.75	mg/Kg dry	1		SW-846 6010D	10/17/18	10/18/18 19:27	QNW

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: 200 Trapelo Rd., Waltham, MA Sample Description: Work Order: 18J0650

Date Received: 10/12/2018

Field Sample #: SB/MW-2 5-10' Sampled: 10/3/2018 15:30

Sample ID: 18J0650-25

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	87.1		% Wt	1		SM 2540G	10/15/18	10/16/18 14:43	JFC

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Sample Extraction Data

Prep Method: SW-846 3546-MADEP-EPH-04-1.1

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
18J0650-16 [2019 5-10']	B214945	20.3	2.00	10/16/18

Prep Method: MA VPH-MADEP-VPH-Feb 2018 Rev 2.1

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
18J0650-16 [2019 5-10']	B215011	13.4	16.4	10/17/18

Prep Method: % Solids-SM 2540G

Lab Number [Field ID]	Batch	Date
18J0650-01 [2001 0-5']	B214769	10/15/18
18J0650-02 [2001 5-10']	B214769	10/15/18
18J0650-03 [2005 0-5']	B214769	10/15/18
18J0650-04 [2005 5-7']	B214769	10/15/18
18J0650-05 [2009 0-5']	B214769	10/15/18
18J0650-06 [2009 5-10']	B214769	10/15/18
18J0650-07 [2010 0-5']	B214769	10/15/18
18J0650-08 [2010 5-10']	B214769	10/15/18
18J0650-09 [2011 0-5']	B214769	10/15/18
18J0650-10 [2011 5-10']	B214769	10/15/18
18J0650-11 [2012 0-5']	B214769	10/15/18
18J0650-12 [2012 5-10']	B214769	10/15/18
18J0650-13 [2017 0-5']	B214769	10/15/18
18J0650-14 [2017 5-9']	B214769	10/15/18
18J0650-15 [2019 0-5']	B214769	10/15/18
18J0650-16 [2019 5-10']	B214769	10/15/18
18J0650-18 [2020 0-5']	B214769	10/15/18
18J0650-20 [2023 0-5']	B214769	10/15/18
18J0650-21 [2023 5-10']	B214769	10/15/18
18J0650-22 [2024 0-5']	B214769	10/15/18
18J0650-23 [2024 5-10']	B214769	10/15/18
18J0650-24 [SB/MW-2 0-5']	B214769	10/15/18
18J0650-25 [SB/MW-2 5-10']	B214769	10/15/18

Prep Method: % Solids-SM 2540G

Lab Number [Field ID]	Batch	Date
18J0650-19 [2020 5-10']	B214944	10/16/18

Prep Method: SW-846 3050B-SW-846 6010D

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
18J0650-01 [2001 0-5']	B214905	1.49	50.0	10/16/18
18J0650-02 [2001 5-10']	B214905	1.54	50.0	10/16/18
18J0650-03 [2005 0-5']	B214905	1.53	50.0	10/16/18
18J0650-04 [2005 5-7']	B214905	1.53	50.0	10/16/18
18J0650-05 [2009 0-5']	B214905	1.52	50.0	10/16/18
18J0650-06 [2009 5-10']	B214905	1.50	50.0	10/16/18
18J0650-07 [2010 0-5']	B214905	1.51	50.0	10/16/18
18J0650-08 [2010 5-10']	B214905	1.52	50.0	10/16/18

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Sample Extraction Data

Prep Method: SW-846 3050B-SW-846 6010D

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
18J0650-09 [2011 0-5']	B214905	1.50	50.0	10/16/18
18J0650-10 [2011 5-10']	B214905	1.49	50.0	10/16/18
18J0650-11 [2012 0-5']	B214905	1.49	50.0	10/16/18
18J0650-12 [2012 5-10']	B214905	1.53	50.0	10/16/18
18J0650-13 [2017 0-5']	B214905	1.51	50.0	10/16/18
18J0650-14 [2017 5-9']	B214905	1.54	50.0	10/16/18
18J0650-15 [2019 0-5']	B214905	1.50	50.0	10/16/18
18J0650-16 [2019 5-10']	B214905	1.50	50.0	10/16/18
18J0650-18 [2020 0-5']	B214905	1.53	50.0	10/16/18
18J0650-19 [2020 5-10']	B214905	1.50	50.0	10/16/18

Prep Method: SW-846 3050B-SW-846 6010D

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
18J0650-20 [2023 0-5']	B215021	1.53	50.0	10/17/18
18J0650-21 [2023 5-10']	B215021	1.51	50.0	10/17/18
18J0650-22 [2024 0-5']	B215021	1.51	50.0	10/17/18
18J0650-23 [2024 5-10']	B215021	1.51	50.0	10/17/18
18J0650-24 [SB/MW-2 0-5']	B215021	1.51	50.0	10/17/18
18J0650-25 [SB/MW-2 5-10']	B215021	1.53	50.0	10/17/18

Prep Method: SW-846 7471-SW-846 7471B

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
18J0650-01 [2001 0-5']	B214921	0.587	50.0	10/16/18
18J0650-02 [2001 5-10']	B214921	0.630	50.0	10/16/18
18J0650-03 [2005 0-5']	B214921	0.570	50.0	10/16/18
18J0650-04 [2005 5-7']	B214921	0.620	50.0	10/16/18
18J0650-05 [2009 0-5']	B214921	0.608	50.0	10/16/18
18J0650-06 [2009 5-10']	B214921	0.595	50.0	10/16/18
18J0650-07 [2010 0-5']	B214921	0.603	50.0	10/16/18
18J0650-08 [2010 5-10']	B214921	0.615	50.0	10/16/18
18J0650-09 [2011 0-5']	B214921	0.610	50.0	10/16/18
18J0650-10 [2011 5-10']	B214921	0.577	50.0	10/16/18
18J0650-11 [2012 0-5']	B214921	0.634	50.0	10/16/18
18J0650-12 [2012 5-10']	B214921	0.586	50.0	10/16/18
18J0650-13 [2017 0-5']	B214921	0.611	50.0	10/16/18
18J0650-14 [2017 5-9']	B214921	0.624	50.0	10/16/18
18J0650-15 [2019 0-5']	B214921	0.576	50.0	10/16/18
18J0650-16 [2019 5-10']	B214921	0.606	50.0	10/16/18
18J0650-18 [2020 0-5']	B214921	0.620	50.0	10/16/18
18J0650-19 [2020 5-10']	B214921	0.607	50.0	10/16/18

Prep Method: SW-846 7471-SW-846 7471B

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
18J0650-20 [2023 0-5']	B215065	0.588	50.0	10/17/18
18J0650-21 [2023 5-10']	B215065	0.595	50.0	10/17/18
18J0650-22 [2024 0-5']	B215065	0.637	50.0	10/17/18
18J0650-23 [2024 5-10']	B215065	0.603	50.0	10/17/18
18J0650-24 [SB/MW-2 0-5']	B215065	0.590	50.0	10/17/18

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Sample Extraction Data

Prep Method: SW-846 7471-SW-846 7471B

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
18J0650-25 [SB/MW-2 5-10']	B215065	0.581	50.0	10/17/18

Prep Method: SW-846 3540C-SW-846 8082A

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
18J0650-01 [2001 0-5']	B214859	10.3	10.0	10/16/18
18J0650-02 [2001 5-10']	B214859	10.2	10.0	10/16/18
18J0650-03 [2005 0-5']	B214859	10.4	10.0	10/16/18
18J0650-04 [2005 5-7']	B214859	10.7	10.0	10/16/18
18J0650-05 [2009 0-5']	B214859	10.5	10.0	10/16/18
18J0650-06 [2009 5-10']	B214859	10.3	10.0	10/16/18
18J0650-07 [2010 0-5']	B214859	10.0	10.0	10/16/18
18J0650-08 [2010 5-10']	B214859	10.1	10.0	10/16/18
18J0650-09 [2011 0-5']	B214859	10.3	10.0	10/16/18
18J0650-10 [2011 5-10']	B214859	10.8	10.0	10/16/18
18J0650-11 [2012 0-5']	B214859	10.2	10.0	10/16/18
18J0650-12 [2012 5-10']	B214859	10.2	10.0	10/16/18
18J0650-13 [2017 0-5']	B214859	10.1	10.0	10/16/18
18J0650-14 [2017 5-9']	B214859	10.4	10.0	10/16/18
18J0650-15 [2019 0-5']	B214859	10.5	10.0	10/16/18
18J0650-16 [2019 5-10']	B214859	10.3	10.0	10/16/18
18J0650-18 [2020 0-5']	B214859	10.7	10.0	10/16/18
18J0650-19 [2020 5-10']	B214859	10.3	10.0	10/16/18
18J0650-20 [2023 0-5']	B214859	10.1	10.0	10/16/18
18J0650-21 [2023 5-10']	B214859	10.6	10.0	10/16/18

Prep Method: SW-846 3540C-SW-846 8082A

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
18J0650-22 [2024 0-5']	B214861	10.5	10.0	10/16/18
18J0650-23 [2024 5-10']	B214861	10.8	10.0	10/16/18
18J0650-24 [SB/MW-2 0-5']	B214861	10.3	10.0	10/16/18
18J0650-25 [SB/MW-2 5-10']	B214861	10.5	10.0	10/16/18

Prep Method: SW-846 5035-SW-846 8260C

Lab Number [Field ID]	Batch	Sample Amount(g)	Methanol Volume(mL)	Methanol Aliquot(mL)	Final Volume(mL)	Date
18J0650-16 [2019 5-10']	B214517	13.9	16.4	1	50	10/15/18

Prep Method: SW-846 3546-SW-846 8270D

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
18J0650-01 [2001 0-5']	B214942	30.6	1.00	10/16/18
18J0650-02 [2001 5-10']	B214942	30.0	1.00	10/16/18
18J0650-03 [2005 0-5']	B214942	30.1	1.00	10/16/18
18J0650-04 [2005 5-7']	B214942	30.2	1.00	10/16/18
18J0650-05 [2009 0-5']	B214942	30.0	1.00	10/16/18
18J0650-06 [2009 5-10']	B214942	30.4	1.00	10/16/18
18J0650-07 [2010 0-5']	B214942	30.1	1.00	10/16/18
18J0650-08 [2010 5-10']	B214942	30.0	1.00	10/16/18

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Sample Extraction Data

Prep Method: SW-846 3546-SW-846 8270D

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
18J0650-09 [2011 0-5']	B214942	30.4	1.00	10/16/18
18J0650-10 [2011 5-10']	B214942	30.3	1.00	10/16/18
18J0650-11 [2012 0-5']	B214942	30.3	1.00	10/16/18
18J0650-12 [2012 5-10']	B214942	30.2	1.00	10/16/18
18J0650-13 [2017 0-5']	B214942	30.0	1.00	10/16/18
18J0650-14 [2017 5-9']	B214942	30.2	1.00	10/16/18
18J0650-15 [2019 0-5']	B214942	30.0	1.00	10/16/18
18J0650-16 [2019 5-10']	B214942	30.3	1.00	10/16/18
18J0650-18 [2020 0-5']	B214942	30.0	1.00	10/16/18
18J0650-19 [2020 5-10']	B214942	30.3	1.00	10/16/18
18J0650-20 [2023 0-5']	B214942	30.5	1.00	10/16/18
18J0650-21 [2023 5-10']	B214942	30.4	1.00	10/16/18

Prep Method: SW-846 3546-SW-846 8270D

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
18J0650-22 [2024 0-5']	B214943	30.4	1.00	10/16/18
18J0650-23 [2024 5-10']	B214943	30.4	1.00	10/16/18
18J0650-24 [SB/MW-2 0-5']	B214943	30.4	1.00	10/16/18
18J0650-25 [SB/MW-2 5-10']	B214943	30.2	1.00	10/16/18

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QUALITY CONTROL

Volatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B214517 - SW-846 5035										
Blank (B214517-BLK1)				Prepared: 10/11/18 Analyzed: 10/15/18						
Acetone	ND	2.5	mg/Kg wet							R-05
tert-Amyl Methyl Ether (TAME)	ND	0.025	mg/Kg wet							
Benzene	ND	0.050	mg/Kg wet							
Bromobenzene	ND	0.050	mg/Kg wet							
Bromochloromethane	ND	0.050	mg/Kg wet							
Bromodichloromethane	ND	0.050	mg/Kg wet							
Bromoform	ND	0.050	mg/Kg wet							
Bromomethane	ND	0.10	mg/Kg wet							
2-Butanone (MEK)	ND	1.0	mg/Kg wet							R-05
n-Butylbenzene	ND	0.050	mg/Kg wet							
sec-Butylbenzene	ND	0.050	mg/Kg wet							
tert-Butylbenzene	ND	0.050	mg/Kg wet							
tert-Butyl Ethyl Ether (TBEE)	ND	0.025	mg/Kg wet							
Carbon Disulfide	ND	0.50	mg/Kg wet							
Carbon Tetrachloride	ND	0.050	mg/Kg wet							
Chlorobenzene	ND	0.050	mg/Kg wet							
Chlorodibromomethane	ND	0.025	mg/Kg wet							
Chloroethane	ND	0.10	mg/Kg wet							
Chloroform	ND	0.10	mg/Kg wet							
Chloromethane	ND	0.10	mg/Kg wet							
2-Chlorotoluene	ND	0.050	mg/Kg wet							
4-Chlorotoluene	ND	0.050	mg/Kg wet							
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.20	mg/Kg wet							
1,2-Dibromoethane (EDB)	ND	0.025	mg/Kg wet							
Dibromomethane	ND	0.050	mg/Kg wet							
1,2-Dichlorobenzene	ND	0.050	mg/Kg wet							
1,3-Dichlorobenzene	ND	0.050	mg/Kg wet							
1,4-Dichlorobenzene	ND	0.050	mg/Kg wet							
Dichlorodifluoromethane (Freon 12)	ND	0.10	mg/Kg wet							
1,1-Dichloroethane	ND	0.050	mg/Kg wet							
1,2-Dichloroethane	ND	0.050	mg/Kg wet							
1,1-Dichloroethylene	ND	0.050	mg/Kg wet							
cis-1,2-Dichloroethylene	ND	0.050	mg/Kg wet							
trans-1,2-Dichloroethylene	ND	0.050	mg/Kg wet							
1,2-Dichloropropane	ND	0.050	mg/Kg wet							
1,3-Dichloropropane	ND	0.025	mg/Kg wet							
2,2-Dichloropropane	ND	0.050	mg/Kg wet							
1,1-Dichloropropene	ND	0.10	mg/Kg wet							
cis-1,3-Dichloropropene	ND	0.025	mg/Kg wet							
trans-1,3-Dichloropropene	ND	0.025	mg/Kg wet							
Diethyl Ether	ND	0.10	mg/Kg wet							
Diisopropyl Ether (DIPE)	ND	0.025	mg/Kg wet							
1,4-Dioxane	ND	2.5	mg/Kg wet							V-16
Ethylbenzene	ND	0.050	mg/Kg wet							
Hexachlorobutadiene	ND	0.050	mg/Kg wet							
2-Hexanone (MBK)	ND	0.50	mg/Kg wet							
Isopropylbenzene (Cumene)	ND	0.050	mg/Kg wet							
p-Isopropyltoluene (p-Cymene)	ND	0.050	mg/Kg wet							
Methyl tert-Butyl Ether (MTBE)	ND	0.050	mg/Kg wet							
Methylene Chloride	ND	0.25	mg/Kg wet							
4-Methyl-2-pentanone (MIBK)	ND	0.50	mg/Kg wet							
Naphthalene	ND	0.10	mg/Kg wet							

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QUALITY CONTROL

Volatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes	
Batch B214517 - SW-846 5035											
Blank (B214517-BLK1)				Prepared: 10/11/18 Analyzed: 10/15/18							
n-Propylbenzene	ND	0.050	mg/Kg wet								
Styrene	ND	0.050	mg/Kg wet								
1,1,1,2-Tetrachloroethane	ND	0.050	mg/Kg wet								
1,1,2,2-Tetrachloroethane	ND	0.025	mg/Kg wet								
Tetrachloroethylene	ND	0.050	mg/Kg wet								
Tetrahydrofuran	ND	0.20	mg/Kg wet								
Toluene	ND	0.050	mg/Kg wet								
1,2,3-Trichlorobenzene	ND	0.20	mg/Kg wet								
1,2,4-Trichlorobenzene	ND	0.050	mg/Kg wet								
1,1,1-Trichloroethane	ND	0.050	mg/Kg wet								
1,1,2-Trichloroethane	ND	0.050	mg/Kg wet								
Trichloroethylene	ND	0.050	mg/Kg wet								
Trichlorofluoromethane (Freon 11)	ND	0.10	mg/Kg wet								
1,2,3-Trichloropropane	ND	0.10	mg/Kg wet								
1,2,4-Trimethylbenzene	ND	0.050	mg/Kg wet								
1,3,5-Trimethylbenzene	ND	0.050	mg/Kg wet								
Vinyl Chloride	ND	0.10	mg/Kg wet								
m+p Xylene	ND	0.10	mg/Kg wet								
o-Xylene	ND	0.050	mg/Kg wet								
Surrogate: 1,2-Dichloroethane-d4	*0.0200*		mg/Kg wet	0.0250		79.9	70-130				
Surrogate: Toluene-d8	*0.0254*		mg/Kg wet	0.0250		102	70-130				
Surrogate: 4-Bromofluorobenzene	*0.0244*		mg/Kg wet	0.0250		97.8	70-130				
LCS (B214517-BS1)				Prepared: 10/11/18 Analyzed: 10/15/18							
Acetone	0.122	0.057	mg/Kg wet	0.113		107	40-160			R-05	†
tert-Amyl Methyl Ether (TAME)	0.0114	0.00057	mg/Kg wet	0.0113		101	70-130				
Benzene	0.0111	0.0011	mg/Kg wet	0.0113		98.1	70-130				
Bromobenzene	0.0120	0.0011	mg/Kg wet	0.0113		106	70-130				
Bromochloromethane	0.0122	0.0011	mg/Kg wet	0.0113		108	70-130				
Bromodichloromethane	0.0111	0.0011	mg/Kg wet	0.0113		98.1	70-130				
Bromoform	0.0129	0.0011	mg/Kg wet	0.0113		114	70-130				
Bromomethane	0.0108	0.0023	mg/Kg wet	0.0113		94.9	40-160			V-20	†
2-Butanone (MEK)	0.102	0.023	mg/Kg wet	0.113		89.9	40-160			R-05	†
n-Butylbenzene	0.0120	0.0011	mg/Kg wet	0.0113		106	70-130				
sec-Butylbenzene	0.0126	0.0011	mg/Kg wet	0.0113		111	70-130				
tert-Butylbenzene	0.0125	0.0011	mg/Kg wet	0.0113		110	70-130				
tert-Butyl Ethyl Ether (TBEE)	0.0111	0.00057	mg/Kg wet	0.0113		98.3	70-130				
Carbon Disulfide	0.0137	0.011	mg/Kg wet	0.0113		121	70-130				
Carbon Tetrachloride	0.00976	0.0011	mg/Kg wet	0.0113		86.1	70-130				
Chlorobenzene	0.0122	0.0011	mg/Kg wet	0.0113		108	70-130				
Chlorodibromomethane	0.0120	0.00057	mg/Kg wet	0.0113		106	70-130				
Chloroethane	0.0125	0.0023	mg/Kg wet	0.0113		111	70-130				
Chloroform	0.0105	0.0023	mg/Kg wet	0.0113		92.4	70-130				
Chloromethane	0.00921	0.0023	mg/Kg wet	0.0113		81.3	40-160				†
2-Chlorotoluene	0.0119	0.0011	mg/Kg wet	0.0113		105	70-130				
4-Chlorotoluene	0.0116	0.0011	mg/Kg wet	0.0113		103	70-130				
1,2-Dibromo-3-chloropropane (DBCP)	0.0110	0.0045	mg/Kg wet	0.0113		97.4	70-130				
1,2-Dibromoethane (EDB)	0.0119	0.00057	mg/Kg wet	0.0113		105	70-130				
Dibromomethane	0.0114	0.0011	mg/Kg wet	0.0113		100	70-130				
1,2-Dichlorobenzene	0.0122	0.0011	mg/Kg wet	0.0113		108	70-130				
1,3-Dichlorobenzene	0.0129	0.0011	mg/Kg wet	0.0113		113	70-130				
1,4-Dichlorobenzene	0.0117	0.0011	mg/Kg wet	0.0113		103	70-130				

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QUALITY CONTROL

Volatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes	
Batch B214517 - SW-846 5035											
LCS (B214517-BS1)				Prepared: 10/11/18 Analyzed: 10/15/18							
Dichlorodifluoromethane (Freon 12)	0.00654	0.0023	mg/Kg wet	0.0113		57.7	40-160			L-14	†
1,1-Dichloroethane	0.0113	0.0011	mg/Kg wet	0.0113		99.7	70-130				
1,2-Dichloroethane	0.00954	0.0011	mg/Kg wet	0.0113		84.2	70-130				
1,1-Dichloroethylene	0.0121	0.0011	mg/Kg wet	0.0113		107	70-130				
cis-1,2-Dichloroethylene	0.0108	0.0011	mg/Kg wet	0.0113		94.9	70-130				
trans-1,2-Dichloroethylene	0.0134	0.0011	mg/Kg wet	0.0113		118	70-130				
1,2-Dichloropropane	0.0130	0.0011	mg/Kg wet	0.0113		115	70-130				
1,3-Dichloropropane	0.0108	0.00057	mg/Kg wet	0.0113		94.9	70-130				
2,2-Dichloropropane	0.0114	0.0011	mg/Kg wet	0.0113		101	70-130				
1,1-Dichloropropene	0.0106	0.0023	mg/Kg wet	0.0113		93.1	70-130				
cis-1,3-Dichloropropene	0.0123	0.00057	mg/Kg wet	0.0113		109	70-130				
trans-1,3-Dichloropropene	0.0126	0.00057	mg/Kg wet	0.0113		112	70-130				
Diethyl Ether	0.0135	0.0023	mg/Kg wet	0.0113		120	70-130				
Diisopropyl Ether (DIPE)	0.0110	0.00057	mg/Kg wet	0.0113		96.9	70-130				
1,4-Dioxane	0.121	0.057	mg/Kg wet	0.113		106	40-160			V-16	†
Ethylbenzene	0.0127	0.0011	mg/Kg wet	0.0113		112	70-130				
Hexachlorobutadiene	0.0129	0.0011	mg/Kg wet	0.0113		114	70-130				
2-Hexanone (MBK)	0.112	0.011	mg/Kg wet	0.113		99.1	40-160				†
Isopropylbenzene (Cumene)	0.0132	0.0011	mg/Kg wet	0.0113		116	70-130				
p-Isopropyltoluene (p-Cymene)	0.0124	0.0011	mg/Kg wet	0.0113		110	70-130				
Methyl tert-Butyl Ether (MTBE)	0.0132	0.0011	mg/Kg wet	0.0113		116	70-130				
Methylene Chloride	0.0125	0.0057	mg/Kg wet	0.0113		110	70-130				
4-Methyl-2-pentanone (MIBK)	0.116	0.011	mg/Kg wet	0.113		102	40-160				†
Naphthalene	0.0113	0.0023	mg/Kg wet	0.0113		99.5	70-130				
n-Propylbenzene	0.0119	0.0011	mg/Kg wet	0.0113		105	70-130				
Styrene	0.0129	0.0011	mg/Kg wet	0.0113		114	70-130				
1,1,1,2-Tetrachloroethane	0.0133	0.0011	mg/Kg wet	0.0113		118	70-130				
1,1,2,2-Tetrachloroethane	0.0126	0.00057	mg/Kg wet	0.0113		111	70-130				
Tetrachloroethylene	0.0131	0.0011	mg/Kg wet	0.0113		116	70-130				
Tetrahydrofuran	0.0111	0.0045	mg/Kg wet	0.0113		98.1	70-130				
Toluene	0.0121	0.0011	mg/Kg wet	0.0113		107	70-130				
1,2,3-Trichlorobenzene	0.0119	0.0045	mg/Kg wet	0.0113		105	70-130				
1,2,4-Trichlorobenzene	0.0121	0.0011	mg/Kg wet	0.0113		106	70-130				
1,1,1-Trichloroethane	0.0108	0.0011	mg/Kg wet	0.0113		95.0	70-130				
1,1,2-Trichloroethane	0.0121	0.0011	mg/Kg wet	0.0113		107	70-130				
Trichloroethylene	0.0121	0.0011	mg/Kg wet	0.0113		107	70-130				
Trichlorofluoromethane (Freon 11)	0.00985	0.0023	mg/Kg wet	0.0113		86.9	70-130				
1,2,3-Trichloropropane	0.0114	0.0023	mg/Kg wet	0.0113		101	70-130				
1,2,4-Trimethylbenzene	0.0120	0.0011	mg/Kg wet	0.0113		106	70-130				
1,3,5-Trimethylbenzene	0.0124	0.0011	mg/Kg wet	0.0113		109	70-130				
Vinyl Chloride	0.00967	0.0023	mg/Kg wet	0.0113		85.3	70-130				
m+p Xylene	0.0247	0.0023	mg/Kg wet	0.0227		109	70-130				
o-Xylene	0.0123	0.0011	mg/Kg wet	0.0113		109	70-130				
Surrogate: 1,2-Dichloroethane-d4	*0.0220*		mg/Kg wet	0.0283		77.8	70-130				
Surrogate: Toluene-d8	*0.0284*		mg/Kg wet	0.0283		100	70-130				
Surrogate: 4-Bromofluorobenzene	*0.0285*		mg/Kg wet	0.0283		101	70-130				

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QUALITY CONTROL

Volatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD		RPD Limit	Notes	
Batch B214517 - SW-846 5035													
LCS Dup (B214517-BSD1)				Prepared: 10/11/18 Analyzed: 10/15/18									
Acetone	0.184	0.057	mg/Kg wet	0.113		**163**	*	40-160	**40.9**	*	20	L-07A, R-05	†
tert-Amyl Methyl Ether (TAME)	0.0115	0.00057	mg/Kg wet	0.0113		101		70-130	0.395		20		
Benzene	0.0108	0.0011	mg/Kg wet	0.0113		94.9		70-130	3.32		20		
Bromobenzene	0.0115	0.0011	mg/Kg wet	0.0113		101		70-130	4.45		20		
Bromochloromethane	0.0121	0.0011	mg/Kg wet	0.0113		107		70-130	0.558		20		
Bromodichloromethane	0.0109	0.0011	mg/Kg wet	0.0113		96.0		70-130	2.16		20		
Bromoform	0.0131	0.0011	mg/Kg wet	0.0113		116		70-130	1.48		20		
Bromomethane	0.0123	0.0023	mg/Kg wet	0.0113		109		40-160	13.4		20	V-20	†
2-Butanone (MEK)	0.130	0.023	mg/Kg wet	0.113		115		40-160	**24.6**	*	20	R-05	†
n-Butylbenzene	0.0116	0.0011	mg/Kg wet	0.0113		102		70-130	3.94		20		
sec-Butylbenzene	0.0119	0.0011	mg/Kg wet	0.0113		105		70-130	5.47		20		
tert-Butylbenzene	0.0118	0.0011	mg/Kg wet	0.0113		104		70-130	5.31		20		
tert-Butyl Ethyl Ether (TBEE)	0.0109	0.00057	mg/Kg wet	0.0113		96.6		70-130	1.74		20		
Carbon Disulfide	0.0126	0.011	mg/Kg wet	0.0113		111		70-130	9.05		20		
Carbon Tetrachloride	0.00953	0.0011	mg/Kg wet	0.0113		84.1		70-130	2.35		20		
Chlorobenzene	0.0120	0.0011	mg/Kg wet	0.0113		106		70-130	1.50		20		
Chlorodibromomethane	0.0118	0.00057	mg/Kg wet	0.0113		104		70-130	1.81		20		
Chloroethane	0.0120	0.0023	mg/Kg wet	0.0113		106		70-130	4.15		20		
Chloroform	0.0102	0.0023	mg/Kg wet	0.0113		89.8		70-130	2.85		20		
Chloromethane	0.00898	0.0023	mg/Kg wet	0.0113		79.2		40-160	2.62		20		†
2-Chlorotoluene	0.0114	0.0011	mg/Kg wet	0.0113		101		70-130	4.66		20		
4-Chlorotoluene	0.0112	0.0011	mg/Kg wet	0.0113		99.2		70-130	3.37		20		
1,2-Dibromo-3-chloropropane (DBCP)	0.0112	0.0045	mg/Kg wet	0.0113		98.8		70-130	1.43		20		
1,2-Dibromoethane (EDB)	0.0120	0.00057	mg/Kg wet	0.0113		106		70-130	0.856		20		
Dibromomethane	0.0113	0.0011	mg/Kg wet	0.0113		99.4		70-130	0.802		20		
1,2-Dichlorobenzene	0.0119	0.0011	mg/Kg wet	0.0113		105		70-130	2.82		20		
1,3-Dichlorobenzene	0.0121	0.0011	mg/Kg wet	0.0113		106		70-130	6.28		20		
1,4-Dichlorobenzene	0.0112	0.0011	mg/Kg wet	0.0113		98.7		70-130	4.07		20		
Dichlorodifluoromethane (Freon 12)	0.00602	0.0023	mg/Kg wet	0.0113		53.1		40-160	8.30		20	L-14	†
1,1-Dichloroethane	0.0110	0.0011	mg/Kg wet	0.0113		97.3		70-130	2.44		20		
1,2-Dichloroethane	0.00942	0.0011	mg/Kg wet	0.0113		83.1		70-130	1.32		20		
1,1-Dichloroethylene	0.0115	0.0011	mg/Kg wet	0.0113		102		70-130	5.09		20		
cis-1,2-Dichloroethylene	0.0104	0.0011	mg/Kg wet	0.0113		92.0		70-130	3.10		20		
trans-1,2-Dichloroethylene	0.0124	0.0011	mg/Kg wet	0.0113		109		70-130	8.10		20		
1,2-Dichloropropane	0.0124	0.0011	mg/Kg wet	0.0113		109		70-130	5.26		20		
1,3-Dichloropropane	0.0110	0.00057	mg/Kg wet	0.0113		97.4		70-130	2.60		20		
2,2-Dichloropropane	0.0109	0.0011	mg/Kg wet	0.0113		96.3		70-130	4.76		20		
1,1-Dichloropropene	0.0104	0.0023	mg/Kg wet	0.0113		91.6		70-130	1.62		20		
cis-1,3-Dichloropropene	0.0123	0.00057	mg/Kg wet	0.0113		108		70-130	0.277		20		
trans-1,3-Dichloropropene	0.0121	0.00057	mg/Kg wet	0.0113		107		70-130	4.03		20		
Diethyl Ether	0.0138	0.0023	mg/Kg wet	0.0113		122		70-130	2.15		20		
Diisopropyl Ether (DIPE)	0.0108	0.00057	mg/Kg wet	0.0113		95.4		70-130	1.56		20		
1,4-Dioxane	0.135	0.057	mg/Kg wet	0.113		119		40-160	11.0		20	V-16	†
Ethylbenzene	0.0120	0.0011	mg/Kg wet	0.0113		106		70-130	5.89		20		
Hexachlorobutadiene	0.0128	0.0011	mg/Kg wet	0.0113		113		70-130	1.06		20		
2-Hexanone (MBK)	0.127	0.011	mg/Kg wet	0.113		112		40-160	12.6		20		†
Isopropylbenzene (Cumene)	0.0125	0.0011	mg/Kg wet	0.0113		110		70-130	5.11		20		
p-Isopropyltoluene (p-Cymene)	0.0122	0.0011	mg/Kg wet	0.0113		108		70-130	1.84		20		
Methyl tert-Butyl Ether (MTBE)	0.0124	0.0011	mg/Kg wet	0.0113		109		70-130	6.47		20		
Methylene Chloride	0.0121	0.0057	mg/Kg wet	0.0113		107		70-130	2.86		20		
4-Methyl-2-pentanone (MIBK)	0.119	0.011	mg/Kg wet	0.113		105		40-160	2.89		20		†
Naphthalene	0.0113	0.0023	mg/Kg wet	0.0113		99.6		70-130	0.100		20		

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QUALITY CONTROL

Volatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B214517 - SW-846 5035										
LCS Dup (B214517-BSD1)				Prepared: 10/11/18 Analyzed: 10/15/18						
n-Propylbenzene	0.0114	0.0011	mg/Kg wet	0.0113		101	70-130	3.99	20	
Styrene	0.0123	0.0011	mg/Kg wet	0.0113		108	70-130	4.87	20	
1,1,1,2-Tetrachloroethane	0.0128	0.0011	mg/Kg wet	0.0113		113	70-130	3.90	20	
1,1,2,2-Tetrachloroethane	0.0126	0.00057	mg/Kg wet	0.0113		111	70-130	0.180	20	
Tetrachloroethylene	0.0120	0.0011	mg/Kg wet	0.0113		106	70-130	8.56	20	
Tetrahydrofuran	0.0122	0.0045	mg/Kg wet	0.0113		107	70-130	8.96	20	
Toluene	0.0118	0.0011	mg/Kg wet	0.0113		104	70-130	3.13	20	
1,2,3-Trichlorobenzene	0.0109	0.0045	mg/Kg wet	0.0113		96.5	70-130	8.15	20	
1,2,4-Trichlorobenzene	0.0117	0.0011	mg/Kg wet	0.0113		103	70-130	3.44	20	
1,1,1-Trichloroethane	0.0102	0.0011	mg/Kg wet	0.0113		90.0	70-130	5.41	20	
1,1,2-Trichloroethane	0.0121	0.0011	mg/Kg wet	0.0113		107	70-130	0.374	20	
Trichloroethylene	0.0115	0.0011	mg/Kg wet	0.0113		101	70-130	5.47	20	
Trichlorofluoromethane (Freon 11)	0.00946	0.0023	mg/Kg wet	0.0113		83.5	70-130	3.99	20	
1,2,3-Trichloropropane	0.0115	0.0023	mg/Kg wet	0.0113		102	70-130	0.987	20	
1,2,4-Trimethylbenzene	0.0115	0.0011	mg/Kg wet	0.0113		102	70-130	3.95	20	
1,3,5-Trimethylbenzene	0.0118	0.0011	mg/Kg wet	0.0113		104	70-130	5.25	20	
Vinyl Chloride	0.00924	0.0023	mg/Kg wet	0.0113		81.5	70-130	4.56	20	
m+p Xylene	0.0234	0.0023	mg/Kg wet	0.0227		103	70-130	5.46	20	
o-Xylene	0.0117	0.0011	mg/Kg wet	0.0113		104	70-130	4.72	20	
Surrogate: 1,2-Dichloroethane-d4	*0.0220*		mg/Kg wet	0.0283		77.7	70-130			
Surrogate: Toluene-d8	*0.0285*		mg/Kg wet	0.0283		101	70-130			
Surrogate: 4-Bromofluorobenzene	*0.0284*		mg/Kg wet	0.0283		100	70-130			

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QUALITY CONTROL

Semivolatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B214942 - SW-846 3546										
Blank (B214942-BLK1)				Prepared: 10/16/18 Analyzed: 10/18/18						
Acenaphthene	ND	0.17	mg/Kg wet							
Acenaphthylene	ND	0.17	mg/Kg wet							
Acetophenone	ND	0.34	mg/Kg wet							
Aniline	ND	0.34	mg/Kg wet							V-34
Anthracene	ND	0.17	mg/Kg wet							
Benzo(a)anthracene	ND	0.17	mg/Kg wet							
Benzo(a)pyrene	ND	0.17	mg/Kg wet							
Benzo(b)fluoranthene	ND	0.17	mg/Kg wet							
Benzo(g,h,i)perylene	ND	0.17	mg/Kg wet							
Benzo(k)fluoranthene	ND	0.17	mg/Kg wet							
Bis(2-chloroethoxy)methane	ND	0.34	mg/Kg wet							
Bis(2-chloroethyl)ether	ND	0.34	mg/Kg wet							V-20
Bis(2-chloroisopropyl)ether	ND	0.34	mg/Kg wet							V-20
Bis(2-Ethylhexyl)phthalate	ND	0.34	mg/Kg wet							
4-Bromophenylphenylether	ND	0.34	mg/Kg wet							
Butylbenzylphthalate	ND	0.34	mg/Kg wet							
4-Chloroaniline	ND	0.66	mg/Kg wet							V-34
2-Chloronaphthalene	ND	0.34	mg/Kg wet							
2-Chlorophenol	ND	0.34	mg/Kg wet							
Chrysene	ND	0.17	mg/Kg wet							
Dibenz(a,h)anthracene	ND	0.17	mg/Kg wet							
Dibenzofuran	ND	0.34	mg/Kg wet							
Di-n-butylphthalate	ND	0.34	mg/Kg wet							
1,2-Dichlorobenzene	ND	0.34	mg/Kg wet							
1,3-Dichlorobenzene	ND	0.34	mg/Kg wet							
1,4-Dichlorobenzene	ND	0.34	mg/Kg wet							
3,3-Dichlorobenzidine	ND	0.17	mg/Kg wet							
2,4-Dichlorophenol	ND	0.34	mg/Kg wet							
Diethylphthalate	ND	0.34	mg/Kg wet							
2,4-Dimethylphenol	ND	0.34	mg/Kg wet							
Dimethylphthalate	ND	0.34	mg/Kg wet							
2,4-Dinitrophenol	ND	0.66	mg/Kg wet							V-19
2,4-Dinitrotoluene	ND	0.34	mg/Kg wet							
2,6-Dinitrotoluene	ND	0.34	mg/Kg wet							
Di-n-octylphthalate	ND	0.34	mg/Kg wet							V-20
1,2-Diphenylhydrazine (as Azobenzene)	ND	0.34	mg/Kg wet							
Fluoranthene	ND	0.17	mg/Kg wet							
Fluorene	ND	0.17	mg/Kg wet							
Hexachlorobenzene	ND	0.34	mg/Kg wet							
Hexachlorobutadiene	ND	0.34	mg/Kg wet							
Hexachloroethane	ND	0.34	mg/Kg wet							
Indeno(1,2,3-cd)pyrene	ND	0.17	mg/Kg wet							
Isophorone	ND	0.34	mg/Kg wet							
2-Methylnaphthalene	ND	0.17	mg/Kg wet							
2-Methylphenol	ND	0.34	mg/Kg wet							
3/4-Methylphenol	ND	0.34	mg/Kg wet							
Naphthalene	ND	0.17	mg/Kg wet							
Nitrobenzene	ND	0.34	mg/Kg wet							
2-Nitrophenol	ND	0.34	mg/Kg wet							
4-Nitrophenol	ND	0.66	mg/Kg wet							V-20
Pentachlorophenol	ND	0.34	mg/Kg wet							
Phenanthrene	ND	0.17	mg/Kg wet							

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

QUALITY CONTROL

Semivolatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes	
Batch B214942 - SW-846 3546											
Blank (B214942-BLK1)				Prepared: 10/16/18 Analyzed: 10/18/18							
Phenol	ND	0.34	mg/Kg wet								
Pyrene	ND	0.17	mg/Kg wet								
1,2,4-Trichlorobenzene	ND	0.34	mg/Kg wet								
2,4,5-Trichlorophenol	ND	0.34	mg/Kg wet								
2,4,6-Trichlorophenol	ND	0.34	mg/Kg wet								
Surrogate: 2-Fluorophenol	*5.36*		mg/Kg wet	6.67		80.4	30-130				
Surrogate: Phenol-d6	*5.69*		mg/Kg wet	6.67		85.3	30-130				
Surrogate: Nitrobenzene-d5	*2.98*		mg/Kg wet	3.33		89.5	30-130				
Surrogate: 2-Fluorobiphenyl	*2.72*		mg/Kg wet	3.33		81.6	30-130				
Surrogate: 2,4,6-Tribromophenol	*7.02*		mg/Kg wet	6.67		105	30-130				
Surrogate: p-Terphenyl-d14	*3.72*		mg/Kg wet	3.33		112	30-130				
LCS (B214942-BS1)				Prepared: 10/16/18 Analyzed: 10/18/18							
Acenaphthene	1.18	0.17	mg/Kg wet	1.67		70.9	40-140				
Acenaphthylene	1.24	0.17	mg/Kg wet	1.67		74.5	40-140				
Acetophenone	1.31	0.34	mg/Kg wet	1.67		78.6	40-140				
Aniline	1.08	0.34	mg/Kg wet	1.67		65.1	40-140			V-34	
Anthracene	1.24	0.17	mg/Kg wet	1.67		74.3	40-140				
Benzo(a)anthracene	1.29	0.17	mg/Kg wet	1.67		77.5	40-140				
Benzo(a)pyrene	1.29	0.17	mg/Kg wet	1.67		77.5	40-140				
Benzo(b)fluoranthene	1.19	0.17	mg/Kg wet	1.67		71.2	40-140				
Benzo(g,h,i)perylene	1.29	0.17	mg/Kg wet	1.67		77.5	40-140				
Benzo(k)fluoranthene	1.26	0.17	mg/Kg wet	1.67		75.4	40-140				
Bis(2-chloroethoxy)methane	1.49	0.34	mg/Kg wet	1.67		89.4	40-140				
Bis(2-chloroethyl)ether	1.39	0.34	mg/Kg wet	1.67		83.5	40-140			V-06	
Bis(2-chloroisopropyl)ether	1.69	0.34	mg/Kg wet	1.67		101	40-140			V-06	
Bis(2-Ethylhexyl)phthalate	1.59	0.34	mg/Kg wet	1.67		95.2	40-140				
4-Bromophenylphenylether	1.37	0.34	mg/Kg wet	1.67		81.9	40-140				
Butylbenzylphthalate	1.51	0.34	mg/Kg wet	1.67		90.7	40-140				
4-Chloroaniline	0.752	0.66	mg/Kg wet	1.67		45.1	15-140			V-34	†
2-Chloronaphthalene	1.16	0.34	mg/Kg wet	1.67		69.9	40-140				
2-Chlorophenol	1.16	0.34	mg/Kg wet	1.67		69.8	30-130				
Chrysene	1.20	0.17	mg/Kg wet	1.67		71.9	40-140				
Dibenz(a,h)anthracene	1.30	0.17	mg/Kg wet	1.67		77.9	40-140				
Dibenzofuran	1.26	0.34	mg/Kg wet	1.67		75.7	40-140				
Di-n-butylphthalate	1.35	0.34	mg/Kg wet	1.67		80.9	40-140				
1,2-Dichlorobenzene	0.999	0.34	mg/Kg wet	1.67		59.9	40-140				
1,3-Dichlorobenzene	0.983	0.34	mg/Kg wet	1.67		59.0	40-140				
1,4-Dichlorobenzene	0.981	0.34	mg/Kg wet	1.67		58.9	40-140				
3,3-Dichlorobenzidine	1.10	0.17	mg/Kg wet	1.67		66.0	40-140				
2,4-Dichlorophenol	1.25	0.34	mg/Kg wet	1.67		75.2	30-130				
Diethylphthalate	1.39	0.34	mg/Kg wet	1.67		83.3	40-140				
2,4-Dimethylphenol	1.06	0.34	mg/Kg wet	1.67		63.8	30-130				
Dimethylphthalate	1.34	0.34	mg/Kg wet	1.67		80.1	40-140				
2,4-Dinitrophenol	1.27	0.66	mg/Kg wet	1.67		76.3	15-140			V-19	†
2,4-Dinitrotoluene	1.32	0.34	mg/Kg wet	1.67		79.4	40-140				
2,6-Dinitrotoluene	1.40	0.34	mg/Kg wet	1.67		84.1	40-140				
Di-n-octylphthalate	1.61	0.34	mg/Kg wet	1.67		96.3	40-140			V-06	
1,2-Diphenylhydrazine (as Azobenzene)	1.56	0.34	mg/Kg wet	1.67		93.3	40-140				
Fluoranthene	1.16	0.17	mg/Kg wet	1.67		69.8	40-140				
Fluorene	1.24	0.17	mg/Kg wet	1.67		74.6	40-140				
Hexachlorobenzene	1.30	0.34	mg/Kg wet	1.67		78.3	40-140				

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

QUALITY CONTROL

Semivolatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes	
Batch B214942 - SW-846 3546											
LCS (B214942-BS1)				Prepared: 10/16/18 Analyzed: 10/18/18							
Hexachlorobutadiene	1.06	0.34	mg/Kg wet	1.67		63.9	40-140				
Hexachloroethane	1.11	0.34	mg/Kg wet	1.67		66.4	40-140				
Indeno(1,2,3-cd)pyrene	1.41	0.17	mg/Kg wet	1.67		84.8	40-140				
Isophorone	1.46	0.34	mg/Kg wet	1.67		87.8	40-140				
2-Methylnaphthalene	1.28	0.17	mg/Kg wet	1.67		76.5	40-140				
2-Methylphenol	1.27	0.34	mg/Kg wet	1.67		76.1	30-130				
3/4-Methylphenol	1.37	0.34	mg/Kg wet	1.67		82.3	30-130				
Naphthalene	1.16	0.17	mg/Kg wet	1.67		69.8	40-140				
Nitrobenzene	1.34	0.34	mg/Kg wet	1.67		80.1	40-140				
2-Nitrophenol	1.31	0.34	mg/Kg wet	1.67		78.5	30-130				
4-Nitrophenol	1.65	0.66	mg/Kg wet	1.67		98.7	15-140			V-06	†
Pentachlorophenol	0.996	0.34	mg/Kg wet	1.67		59.8	30-130				
Phenanthrene	1.29	0.17	mg/Kg wet	1.67		77.3	40-140				
Phenol	1.35	0.34	mg/Kg wet	1.67		80.8	15-140				†
Pyrene	1.37	0.17	mg/Kg wet	1.67		82.4	40-140				
1,2,4-Trichlorobenzene	1.05	0.34	mg/Kg wet	1.67		63.0	40-140				
2,4,5-Trichlorophenol	1.26	0.34	mg/Kg wet	1.67		75.5	30-130				
2,4,6-Trichlorophenol	1.26	0.34	mg/Kg wet	1.67		75.4	30-130				
Surrogate: 2-Fluorophenol	*4.90*		mg/Kg wet	6.67		73.5	30-130				
Surrogate: Phenol-d6	*5.86*		mg/Kg wet	6.67		87.9	30-130				
Surrogate: Nitrobenzene-d5	*2.86*		mg/Kg wet	3.33		85.8	30-130				
Surrogate: 2-Fluorobiphenyl	*2.87*		mg/Kg wet	3.33		86.0	30-130				
Surrogate: 2,4,6-Tribromophenol	*6.80*		mg/Kg wet	6.67		102	30-130				
Surrogate: p-Terphenyl-d14	*3.22*		mg/Kg wet	3.33		96.6	30-130				
LCS Dup (B214942-BSD1)				Prepared: 10/16/18 Analyzed: 10/18/18							
Acenaphthene	1.13	0.17	mg/Kg wet	1.67		68.0	40-140	4.15	30		
Acenaphthylene	1.13	0.17	mg/Kg wet	1.67		67.5	40-140	9.80	30		
Acetophenone	1.11	0.34	mg/Kg wet	1.67		66.7	40-140	16.3	30		
Aniline	0.911	0.34	mg/Kg wet	1.67		54.7	40-140	17.4	30	V-34	
Anthracene	1.18	0.17	mg/Kg wet	1.67		71.1	40-140	4.43	30		
Benzo(a)anthracene	1.20	0.17	mg/Kg wet	1.67		72.3	40-140	7.00	30		
Benzo(a)pyrene	1.30	0.17	mg/Kg wet	1.67		78.1	40-140	0.668	30		
Benzo(b)fluoranthene	1.17	0.17	mg/Kg wet	1.67		70.4	40-140	1.10	30		
Benzo(g,h,i)perylene	1.24	0.17	mg/Kg wet	1.67		74.3	40-140	4.24	30		
Benzo(k)fluoranthene	1.20	0.17	mg/Kg wet	1.67		72.2	40-140	4.33	30		
Bis(2-chloroethoxy)methane	1.25	0.34	mg/Kg wet	1.67		74.9	40-140	17.6	30		
Bis(2-chloroethyl)ether	1.18	0.34	mg/Kg wet	1.67		70.6	40-140	16.7	30	V-06	
Bis(2-chloroisopropyl)ether	1.40	0.34	mg/Kg wet	1.67		84.1	40-140	18.5	30	V-06	
Bis(2-Ethylhexyl)phthalate	1.48	0.34	mg/Kg wet	1.67		88.9	40-140	6.85	30		
4-Bromophenylphenylether	1.19	0.34	mg/Kg wet	1.67		71.4	40-140	13.7	30		
Butylbenzylphthalate	1.41	0.34	mg/Kg wet	1.67		84.6	40-140	7.03	30		
4-Chloroaniline	0.697	0.66	mg/Kg wet	1.67		41.8	15-140	7.50	30	V-34	†
2-Chloronaphthalene	0.977	0.34	mg/Kg wet	1.67		58.6	40-140	17.5	30		
2-Chlorophenol	0.986	0.34	mg/Kg wet	1.67		59.1	30-130	16.5	30		
Chrysene	1.16	0.17	mg/Kg wet	1.67		69.6	40-140	3.28	30		
Dibenz(a,h)anthracene	1.23	0.17	mg/Kg wet	1.67		73.5	40-140	5.73	30		
Dibenzofuran	1.17	0.34	mg/Kg wet	1.67		70.2	40-140	7.59	30		
Di-n-butylphthalate	1.25	0.34	mg/Kg wet	1.67		75.0	40-140	7.57	30		
1,2-Dichlorobenzene	0.888	0.34	mg/Kg wet	1.67		53.3	40-140	11.8	30		
1,3-Dichlorobenzene	0.864	0.34	mg/Kg wet	1.67		51.9	40-140	12.9	30		
1,4-Dichlorobenzene	0.875	0.34	mg/Kg wet	1.67		52.5	40-140	11.5	30		

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

QUALITY CONTROL

Semivolatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes	
Batch B214942 - SW-846 3546												
LCS Dup (B214942-BSD1)				Prepared: 10/16/18 Analyzed: 10/18/18								
3,3-Dichlorobenzidine	1.14	0.17	mg/Kg wet	1.67		68.3		40-140	3.46	30		
2,4-Dichlorophenol	1.11	0.34	mg/Kg wet	1.67		66.7		30-130	12.1	30		
Diethylphthalate	1.27	0.34	mg/Kg wet	1.67		76.4		40-140	8.54	30		
2,4-Dimethylphenol	0.908	0.34	mg/Kg wet	1.67		54.5		30-130	15.7	30		
Dimethylphthalate	1.27	0.34	mg/Kg wet	1.67		76.2		40-140	5.07	30		
2,4-Dinitrophenol	1.20	0.66	mg/Kg wet	1.67		72.2		15-140	5.50	30	V-19	†
2,4-Dinitrotoluene	1.24	0.34	mg/Kg wet	1.67		74.6		40-140	6.18	30		
2,6-Dinitrotoluene	1.33	0.34	mg/Kg wet	1.67		79.6		40-140	5.52	30		
Di-n-octylphthalate	1.60	0.34	mg/Kg wet	1.67		95.9		40-140	0.437	30	V-06	
1,2-Diphenylhydrazine (as Azobenzene)	1.37	0.34	mg/Kg wet	1.67		82.2		40-140	12.7	30		
Fluoranthene	1.09	0.17	mg/Kg wet	1.67		65.4		40-140	6.48	30		
Fluorene	1.17	0.17	mg/Kg wet	1.67		70.4		40-140	5.74	30		
Hexachlorobenzene	1.13	0.34	mg/Kg wet	1.67		67.8		40-140	14.3	30		
Hexachlorobutadiene	0.903	0.34	mg/Kg wet	1.67		54.2		40-140	16.4	30		
Hexachloroethane	0.971	0.34	mg/Kg wet	1.67		58.2		40-140	13.2	30		
Indeno(1,2,3-cd)pyrene	1.26	0.17	mg/Kg wet	1.67		75.5		40-140	11.6	30		
Isophorone	1.24	0.34	mg/Kg wet	1.67		74.3		40-140	16.6	30		
2-Methylnaphthalene	1.13	0.17	mg/Kg wet	1.67		67.9		40-140	11.9	30		
2-Methylphenol	1.06	0.34	mg/Kg wet	1.67		63.5		30-130	18.0	30		
3/4-Methylphenol	1.19	0.34	mg/Kg wet	1.67		71.1		30-130	14.6	30		
Naphthalene	0.985	0.17	mg/Kg wet	1.67		59.1		40-140	16.6	30		
Nitrobenzene	1.09	0.34	mg/Kg wet	1.67		65.5		40-140	20.0	30		
2-Nitrophenol	1.10	0.34	mg/Kg wet	1.67		65.9		30-130	17.4	30		
4-Nitrophenol	1.41	0.66	mg/Kg wet	1.67		84.3		15-140	15.7	30	V-06	†
Pentachlorophenol	0.810	0.34	mg/Kg wet	1.67		48.6		30-130	20.6	30		
Phenanthrene	1.18	0.17	mg/Kg wet	1.67		70.6		40-140	9.06	30		
Phenol	1.14	0.34	mg/Kg wet	1.67		68.2		15-140	16.9	30		†
Pyrene	1.25	0.17	mg/Kg wet	1.67		74.8		40-140	9.72	30		
1,2,4-Trichlorobenzene	0.926	0.34	mg/Kg wet	1.67		55.6		40-140	12.6	30		
2,4,5-Trichlorophenol	1.21	0.34	mg/Kg wet	1.67		72.6		30-130	3.89	30		
2,4,6-Trichlorophenol	1.20	0.34	mg/Kg wet	1.67		72.2		30-130	4.28	30		
Surrogate: 2-Fluorophenol	*4.08*		mg/Kg wet	6.67		61.2		30-130				
Surrogate: Phenol-d6	*4.90*		mg/Kg wet	6.67		73.5		30-130				
Surrogate: Nitrobenzene-d5	*2.33*		mg/Kg wet	3.33		69.8		30-130				
Surrogate: 2-Fluorobiphenyl	*2.53*		mg/Kg wet	3.33		75.9		30-130				
Surrogate: 2,4,6-Tribromophenol	*6.24*		mg/Kg wet	6.67		93.6		30-130				
Surrogate: p-Terphenyl-d14	*2.82*		mg/Kg wet	3.33		84.8		30-130				
Matrix Spike (B214942-MS1)	**Source: 18J0650-01**			Prepared: 10/16/18 Analyzed: 10/18/18								
Acenaphthene	1.42	0.21	mg/Kg dry	2.05	ND	69.4		40-140				
Acenaphthylene	1.43	0.21	mg/Kg dry	2.05	ND	69.8		40-140				
Acetophenone	1.60	0.42	mg/Kg dry	2.05	ND	78.2		40-140				
Aniline	0.514	0.42	mg/Kg dry	2.05	ND	**25.1**	*	40-140			MS-09, V-34	
Anthracene	1.46	0.21	mg/Kg dry	2.05	ND	71.5		40-140				
Benzo(a)anthracene	1.47	0.21	mg/Kg dry	2.05	ND	71.8		40-140				
Benzo(a)pyrene	1.51	0.21	mg/Kg dry	2.05	ND	73.7		40-140				
Benzo(b)fluoranthene	1.44	0.21	mg/Kg dry	2.05	ND	70.6		40-140				
Benzo(g,h,i)perylene	1.33	0.21	mg/Kg dry	2.05	ND	65.0		40-140				
Benzo(k)fluoranthene	1.39	0.21	mg/Kg dry	2.05	ND	67.8		40-140				
Bis(2-chloroethoxy)methane	1.77	0.42	mg/Kg dry	2.05	ND	86.6		40-140				
Bis(2-chloroethyl)ether	1.69	0.42	mg/Kg dry	2.05	ND	82.4		40-140			V-06	
Bis(2-chloroisopropyl)ether	1.94	0.42	mg/Kg dry	2.05	ND	95.0		40-140			V-06	

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

QUALITY CONTROL

Semivolatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes
Batch B214942 - SW-846 3546											
Matrix Spike (B214942-MS1)	**Source: 18J0650-01**			Prepared: 10/16/18 Analyzed: 10/18/18							
Bis(2-Ethylhexyl)phthalate	1.82	0.42	mg/Kg dry	2.05	ND	88.7		40-140			
4-Bromophenylphenylether	1.59	0.42	mg/Kg dry	2.05	ND	77.6		40-140			
Butylbenzylphthalate	1.73	0.42	mg/Kg dry	2.05	ND	84.8		40-140			
4-Chloroaniline	0.592	0.81	mg/Kg dry	2.05	ND	**28.9**	*	40-140			MS-09, V-34
2-Chloronaphthalene	1.27	0.42	mg/Kg dry	2.05	ND	62.1		40-140			
2-Chlorophenol	1.44	0.42	mg/Kg dry	2.05	ND	70.5		30-130			
Chrysene	1.34	0.21	mg/Kg dry	2.05	ND	65.6		40-140			
Dibenz(a,h)anthracene	1.41	0.21	mg/Kg dry	2.05	ND	69.1		40-140			
Dibenzofuran	1.43	0.42	mg/Kg dry	2.05	ND	70.1		40-140			
Di-n-butylphthalate	1.55	0.42	mg/Kg dry	2.05	ND	76.0		40-140			
1,2-Dichlorobenzene	1.26	0.42	mg/Kg dry	2.05	ND	61.5		40-140			
1,3-Dichlorobenzene	1.20	0.42	mg/Kg dry	2.05	ND	58.5		40-140			
1,4-Dichlorobenzene	1.21	0.42	mg/Kg dry	2.05	ND	59.2		40-140			
3,3-Dichlorobenzidine	1.01	0.21	mg/Kg dry	2.05	ND	49.2		40-140			
2,4-Dichlorophenol	1.47	0.42	mg/Kg dry	2.05	ND	71.9		30-130			
Diethylphthalate	1.56	0.42	mg/Kg dry	2.05	ND	76.2		40-140			
2,4-Dimethylphenol	1.34	0.42	mg/Kg dry	2.05	ND	65.3		30-130			
Dimethylphthalate	1.56	0.42	mg/Kg dry	2.05	ND	76.4		40-140			
2,4-Dinitrophenol	1.37	0.81	mg/Kg dry	2.05	ND	67.0		30-130			V-19
2,4-Dinitrotoluene	1.50	0.42	mg/Kg dry	2.05	ND	73.1		40-140			
2,6-Dinitrotoluene	1.70	0.42	mg/Kg dry	2.05	ND	83.0		40-140			
Di-n-octylphthalate	1.90	0.42	mg/Kg dry	2.05	ND	92.7		40-140			V-06
1,2-Diphenylhydrazine (as Azobenzene)	1.79	0.42	mg/Kg dry	2.05	ND	87.3		40-140			
Fluoranthene	1.39	0.21	mg/Kg dry	2.05	ND	67.9		40-140			
Fluorene	1.41	0.21	mg/Kg dry	2.05	ND	69.1		40-140			
Hexachlorobenzene	1.52	0.42	mg/Kg dry	2.05	ND	74.3		40-140			
Hexachlorobutadiene	1.39	0.42	mg/Kg dry	2.05	ND	67.9		40-140			
Hexachloroethane	1.33	0.42	mg/Kg dry	2.05	ND	65.1		40-140			
Indeno(1,2,3-cd)pyrene	1.41	0.21	mg/Kg dry	2.05	ND	69.1		40-140			
Isophorone	1.71	0.42	mg/Kg dry	2.05	ND	83.4		40-140			
2-Methylnaphthalene	1.53	0.21	mg/Kg dry	2.05	ND	75.0		40-140			
2-Methylphenol	1.47	0.42	mg/Kg dry	2.05	ND	71.6		30-130			
3/4-Methylphenol	1.60	0.42	mg/Kg dry	2.05	ND	78.4		30-130			
Naphthalene	1.44	0.21	mg/Kg dry	2.05	ND	70.2		40-140			
Nitrobenzene	1.60	0.42	mg/Kg dry	2.05	ND	78.2		40-140			
2-Nitrophenol	1.63	0.42	mg/Kg dry	2.05	ND	79.8		30-130			
4-Nitrophenol	1.50	0.81	mg/Kg dry	2.05	ND	73.4		30-130			V-06
Pentachlorophenol	1.13	0.42	mg/Kg dry	2.05	ND	55.1		30-130			
Phenanthrene	1.52	0.21	mg/Kg dry	2.05	ND	74.2		40-140			
Phenol	1.58	0.42	mg/Kg dry	2.05	ND	77.1		30-130			
Pyrene	1.53	0.21	mg/Kg dry	2.05	ND	75.0		40-140			
1,2,4-Trichlorobenzene	1.35	0.42	mg/Kg dry	2.05	ND	65.9		40-140			
2,4,5-Trichlorophenol	1.47	0.42	mg/Kg dry	2.05	ND	71.9		30-130			
2,4,6-Trichlorophenol	1.51	0.42	mg/Kg dry	2.05	ND	73.9		30-130			
Surrogate: 2-Fluorophenol	*5.89*		mg/Kg dry	8.18		72.0		30-130			
Surrogate: Phenol-d6	*6.79*		mg/Kg dry	8.18		82.9		30-130			
Surrogate: Nitrobenzene-d5	*3.43*		mg/Kg dry	4.09		83.8		30-130			
Surrogate: 2-Fluorobiphenyl	*3.29*		mg/Kg dry	4.09		80.4		30-130			
Surrogate: 2,4,6-Tribromophenol	*7.20*		mg/Kg dry	8.18		88.0		30-130			
Surrogate: p-Terphenyl-d14	*3.57*		mg/Kg dry	4.09		87.3		30-130			

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

QUALITY CONTROL

Semivolatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes
Batch B214942 - SW-846 3546											
Matrix Spike Dup (B214942-MSD1)	**Source: 18J0650-01**			Prepared: 10/16/18 Analyzed: 10/18/18							
Acenaphthene	1.41	0.21	mg/Kg dry	2.04	ND	68.9		40-140	0.962	30	
Acenaphthylene	1.43	0.21	mg/Kg dry	2.04	ND	70.0		40-140	0.0687	30	
Acetophenone	1.34	0.42	mg/Kg dry	2.04	ND	65.5		40-140	18.0	30	
Aniline	0.399	0.42	mg/Kg dry	2.04	ND	**19.6**	*	40-140	25.2	30	MS-09, V-34
Anthracene	1.47	0.21	mg/Kg dry	2.04	ND	72.2		40-140	0.648	30	
Benzo(a)anthracene	1.50	0.21	mg/Kg dry	2.04	ND	73.4		40-140	1.82	30	
Benzo(a)pyrene	1.52	0.21	mg/Kg dry	2.04	ND	74.4		40-140	0.673	30	
Benzo(b)fluoranthene	1.46	0.21	mg/Kg dry	2.04	ND	71.6		40-140	1.11	30	
Benzo(g,h,i)perylene	1.11	0.21	mg/Kg dry	2.04	ND	54.6		40-140	17.6	30	
Benzo(k)fluoranthene	1.44	0.21	mg/Kg dry	2.04	ND	70.8		40-140	4.01	30	
Bis(2-chloroethoxy)methane	1.57	0.42	mg/Kg dry	2.04	ND	77.2		40-140	11.9	30	
Bis(2-chloroethyl)ether	1.32	0.42	mg/Kg dry	2.04	ND	64.6		40-140	24.5	30	V-06
Bis(2-chloroisopropyl)ether	1.66	0.42	mg/Kg dry	2.04	ND	81.6		40-140	15.5	30	V-06
Bis(2-Ethylhexyl)phthalate	1.87	0.42	mg/Kg dry	2.04	ND	91.8		40-140	3.06	30	
4-Bromophenylphenylether	1.61	0.42	mg/Kg dry	2.04	ND	78.9		40-140	1.36	30	
Butylbenzylphthalate	1.80	0.42	mg/Kg dry	2.04	ND	88.5		40-140	3.97	30	
4-Chloroaniline	0.603	0.81	mg/Kg dry	2.04	ND	**29.6**	*	40-140	1.93	30	MS-09, V-34
2-Chloronaphthalene	1.23	0.42	mg/Kg dry	2.04	ND	60.3		40-140	3.23	30	
2-Chlorophenol	1.20	0.42	mg/Kg dry	2.04	ND	58.8		30-130	18.4	30	
Chrysene	1.44	0.21	mg/Kg dry	2.04	ND	70.5		40-140	6.79	30	
Dibenz(a,h)anthracene	1.12	0.21	mg/Kg dry	2.04	ND	54.9		40-140	23.1	30	
Dibenzofuran	1.48	0.42	mg/Kg dry	2.04	ND	72.5		40-140	2.98	30	
Di-n-butylphthalate	1.58	0.42	mg/Kg dry	2.04	ND	77.6		40-140	1.78	30	
1,2-Dichlorobenzene	0.972	0.42	mg/Kg dry	2.04	ND	47.7		40-140	25.6	30	
1,3-Dichlorobenzene	0.923	0.42	mg/Kg dry	2.04	ND	45.2		40-140	25.9	30	
1,4-Dichlorobenzene	0.932	0.42	mg/Kg dry	2.04	ND	45.7		40-140	26.0	30	
3,3-Dichlorobenzidine	0.969	0.21	mg/Kg dry	2.04	ND	47.5		40-140	3.80	30	
2,4-Dichlorophenol	1.37	0.42	mg/Kg dry	2.04	ND	67.3		30-130	6.99	30	
Diethylphthalate	1.55	0.42	mg/Kg dry	2.04	ND	76.2		40-140	0.300	30	
2,4-Dimethylphenol	1.18	0.42	mg/Kg dry	2.04	ND	57.9		30-130	12.2	30	
Dimethylphthalate	1.52	0.42	mg/Kg dry	2.04	ND	74.6		40-140	2.60	30	
2,4-Dinitrophenol	1.27	0.81	mg/Kg dry	2.04	ND	62.5		30-130	7.22	30	V-19
2,4-Dinitrotoluene	1.53	0.42	mg/Kg dry	2.04	ND	75.1		40-140	2.37	30	
2,6-Dinitrotoluene	1.63	0.42	mg/Kg dry	2.04	ND	80.1		40-140	3.86	30	
Di-n-octylphthalate	1.95	0.42	mg/Kg dry	2.04	ND	95.7		40-140	2.88	30	V-06
1,2-Diphenylhydrazine (as Azobenzene)	1.78	0.42	mg/Kg dry	2.04	ND	87.4		40-140	0.143	30	
Fluoranthene	1.43	0.21	mg/Kg dry	2.04	ND	69.9		40-140	2.61	30	
Fluorene	1.42	0.21	mg/Kg dry	2.04	ND	69.8		40-140	0.682	30	
Hexachlorobenzene	1.44	0.42	mg/Kg dry	2.04	ND	70.6		40-140	5.43	30	
Hexachlorobutadiene	1.16	0.42	mg/Kg dry	2.04	ND	56.8		40-140	18.2	30	
Hexachloroethane	1.03	0.42	mg/Kg dry	2.04	ND	50.5		40-140	25.5	30	
Indeno(1,2,3-cd)pyrene	1.17	0.21	mg/Kg dry	2.04	ND	57.2		40-140	19.1	30	
Isophorone	1.53	0.42	mg/Kg dry	2.04	ND	74.9		40-140	11.1	30	
2-Methylnaphthalene	1.42	0.21	mg/Kg dry	2.04	ND	69.7		40-140	7.65	30	
2-Methylphenol	1.26	0.42	mg/Kg dry	2.04	ND	61.9		30-130	14.9	30	
3/4-Methylphenol	1.43	0.42	mg/Kg dry	2.04	ND	70.2		30-130	11.4	30	
Naphthalene	1.26	0.21	mg/Kg dry	2.04	ND	61.7		40-140	13.1	30	
Nitrobenzene	1.32	0.42	mg/Kg dry	2.04	ND	64.6		40-140	19.4	30	
2-Nitrophenol	1.35	0.42	mg/Kg dry	2.04	ND	66.4		30-130	18.6	30	
4-Nitrophenol	1.44	0.81	mg/Kg dry	2.04	ND	70.6		30-130	4.10	30	V-06
Pentachlorophenol	1.12	0.42	mg/Kg dry	2.04	ND	55.0		30-130	0.399	30	
Phenanthrene	1.52	0.21	mg/Kg dry	2.04	ND	74.5		40-140	0.0234	30	

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

QUALITY CONTROL

Semivolatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B214942 - SW-846 3546										
Matrix Spike Dup (B214942-MSD1)	**Source: 18J0650-01**			Prepared: 10/16/18 Analyzed: 10/18/18						
Phenol	1.34	0.42	mg/Kg dry	2.04	ND	65.9	30-130	16.0	30	
Pyrene	1.54	0.21	mg/Kg dry	2.04	ND	75.7	40-140	0.682	30	
1,2,4-Trichlorobenzene	1.16	0.42	mg/Kg dry	2.04	ND	57.1	40-140	14.6	30	
2,4,5-Trichlorophenol	1.36	0.42	mg/Kg dry	2.04	ND	66.5	30-130	8.19	30	
2,4,6-Trichlorophenol	1.42	0.42	mg/Kg dry	2.04	ND	69.4	30-130	6.63	30	
Surrogate: 2-Fluorophenol	*4.70*		mg/Kg dry	8.16		57.6	30-130			
Surrogate: Phenol-d6	*5.92*		mg/Kg dry	8.16		72.6	30-130			
Surrogate: Nitrobenzene-d5	*2.88*		mg/Kg dry	4.08		70.6	30-130			
Surrogate: 2-Fluorobiphenyl	*3.18*		mg/Kg dry	4.08		78.0	30-130			
Surrogate: 2,4,6-Tribromophenol	*7.21*		mg/Kg dry	8.16		88.4	30-130			
Surrogate: p-Terphenyl-d14	*3.63*		mg/Kg dry	4.08		88.9	30-130			
Batch B214943 - SW-846 3546										
Blank (B214943-BLK1)				Prepared: 10/16/18 Analyzed: 10/17/18						
Acenaphthene	ND	0.17	mg/Kg wet							
Acenaphthylene	ND	0.17	mg/Kg wet							
Acetophenone	ND	0.34	mg/Kg wet							
Aniline	ND	0.34	mg/Kg wet							V-34
Anthracene	ND	0.17	mg/Kg wet							
Benzo(a)anthracene	ND	0.17	mg/Kg wet							
Benzo(a)pyrene	ND	0.17	mg/Kg wet							
Benzo(b)fluoranthene	ND	0.17	mg/Kg wet							
Benzo(g,h,i)perylene	ND	0.17	mg/Kg wet							
Benzo(k)fluoranthene	ND	0.17	mg/Kg wet							
Bis(2-chloroethoxy)methane	ND	0.34	mg/Kg wet							
Bis(2-chloroethyl)ether	ND	0.34	mg/Kg wet							
Bis(2-chloroisopropyl)ether	ND	0.34	mg/Kg wet							V-20
Bis(2-Ethylhexyl)phthalate	ND	0.34	mg/Kg wet							
4-Bromophenylphenylether	ND	0.34	mg/Kg wet							
Butylbenzylphthalate	ND	0.34	mg/Kg wet							
4-Chloroaniline	ND	0.66	mg/Kg wet							V-34
2-Chloronaphthalene	ND	0.34	mg/Kg wet							
2-Chlorophenol	ND	0.34	mg/Kg wet							
Chrysene	ND	0.17	mg/Kg wet							
Dibenz(a,h)anthracene	ND	0.17	mg/Kg wet							
Dibenzofuran	ND	0.34	mg/Kg wet							
Di-n-butylphthalate	ND	0.34	mg/Kg wet							
1,2-Dichlorobenzene	ND	0.34	mg/Kg wet							
1,3-Dichlorobenzene	ND	0.34	mg/Kg wet							
1,4-Dichlorobenzene	ND	0.34	mg/Kg wet							
3,3-Dichlorobenzidine	ND	0.17	mg/Kg wet							
2,4-Dichlorophenol	ND	0.34	mg/Kg wet							
Diethylphthalate	ND	0.34	mg/Kg wet							
2,4-Dimethylphenol	ND	0.34	mg/Kg wet							
Dimethylphthalate	ND	0.34	mg/Kg wet							
2,4-Dinitrophenol	ND	0.66	mg/Kg wet							V-19
2,4-Dinitrotoluene	ND	0.34	mg/Kg wet							
2,6-Dinitrotoluene	ND	0.34	mg/Kg wet							
Di-n-octylphthalate	ND	0.34	mg/Kg wet							
1,2-Diphenylhydrazine (as Azobenzene)	ND	0.34	mg/Kg wet							
Fluoranthene	ND	0.17	mg/Kg wet							
Fluorene	ND	0.17	mg/Kg wet							

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

QUALITY CONTROL

Semivolatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes	
Batch B214943 - SW-846 3546											
Blank (B214943-BLK1)				Prepared: 10/16/18 Analyzed: 10/17/18							
Hexachlorobenzene	ND	0.34	mg/Kg wet								
Hexachlorobutadiene	ND	0.34	mg/Kg wet								
Hexachloroethane	ND	0.34	mg/Kg wet								
Indeno(1,2,3-cd)pyrene	ND	0.17	mg/Kg wet								
Isophorone	ND	0.34	mg/Kg wet								
2-Methylnaphthalene	ND	0.17	mg/Kg wet								
2-Methylphenol	ND	0.34	mg/Kg wet								
3/4-Methylphenol	ND	0.34	mg/Kg wet								
Naphthalene	ND	0.17	mg/Kg wet								
Nitrobenzene	ND	0.34	mg/Kg wet								
2-Nitrophenol	ND	0.34	mg/Kg wet								
4-Nitrophenol	ND	0.66	mg/Kg wet								
Pentachlorophenol	ND	0.34	mg/Kg wet								
Phenanthrene	ND	0.17	mg/Kg wet								
Phenol	ND	0.34	mg/Kg wet								
Pyrene	ND	0.17	mg/Kg wet								
Pyridine	ND	0.34	mg/Kg wet								
1,2,4-Trichlorobenzene	ND	0.34	mg/Kg wet								
2,4,5-Trichlorophenol	ND	0.34	mg/Kg wet								
2,4,6-Trichlorophenol	ND	0.34	mg/Kg wet								
Surrogate: 2-Fluorophenol	*5.20*		mg/Kg wet	6.67		78.0	30-130				
Surrogate: Phenol-d6	*5.48*		mg/Kg wet	6.67		82.2	30-130				
Surrogate: Nitrobenzene-d5	*2.78*		mg/Kg wet	3.33		83.4	30-130				
Surrogate: 2-Fluorobiphenyl	*2.66*		mg/Kg wet	3.33		79.9	30-130				
Surrogate: 2,4,6-Tribromophenol	*5.46*		mg/Kg wet	6.67		81.9	30-130				
Surrogate: p-Terphenyl-d14	*2.94*		mg/Kg wet	3.33		88.3	30-130				
LCS (B214943-BS1)				Prepared: 10/16/18 Analyzed: 10/17/18							
Acenaphthene	1.01	0.17	mg/Kg wet	1.67		60.4	40-140				
Acenaphthylene	1.04	0.17	mg/Kg wet	1.67		62.4	40-140				
Acetophenone	1.14	0.34	mg/Kg wet	1.67		68.3	40-140				
Aniline	0.859	0.34	mg/Kg wet	1.67		51.6	40-140			V-34	
Anthracene	1.05	0.17	mg/Kg wet	1.67		62.8	40-140				
Benzo(a)anthracene	1.04	0.17	mg/Kg wet	1.67		62.7	40-140				
Benzo(a)pyrene	1.07	0.17	mg/Kg wet	1.67		64.1	40-140				
Benzo(b)fluoranthene	1.01	0.17	mg/Kg wet	1.67		60.9	40-140				
Benzo(g,h,i)perylene	1.03	0.17	mg/Kg wet	1.67		61.7	40-140				
Benzo(k)fluoranthene	1.03	0.17	mg/Kg wet	1.67		61.5	40-140				
Bis(2-chloroethoxy)methane	1.29	0.34	mg/Kg wet	1.67		77.2	40-140				
Bis(2-chloroethyl)ether	1.32	0.34	mg/Kg wet	1.67		79.2	40-140				
Bis(2-chloroisopropyl)ether	1.54	0.34	mg/Kg wet	1.67		92.6	40-140			V-06	
Bis(2-Ethylhexyl)phthalate	1.20	0.34	mg/Kg wet	1.67		72.3	40-140				
4-Bromophenylphenylether	1.08	0.34	mg/Kg wet	1.67		64.8	40-140				
Butylbenzylphthalate	1.18	0.34	mg/Kg wet	1.67		71.1	40-140				
4-Chloroaniline	0.663	0.66	mg/Kg wet	1.67		39.8	15-140			V-34	†
2-Chloronaphthalene	0.970	0.34	mg/Kg wet	1.67		58.2	40-140				
2-Chlorophenol	1.07	0.34	mg/Kg wet	1.67		64.3	30-130				
Chrysene	0.999	0.17	mg/Kg wet	1.67		59.9	40-140				
Dibenz(a,h)anthracene	0.960	0.17	mg/Kg wet	1.67		57.6	40-140				
Dibenzofuran	1.05	0.34	mg/Kg wet	1.67		62.8	40-140				
Di-n-butylphthalate	1.09	0.34	mg/Kg wet	1.67		65.4	40-140				
1,2-Dichlorobenzene	0.998	0.34	mg/Kg wet	1.67		59.9	40-140				

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

QUALITY CONTROL

Semivolatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes	
Batch B214943 - SW-846 3546											
LCS (B214943-BS1)				Prepared: 10/16/18 Analyzed: 10/17/18							
1,3-Dichlorobenzene	0.961	0.34	mg/Kg wet	1.67		57.6	40-140				
1,4-Dichlorobenzene	0.971	0.34	mg/Kg wet	1.67		58.2	40-140				
3,3-Dichlorobenzidine	0.885	0.17	mg/Kg wet	1.67		53.1	40-140				
2,4-Dichlorophenol	1.06	0.34	mg/Kg wet	1.67		63.5	30-130				
Diethylphthalate	1.07	0.34	mg/Kg wet	1.67		63.9	40-140				
2,4-Dimethylphenol	0.996	0.34	mg/Kg wet	1.67		59.8	30-130				
Dimethylphthalate	1.07	0.34	mg/Kg wet	1.67		64.2	40-140				
2,4-Dinitrophenol	0.905	0.66	mg/Kg wet	1.67		54.3	15-140			V-19	†
2,4-Dinitrotoluene	1.04	0.34	mg/Kg wet	1.67		62.6	40-140				
2,6-Dinitrotoluene	1.14	0.34	mg/Kg wet	1.67		68.6	40-140				
Di-n-octylphthalate	1.06	0.34	mg/Kg wet	1.67		63.5	40-140				
1,2-Diphenylhydrazine (as Azobenzene)	1.28	0.34	mg/Kg wet	1.67		76.9	40-140				
Fluoranthene	1.01	0.17	mg/Kg wet	1.67		60.3	40-140				
Fluorene	1.02	0.17	mg/Kg wet	1.67		61.1	40-140				
Hexachlorobenzene	1.06	0.34	mg/Kg wet	1.67		63.6	40-140				
Hexachlorobutadiene	1.07	0.34	mg/Kg wet	1.67		64.3	40-140				
Hexachloroethane	1.07	0.34	mg/Kg wet	1.67		64.2	40-140				
Indeno(1,2,3-cd)pyrene	1.02	0.17	mg/Kg wet	1.67		61.3	40-140				
Isophorone	1.23	0.34	mg/Kg wet	1.67		73.9	40-140				
2-Methylnaphthalene	1.09	0.17	mg/Kg wet	1.67		65.5	40-140				
2-Methylphenol	1.03	0.34	mg/Kg wet	1.67		62.0	30-130				
3/4-Methylphenol	1.12	0.34	mg/Kg wet	1.67		67.2	30-130				
Naphthalene	1.08	0.17	mg/Kg wet	1.67		64.7	40-140				
Nitrobenzene	1.23	0.34	mg/Kg wet	1.67		74.0	40-140				
2-Nitrophenol	1.16	0.34	mg/Kg wet	1.67		69.5	30-130				
4-Nitrophenol	1.17	0.66	mg/Kg wet	1.67		70.3	15-140				†
Pentachlorophenol	0.713	0.34	mg/Kg wet	1.67		42.8	30-130				
Phenanthrene	1.04	0.17	mg/Kg wet	1.67		62.4	40-140				
Phenol	1.16	0.34	mg/Kg wet	1.67		69.7	15-140				†
Pyrene	1.08	0.17	mg/Kg wet	1.67		64.7	40-140				
Pyridine	0.714	0.34	mg/Kg wet	1.67		42.8	30-140				†
1,2,4-Trichlorobenzene	1.03	0.34	mg/Kg wet	1.67		61.8	40-140				
2,4,5-Trichlorophenol	1.01	0.34	mg/Kg wet	1.67		60.7	30-130				
2,4,6-Trichlorophenol	1.03	0.34	mg/Kg wet	1.67		61.6	30-130				
Surrogate: 2-Fluorophenol	*4.97*		mg/Kg wet	6.67		74.5	30-130				
Surrogate: Phenol-d6	*5.07*		mg/Kg wet	6.67		76.1	30-130				
Surrogate: Nitrobenzene-d5	*2.67*		mg/Kg wet	3.33		80.2	30-130				
Surrogate: 2-Fluorobiphenyl	*2.46*		mg/Kg wet	3.33		73.9	30-130				
Surrogate: 2,4,6-Tribromophenol	*5.09*		mg/Kg wet	6.67		76.3	30-130				
Surrogate: p-Terphenyl-d14	*2.53*		mg/Kg wet	3.33		76.0	30-130				
LCS Dup (B214943-BSD1)				Prepared: 10/16/18 Analyzed: 10/17/18							
Acenaphthene	0.978	0.17	mg/Kg wet	1.67		58.7	40-140	2.89	30		
Acenaphthylene	1.03	0.17	mg/Kg wet	1.67		61.5	40-140	1.32	30		
Acetophenone	1.13	0.34	mg/Kg wet	1.67		68.0	40-140	0.499	30		
Aniline	0.878	0.34	mg/Kg wet	1.67		52.7	40-140	2.15	30	V-34	
Anthracene	1.00	0.17	mg/Kg wet	1.67		60.0	40-140	4.49	30		
Benzo(a)anthracene	1.03	0.17	mg/Kg wet	1.67		61.6	40-140	1.67	30		
Benzo(a)pyrene	1.07	0.17	mg/Kg wet	1.67		64.0	40-140	0.219	30		
Benzo(b)fluoranthene	1.00	0.17	mg/Kg wet	1.67		60.1	40-140	1.29	30		
Benzo(g,h,i)perylene	1.12	0.17	mg/Kg wet	1.67		66.9	40-140	8.05	30		
Benzo(k)fluoranthene	1.05	0.17	mg/Kg wet	1.67		62.9	40-140	2.22	30		

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QUALITY CONTROL

Semivolatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes	
Batch B214943 - SW-846 3546											
LCS Dup (B214943-BSD1)				Prepared: 10/16/18 Analyzed: 10/17/18							
Bis(2-chloroethoxy)methane	1.27	0.34	mg/Kg wet	1.67		76.2	40-140	1.36	30		
Bis(2-chloroethyl)ether	1.31	0.34	mg/Kg wet	1.67		78.4	40-140	1.04	30		
Bis(2-chloroisopropyl)ether	1.54	0.34	mg/Kg wet	1.67		92.6	40-140	0.0648	30	V-06	
Bis(2-Ethylhexyl)phthalate	1.21	0.34	mg/Kg wet	1.67		72.4	40-140	0.138	30		
4-Bromophenylphenylether	1.05	0.34	mg/Kg wet	1.67		62.8	40-140	3.10	30		
Butylbenzylphthalate	1.20	0.34	mg/Kg wet	1.67		71.8	40-140	1.01	30		
4-Chloroaniline	0.653	0.66	mg/Kg wet	1.67		39.2	15-140	1.47	30	V-34	†
2-Chloronaphthalene	0.965	0.34	mg/Kg wet	1.67		57.9	40-140	0.551	30		
2-Chlorophenol	1.08	0.34	mg/Kg wet	1.67		64.6	30-130	0.372	30		
Chrysene	0.962	0.17	mg/Kg wet	1.67		57.7	40-140	3.71	30		
Dibenz(a,h)anthracene	1.04	0.17	mg/Kg wet	1.67		62.5	40-140	8.19	30		
Dibenzofuran	1.03	0.34	mg/Kg wet	1.67		61.8	40-140	1.64	30		
Di-n-butylphthalate	1.05	0.34	mg/Kg wet	1.67		63.3	40-140	3.33	30		
1,2-Dichlorobenzene	0.976	0.34	mg/Kg wet	1.67		58.6	40-140	2.23	30		
1,3-Dichlorobenzene	0.941	0.34	mg/Kg wet	1.67		56.4	40-140	2.10	30		
1,4-Dichlorobenzene	0.956	0.34	mg/Kg wet	1.67		57.3	40-140	1.56	30		
3,3-Dichlorobenzidine	0.850	0.17	mg/Kg wet	1.67		51.0	40-140	3.96	30		
2,4-Dichlorophenol	1.06	0.34	mg/Kg wet	1.67		63.9	30-130	0.659	30		
Diethylphthalate	1.06	0.34	mg/Kg wet	1.67		63.5	40-140	0.691	30		
2,4-Dimethylphenol	0.988	0.34	mg/Kg wet	1.67		59.3	30-130	0.840	30		
Dimethylphthalate	1.05	0.34	mg/Kg wet	1.67		63.0	40-140	1.98	30		
2,4-Dinitrophenol	0.868	0.66	mg/Kg wet	1.67		52.1	15-140	4.17	30	V-19	†
2,4-Dinitrotoluene	1.04	0.34	mg/Kg wet	1.67		62.2	40-140	0.705	30		
2,6-Dinitrotoluene	1.12	0.34	mg/Kg wet	1.67		67.4	40-140	1.85	30		
Di-n-octylphthalate	1.17	0.34	mg/Kg wet	1.67		70.2	40-140	10.0	30		
1,2-Diphenylhydrazine (as Azobenzene)	1.24	0.34	mg/Kg wet	1.67		74.4	40-140	3.20	30		
Fluoranthene	0.960	0.17	mg/Kg wet	1.67		57.6	40-140	4.68	30		
Fluorene	1.01	0.17	mg/Kg wet	1.67		60.9	40-140	0.361	30		
Hexachlorobenzene	1.02	0.34	mg/Kg wet	1.67		61.5	40-140	3.49	30		
Hexachlorobutadiene	1.03	0.34	mg/Kg wet	1.67		61.9	40-140	3.90	30		
Hexachloroethane	1.06	0.34	mg/Kg wet	1.67		63.8	40-140	0.594	30		
Indeno(1,2,3-cd)pyrene	1.11	0.17	mg/Kg wet	1.67		66.5	40-140	8.26	30		
Isophorone	1.21	0.34	mg/Kg wet	1.67		72.8	40-140	1.39	30		
2-Methylnaphthalene	1.09	0.17	mg/Kg wet	1.67		65.4	40-140	0.0305	30		
2-Methylphenol	1.07	0.34	mg/Kg wet	1.67		63.9	30-130	3.05	30		
3/4-Methylphenol	1.12	0.34	mg/Kg wet	1.67		67.0	30-130	0.328	30		
Naphthalene	1.05	0.17	mg/Kg wet	1.67		63.1	40-140	2.51	30		
Nitrobenzene	1.21	0.34	mg/Kg wet	1.67		72.4	40-140	2.16	30		
2-Nitrophenol	1.17	0.34	mg/Kg wet	1.67		70.3	30-130	1.09	30		
4-Nitrophenol	1.08	0.66	mg/Kg wet	1.67		65.1	15-140	7.65	30		†
Pentachlorophenol	0.708	0.34	mg/Kg wet	1.67		42.5	30-130	0.704	30		
Phenanthrene	1.02	0.17	mg/Kg wet	1.67		61.2	40-140	1.97	30		
Phenol	1.17	0.34	mg/Kg wet	1.67		70.1	15-140	0.601	30		†
Pyrene	1.07	0.17	mg/Kg wet	1.67		64.5	40-140	0.402	30		
Pyridine	0.745	0.34	mg/Kg wet	1.67		44.7	30-140	4.30	30		†
1,2,4-Trichlorobenzene	1.00	0.34	mg/Kg wet	1.67		60.1	40-140	2.76	30		
2,4,5-Trichlorophenol	1.03	0.34	mg/Kg wet	1.67		61.7	30-130	1.63	30		
2,4,6-Trichlorophenol	1.02	0.34	mg/Kg wet	1.67		61.4	30-130	0.390	30		
Surrogate: 2-Fluorophenol	*4.92*		mg/Kg wet	6.67		73.9	30-130				
Surrogate: Phenol-d6	*5.17*		mg/Kg wet	6.67		77.5	30-130				
Surrogate: Nitrobenzene-d5	*2.60*		mg/Kg wet	3.33		78.1	30-130				
Surrogate: 2-Fluorobiphenyl	*2.39*		mg/Kg wet	3.33		71.7	30-130				

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QUALITY CONTROL

Semivolatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B214943 - SW-846 3546										
LCS Dup (B214943-BSD1)				Prepared: 10/16/18 Analyzed: 10/17/18						
Surrogate: 2,4,6-Tribromophenol	*4.99*		mg/Kg wet	6.67		74.9	30-130			
Surrogate: p-Terphenyl-d14	*2.54*		mg/Kg wet	3.33		76.1	30-130			

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QUALITY CONTROL

Polychlorinated Biphenyls with 3540 Soxhlet Extraction - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B214859 - SW-846 3540C										
Blank (B214859-BLK1)				Prepared: 10/16/18 Analyzed: 10/18/18						
Aroclor-1016	ND	0.020	mg/Kg wet							
Aroclor-1016 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1221	ND	0.020	mg/Kg wet							
Aroclor-1221 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1232	ND	0.020	mg/Kg wet							
Aroclor-1232 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1242	ND	0.020	mg/Kg wet							
Aroclor-1242 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1248	ND	0.020	mg/Kg wet							
Aroclor-1248 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1254	ND	0.020	mg/Kg wet							
Aroclor-1254 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1260	ND	0.020	mg/Kg wet							
Aroclor-1260 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1262	ND	0.020	mg/Kg wet							
Aroclor-1262 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1268	ND	0.020	mg/Kg wet							
Aroclor-1268 [2C]	ND	0.020	mg/Kg wet							
Surrogate: Decachlorobiphenyl	*0.185*		mg/Kg wet	0.200		92.5	30-150			
Surrogate: Decachlorobiphenyl [2C]	*0.167*		mg/Kg wet	0.200		83.7	30-150			
Surrogate: Tetrachloro-m-xylene	*0.163*		mg/Kg wet	0.200		81.5	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*0.176*		mg/Kg wet	0.200		88.1	30-150			
LCS (B214859-BS1)				Prepared: 10/16/18 Analyzed: 10/18/18						
Aroclor-1016	0.18	0.020	mg/Kg wet	0.200		89.1	40-140			
Aroclor-1016 [2C]	0.18	0.020	mg/Kg wet	0.200		89.3	40-140			
Aroclor-1260	0.19	0.020	mg/Kg wet	0.200		93.4	40-140			
Aroclor-1260 [2C]	0.17	0.020	mg/Kg wet	0.200		84.6	40-140			
Surrogate: Decachlorobiphenyl	*0.178*		mg/Kg wet	0.200		89.2	30-150			
Surrogate: Decachlorobiphenyl [2C]	*0.162*		mg/Kg wet	0.200		81.0	30-150			
Surrogate: Tetrachloro-m-xylene	*0.165*		mg/Kg wet	0.200		82.4	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*0.177*		mg/Kg wet	0.200		88.4	30-150			
LCS Dup (B214859-BSD1)				Prepared: 10/16/18 Analyzed: 10/18/18						
Aroclor-1016	0.18	0.020	mg/Kg wet	0.200		88.0	40-140	1.21	30	
Aroclor-1016 [2C]	0.18	0.020	mg/Kg wet	0.200		89.9	40-140	0.673	30	
Aroclor-1260	0.19	0.020	mg/Kg wet	0.200		95.2	40-140	1.85	30	
Aroclor-1260 [2C]	0.17	0.020	mg/Kg wet	0.200		85.7	40-140	1.24	30	
Surrogate: Decachlorobiphenyl	*0.186*		mg/Kg wet	0.200		92.8	30-150			
Surrogate: Decachlorobiphenyl [2C]	*0.169*		mg/Kg wet	0.200		84.4	30-150			
Surrogate: Tetrachloro-m-xylene	*0.166*		mg/Kg wet	0.200		82.9	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*0.177*		mg/Kg wet	0.200		88.7	30-150			

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QUALITY CONTROL

Polychlorinated Biphenyls with 3540 Soxhlet Extraction - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B214859 - SW-846 3540C										
Matrix Spike (B214859-MS1)	**Source: 18J0650-01**			Prepared: 10/16/18 Analyzed: 10/19/18						
Aroclor-1016	0.18	0.093	mg/Kg dry	0.232	ND	78.1	40-140			
Aroclor-1016 [2C]	0.20	0.093	mg/Kg dry	0.232	ND	87.7	40-140			
Aroclor-1260	0.19	0.093	mg/Kg dry	0.232	ND	81.6	40-140			
Aroclor-1260 [2C]	0.19	0.093	mg/Kg dry	0.232	ND	83.6	40-140			
Surrogate: Decachlorobiphenyl	*0.162*		mg/Kg dry	0.232		69.8	30-150			
Surrogate: Decachlorobiphenyl [2C]	*0.149*		mg/Kg dry	0.232		64.2	30-150			
Surrogate: Tetrachloro-m-xylene	*0.142*		mg/Kg dry	0.232		61.4	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*0.159*		mg/Kg dry	0.232		68.5	30-150			
Matrix Spike Dup (B214859-MSD1)	**Source: 18J0650-01**			Prepared: 10/16/18 Analyzed: 10/19/18						
Aroclor-1016	0.18	0.099	mg/Kg dry	0.248	ND	74.2	40-140	1.66	50	
Aroclor-1016 [2C]	0.20	0.099	mg/Kg dry	0.248	ND	81.5	40-140	0.690	50	
Aroclor-1260	0.19	0.099	mg/Kg dry	0.248	ND	78.3	40-140	2.62	50	
Aroclor-1260 [2C]	0.20	0.099	mg/Kg dry	0.248	ND	80.7	40-140	3.26	50	
Surrogate: Decachlorobiphenyl	*0.170*		mg/Kg dry	0.248		68.5	30-150			
Surrogate: Decachlorobiphenyl [2C]	*0.156*		mg/Kg dry	0.248		63.0	30-150			
Surrogate: Tetrachloro-m-xylene	*0.153*		mg/Kg dry	0.248		61.7	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*0.173*		mg/Kg dry	0.248		69.8	30-150			
Batch B214861 - SW-846 3540C										
Blank (B214861-BLK1)				Prepared: 10/16/18 Analyzed: 10/18/18						
Aroclor-1016	ND	0.020	mg/Kg wet							
Aroclor-1016 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1221	ND	0.020	mg/Kg wet							
Aroclor-1221 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1232	ND	0.020	mg/Kg wet							
Aroclor-1232 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1242	ND	0.020	mg/Kg wet							
Aroclor-1242 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1248	ND	0.020	mg/Kg wet							
Aroclor-1248 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1254	ND	0.020	mg/Kg wet							
Aroclor-1254 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1260	ND	0.020	mg/Kg wet							
Aroclor-1260 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1262	ND	0.020	mg/Kg wet							
Aroclor-1262 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1268	ND	0.020	mg/Kg wet							
Aroclor-1268 [2C]	ND	0.020	mg/Kg wet							
Surrogate: Decachlorobiphenyl	*0.192*		mg/Kg wet	0.200		96.1	30-150			
Surrogate: Decachlorobiphenyl [2C]	*0.240*		mg/Kg wet	0.200		120	30-150			
Surrogate: Tetrachloro-m-xylene	*0.179*		mg/Kg wet	0.200		89.5	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*0.190*		mg/Kg wet	0.200		95.0	30-150			

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QUALITY CONTROL

Polychlorinated Biphenyls with 3540 Soxhlet Extraction - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B214861 - SW-846 3540C										
LCS (B214861-BS1)				Prepared: 10/16/18 Analyzed: 10/18/18						
Aroclor-1016	0.19	0.020	mg/Kg wet	0.200		92.8	40-140			
Aroclor-1016 [2C]	0.20	0.020	mg/Kg wet	0.200		102	40-140			
Aroclor-1260	0.18	0.020	mg/Kg wet	0.200		88.0	40-140			
Aroclor-1260 [2C]	0.21	0.020	mg/Kg wet	0.200		103	40-140			
Surrogate: Decachlorobiphenyl	*0.190*		mg/Kg wet	0.200		94.8	30-150			
Surrogate: Decachlorobiphenyl [2C]	*0.238*		mg/Kg wet	0.200		119	30-150			
Surrogate: Tetrachloro-m-xylene	*0.180*		mg/Kg wet	0.200		90.0	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*0.190*		mg/Kg wet	0.200		95.1	30-150			
LCS Dup (B214861-BSD1)				Prepared: 10/16/18 Analyzed: 10/18/18						
Aroclor-1016	0.18	0.020	mg/Kg wet	0.200		91.5	40-140	1.42	30	
Aroclor-1016 [2C]	0.20	0.020	mg/Kg wet	0.200		99.9	40-140	2.07	30	
Aroclor-1260	0.17	0.020	mg/Kg wet	0.200		85.9	40-140	2.49	30	
Aroclor-1260 [2C]	0.20	0.020	mg/Kg wet	0.200		102	40-140	1.01	30	
Surrogate: Decachlorobiphenyl	*0.190*		mg/Kg wet	0.200		95.2	30-150			
Surrogate: Decachlorobiphenyl [2C]	*0.238*		mg/Kg wet	0.200		119	30-150			
Surrogate: Tetrachloro-m-xylene	*0.179*		mg/Kg wet	0.200		89.3	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*0.190*		mg/Kg wet	0.200		94.8	30-150			
Matrix Spike (B214861-MS1)		**Source: 18J0650-22**		Prepared: 10/16/18 Analyzed: 10/18/18						
Aroclor-1016	0.19	0.088	mg/Kg dry	0.220	ND	88.2	40-140			
Aroclor-1016 [2C]	0.21	0.088	mg/Kg dry	0.220	ND	97.2	40-140			
Aroclor-1260	0.18	0.088	mg/Kg dry	0.220	ND	80.7	40-140			
Aroclor-1260 [2C]	0.21	0.088	mg/Kg dry	0.220	ND	95.4	40-140			
Surrogate: Decachlorobiphenyl	*0.173*		mg/Kg dry	0.220		78.8	30-150			
Surrogate: Decachlorobiphenyl [2C]	*0.211*		mg/Kg dry	0.220		95.8	30-150			
Surrogate: Tetrachloro-m-xylene	*0.164*		mg/Kg dry	0.220		74.5	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*0.174*		mg/Kg dry	0.220		78.9	30-150			
Matrix Spike Dup (B214861-MSD1)		**Source: 18J0650-22**		Prepared: 10/16/18 Analyzed: 10/18/18						
Aroclor-1016	0.20	0.087	mg/Kg dry	0.218	ND	93.8	40-140	5.20	50	
Aroclor-1016 [2C]	0.23	0.087	mg/Kg dry	0.218	ND	104	40-140	5.39	50	
Aroclor-1260	0.19	0.087	mg/Kg dry	0.218	ND	85.6	40-140	4.94	50	
Aroclor-1260 [2C]	0.22	0.087	mg/Kg dry	0.218	ND	102	40-140	5.36	50	
Surrogate: Decachlorobiphenyl	*0.184*		mg/Kg dry	0.218		84.6	30-150			
Surrogate: Decachlorobiphenyl [2C]	*0.226*		mg/Kg dry	0.218		104	30-150			
Surrogate: Tetrachloro-m-xylene	*0.177*		mg/Kg dry	0.218		81.1	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*0.190*		mg/Kg dry	0.218		87.0	30-150			

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - EPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B214945 - SW-846 3546										
Blank (B214945-BLK1)				Prepared: 10/16/18 Analyzed: 10/18/18						
C9-C18 Aliphatics	ND	10	mg/Kg wet							
C19-C36 Aliphatics	ND	10	mg/Kg wet							
Unadjusted C11-C22 Aromatics	ND	10	mg/Kg wet							
C11-C22 Aromatics	ND	10	mg/Kg wet							
Acenaphthene	ND	0.10	mg/Kg wet							
Acenaphthylene	ND	0.10	mg/Kg wet							
Anthracene	ND	0.10	mg/Kg wet							
Benzo(a)anthracene	ND	0.10	mg/Kg wet							
Benzo(a)pyrene	ND	0.10	mg/Kg wet							
Benzo(b)fluoranthene	ND	0.10	mg/Kg wet							
Benzo(g,h,i)perylene	ND	0.10	mg/Kg wet							
Benzo(k)fluoranthene	ND	0.10	mg/Kg wet							
Chrysene	ND	0.10	mg/Kg wet							
Dibenz(a,h)anthracene	ND	0.10	mg/Kg wet							
Fluoranthene	ND	0.10	mg/Kg wet							
Fluorene	ND	0.10	mg/Kg wet							
Indeno(1,2,3-cd)pyrene	ND	0.10	mg/Kg wet							
2-Methylnaphthalene	ND	0.10	mg/Kg wet							
Naphthalene	ND	0.10	mg/Kg wet							
Phenanthrene	ND	0.10	mg/Kg wet							
Pyrene	ND	0.10	mg/Kg wet							
n-Decane	ND	0.10	mg/Kg wet							
n-Docosane	ND	0.10	mg/Kg wet							
n-Dodecane	ND	0.10	mg/Kg wet							
n-Eicosane	ND	0.10	mg/Kg wet							
n-Hexacosane	ND	0.10	mg/Kg wet							
n-Hexadecane	ND	0.10	mg/Kg wet							
n-Hexatriacontane	ND	0.10	mg/Kg wet							
n-Nonadecane	ND	0.10	mg/Kg wet							
n-Nonane	ND	0.10	mg/Kg wet							
n-Octacosane	ND	0.10	mg/Kg wet							
n-Octadecane	0.11	0.10	mg/Kg wet							
n-Tetracosane	ND	0.10	mg/Kg wet							
n-Tetradecane	ND	0.10	mg/Kg wet							
n-Triacontane	ND	0.10	mg/Kg wet							
Naphthalene-aliphatic fraction	ND	0.10	mg/Kg wet							
2-Methylnaphthalene-aliphatic fraction	ND	0.10	mg/Kg wet							
Surrogate: Chlorooctadecane (COD)	*4.43*		mg/Kg wet	5.00		88.5	40-140			
Surrogate: o-Terphenyl (OTP)	*4.55*		mg/Kg wet	5.00		91.1	40-140			
Surrogate: 2-Bromonaphthalene	*4.57*		mg/Kg wet	5.00		91.4	40-140			
Surrogate: 2-Fluorobiphenyl	*5.21*		mg/Kg wet	5.00		104	40-140			
LCS (B214945-BS1)				Prepared: 10/16/18 Analyzed: 10/18/18						
C9-C18 Aliphatics	27.4	10	mg/Kg wet	30.0		91.4	40-140			
C19-C36 Aliphatics	40.0	10	mg/Kg wet	40.0		100	40-140			
Unadjusted C11-C22 Aromatics	79.5	10	mg/Kg wet	85.0		93.5	40-140			
Acenaphthene	4.37	0.10	mg/Kg wet	5.00		87.4	40-140			
Acenaphthylene	4.05	0.10	mg/Kg wet	5.00		81.0	40-140			
Anthracene	4.21	0.10	mg/Kg wet	5.00		84.2	40-140			
Benzo(a)anthracene	4.14	0.10	mg/Kg wet	5.00		82.7	40-140			
Benzo(a)pyrene	3.91	0.10	mg/Kg wet	5.00		78.3	40-140			
Benzo(b)fluoranthene	4.16	0.10	mg/Kg wet	5.00		83.2	40-140			

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - EPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B214945 - SW-846 3546										
LCS (B214945-BS1)				Prepared: 10/16/18 Analyzed: 10/18/18						
Benzo(g,h,i)perylene	3.98	0.10	mg/Kg wet	5.00		79.6	40-140			
Benzo(k)fluoranthene	4.14	0.10	mg/Kg wet	5.00		82.8	40-140			
Chrysene	4.30	0.10	mg/Kg wet	5.00		85.9	40-140			
Dibenz(a,h)anthracene	4.16	0.10	mg/Kg wet	5.00		83.2	40-140			
Fluoranthene	4.33	0.10	mg/Kg wet	5.00		86.7	40-140			
Fluorene	4.24	0.10	mg/Kg wet	5.00		84.8	40-140			
Indeno(1,2,3-cd)pyrene	3.87	0.10	mg/Kg wet	5.00		77.4	40-140			
2-Methylnaphthalene	3.95	0.10	mg/Kg wet	5.00		78.9	40-140			
Naphthalene	4.01	0.10	mg/Kg wet	5.00		80.3	40-140			
Phenanthrene	4.37	0.10	mg/Kg wet	5.00		87.3	40-140			
Pyrene	4.34	0.10	mg/Kg wet	5.00		86.9	40-140			
n-Decane	3.43	0.10	mg/Kg wet	5.00		68.6	40-140			
n-Docosane	4.29	0.10	mg/Kg wet	5.00		85.9	40-140			
n-Dodecane	3.99	0.10	mg/Kg wet	5.00		79.8	40-140			
n-Eicosane	4.41	0.10	mg/Kg wet	5.00		88.2	40-140			
n-Hexacosane	4.27	0.10	mg/Kg wet	5.00		85.3	40-140			
n-Hexadecane	4.34	0.10	mg/Kg wet	5.00		86.9	40-140			
n-Hexatriacontane	4.17	0.10	mg/Kg wet	5.00		83.5	40-140			
n-Nonadecane	4.27	0.10	mg/Kg wet	5.00		85.4	40-140			
n-Nonane	2.70	0.10	mg/Kg wet	5.00		53.9	30-140			
n-Octacosane	4.17	0.10	mg/Kg wet	5.00		83.4	40-140			
n-Octadecane	4.37	0.10	mg/Kg wet	5.00		87.4	40-140			B
n-Tetracosane	4.30	0.10	mg/Kg wet	5.00		86.0	40-140			
n-Tetradecane	4.22	0.10	mg/Kg wet	5.00		84.5	40-140			
n-Triacontane	4.19	0.10	mg/Kg wet	5.00		83.9	40-140			
Naphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00			0-5			
2-Methylnaphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00			0-5			
Surrogate: Chlorooctadecane (COD)	*4.35*		mg/Kg wet	5.00		87.0	40-140			
Surrogate: o-Terphenyl (OTP)	*4.44*		mg/Kg wet	5.00		88.8	40-140			
Surrogate: 2-Bromonaphthalene	*4.89*		mg/Kg wet	5.00		97.8	40-140			
Surrogate: 2-Fluorobiphenyl	*5.47*		mg/Kg wet	5.00		109	40-140			
LCS Dup (B214945-BSD1)				Prepared: 10/16/18 Analyzed: 10/18/18						
C9-C18 Aliphatics	24.9	10	mg/Kg wet	30.0		83.0	40-140	9.61	25	
C19-C36 Aliphatics	41.8	10	mg/Kg wet	40.0		105	40-140	4.31	25	
Unadjusted C11-C22 Aromatics	79.8	10	mg/Kg wet	85.0		93.8	40-140	0.381	25	
Acenaphthene	4.21	0.10	mg/Kg wet	5.00		84.2	40-140	3.78	25	
Acenaphthylene	3.88	0.10	mg/Kg wet	5.00		77.7	40-140	4.28	25	
Anthracene	4.51	0.10	mg/Kg wet	5.00		90.1	40-140	6.80	25	
Benzo(a)anthracene	4.46	0.10	mg/Kg wet	5.00		89.1	40-140	7.46	25	
Benzo(a)pyrene	4.28	0.10	mg/Kg wet	5.00		85.7	40-140	9.06	25	
Benzo(b)fluoranthene	4.48	0.10	mg/Kg wet	5.00		89.6	40-140	7.50	25	
Benzo(g,h,i)perylene	4.26	0.10	mg/Kg wet	5.00		85.2	40-140	6.81	25	
Benzo(k)fluoranthene	4.44	0.10	mg/Kg wet	5.00		88.7	40-140	6.84	25	
Chrysene	4.59	0.10	mg/Kg wet	5.00		91.8	40-140	6.59	25	
Dibenz(a,h)anthracene	4.46	0.10	mg/Kg wet	5.00		89.2	40-140	6.95	25	
Fluoranthene	4.60	0.10	mg/Kg wet	5.00		92.1	40-140	6.04	25	
Fluorene	4.28	0.10	mg/Kg wet	5.00		85.7	40-140	1.06	25	
Indeno(1,2,3-cd)pyrene	4.19	0.10	mg/Kg wet	5.00		83.8	40-140	7.94	25	
2-Methylnaphthalene	3.59	0.10	mg/Kg wet	5.00		71.7	40-140	9.58	25	
Naphthalene	3.53	0.10	mg/Kg wet	5.00		70.7	40-140	12.7	25	
Phenanthrene	4.58	0.10	mg/Kg wet	5.00		91.6	40-140	4.74	25	

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - EPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B214945 - SW-846 3546										
LCS Dup (B214945-BSD1)				Prepared: 10/16/18 Analyzed: 10/18/18						
Pyrene	4.62	0.10	mg/Kg wet	5.00		92.4	40-140	6.22	25	
n-Decane	2.81	0.10	mg/Kg wet	5.00		56.2	40-140	19.9	25	
n-Docosane	4.51	0.10	mg/Kg wet	5.00		90.3	40-140	5.02	25	
n-Dodecane	3.44	0.10	mg/Kg wet	5.00		68.8	40-140	14.8	25	
n-Eicosane	4.64	0.10	mg/Kg wet	5.00		92.7	40-140	4.97	25	
n-Hexacosane	4.49	0.10	mg/Kg wet	5.00		89.8	40-140	5.14	25	
n-Hexadecane	4.41	0.10	mg/Kg wet	5.00		88.2	40-140	1.49	25	
n-Hexatriacontane	4.43	0.10	mg/Kg wet	5.00		88.5	40-140	5.89	25	
n-Nonadecane	4.49	0.10	mg/Kg wet	5.00		89.8	40-140	5.04	25	
n-Nonane	2.10	0.10	mg/Kg wet	5.00		42.1	30-140	24.7	25	
n-Octacosane	4.40	0.10	mg/Kg wet	5.00		88.0	40-140	5.28	25	
n-Octadecane	4.57	0.10	mg/Kg wet	5.00		91.4	40-140	4.48	25	B
n-Tetracosane	4.52	0.10	mg/Kg wet	5.00		90.4	40-140	4.98	25	
n-Tetradecane	3.95	0.10	mg/Kg wet	5.00		79.0	40-140	6.74	25	
n-Triacontane	4.43	0.10	mg/Kg wet	5.00		88.7	40-140	5.55	25	
Naphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00			0-5			
2-Methylnaphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00			0-5			
Surrogate: Chlorooctadecane (COD)	*4.56*		mg/Kg wet	5.00		91.2	40-140			
Surrogate: o-Terphenyl (OTP)	*4.60*		mg/Kg wet	5.00		92.0	40-140			
Surrogate: 2-Bromonaphthalene	*4.72*		mg/Kg wet	5.00		94.4	40-140			
Surrogate: 2-Fluorobiphenyl	*5.46*		mg/Kg wet	5.00		109	40-140			

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - VPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B215011 - MA VPH										
Blank (B215011-BLK1)				Prepared & Analyzed: 10/17/18						
Unadjusted C5-C8 Aliphatics	ND	10	mg/Kg wet							
C5-C8 Aliphatics	ND	10	mg/Kg wet							
Unadjusted C9-C12 Aliphatics	ND	10	mg/Kg wet							
C9-C12 Aliphatics	ND	10	mg/Kg wet							
C9-C10 Aromatics	ND	10	mg/Kg wet							
Benzene	ND	0.050	mg/Kg wet							
Butylcyclohexane	ND	0.050	mg/Kg wet							
Decane	ND	0.050	mg/Kg wet							
Ethylbenzene	ND	0.050	mg/Kg wet							
Methyl tert-Butyl Ether (MTBE)	ND	0.050	mg/Kg wet							
2-Methylpentane	ND	0.050	mg/Kg wet							
Naphthalene	ND	0.25	mg/Kg wet							
Nonane	ND	0.050	mg/Kg wet							
Pentane	ND	0.050	mg/Kg wet							
Toluene	ND	0.050	mg/Kg wet							
1,2,4-Trimethylbenzene	ND	0.050	mg/Kg wet							
2,2,4-Trimethylpentane	ND	0.050	mg/Kg wet							
m+p Xylene	ND	0.10	mg/Kg wet							
o-Xylene	ND	0.050	mg/Kg wet							
Surrogate: 2,5-Dibromotoluene (FID)	*40.8*		µg/L	40.0		102	70-130			
Surrogate: 2,5-Dibromotoluene (PID)	*36.8*		µg/L	40.0		92.0	70-130			
LCS (B215011-BS1)				Prepared & Analyzed: 10/17/18						
Benzene	0.0501	0.0010	mg/Kg wet	0.0500		100	70-130			
Butylcyclohexane	0.0596	0.0010	mg/Kg wet	0.0500		119	70-130			
Decane	0.0484	0.0010	mg/Kg wet	0.0500		96.7	70-130			
Ethylbenzene	0.0514	0.0010	mg/Kg wet	0.0500		103	70-130			
Methyl tert-Butyl Ether (MTBE)	0.0494	0.0010	mg/Kg wet	0.0500		98.9	70-130			
2-Methylpentane	0.0560	0.0010	mg/Kg wet	0.0500		112	70-130			
Naphthalene	0.0486	0.0050	mg/Kg wet	0.0500		97.1	70-130			
Nonane	0.0584	0.0010	mg/Kg wet	0.0500		117	30-130			
Pentane	0.0540	0.0010	mg/Kg wet	0.0500		108	70-130			
Toluene	0.0506	0.0010	mg/Kg wet	0.0500		101	70-130			
1,2,4-Trimethylbenzene	0.0527	0.0010	mg/Kg wet	0.0500		105	70-130			
2,2,4-Trimethylpentane	0.0543	0.0010	mg/Kg wet	0.0500		109	70-130			
m+p Xylene	0.104	0.0020	mg/Kg wet	0.100		104	70-130			
o-Xylene	0.0513	0.0010	mg/Kg wet	0.0500		103	70-130			
Surrogate: 2,5-Dibromotoluene (FID)	*40.0*		µg/L	40.0		100	70-130			
Surrogate: 2,5-Dibromotoluene (PID)	*35.4*		µg/L	40.0		88.6	70-130			
LCS Dup (B215011-BSD1)				Prepared & Analyzed: 10/17/18						
Benzene	0.0516	0.0010	mg/Kg wet	0.0500		103	70-130	3.00	25	
Butylcyclohexane	0.0594	0.0010	mg/Kg wet	0.0500		119	70-130	0.331	25	
Decane	0.0479	0.0010	mg/Kg wet	0.0500		95.8	70-130	1.01	25	
Ethylbenzene	0.0530	0.0010	mg/Kg wet	0.0500		106	70-130	3.06	25	
Methyl tert-Butyl Ether (MTBE)	0.0505	0.0010	mg/Kg wet	0.0500		101	70-130	2.07	25	
2-Methylpentane	0.0579	0.0010	mg/Kg wet	0.0500		116	70-130	3.30	25	
Naphthalene	0.0484	0.0050	mg/Kg wet	0.0500		96.8	70-130	0.359	25	
Nonane	0.0582	0.0010	mg/Kg wet	0.0500		116	30-130	0.367	25	
Pentane	0.0569	0.0010	mg/Kg wet	0.0500		114	70-130	5.19	25	
Toluene	0.0520	0.0010	mg/Kg wet	0.0500		104	70-130	2.82	25	
1,2,4-Trimethylbenzene	0.0543	0.0010	mg/Kg wet	0.0500		109	70-130	3.02	25	

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - VPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B215011 - MA VPH										
LCS Dup (B215011-BSD1)				Prepared & Analyzed: 10/17/18						
2,2,4-Trimethylpentane	0.0569	0.0010	mg/Kg wet	0.0500		114	70-130	4.69	25	
m+p Xylene	0.108	0.0020	mg/Kg wet	0.100		108	70-130	3.03	25	
o-Xylene	0.0528	0.0010	mg/Kg wet	0.0500		106	70-130	2.89	25	
Surrogate: 2,5-Dibromotoluene (FID)	*39.7*		µg/L	40.0		99.2	70-130			
Surrogate: 2,5-Dibromotoluene (PID)	*34.9*		µg/L	40.0		87.1	70-130			

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

QUALITY CONTROL

Metals Analyses (Total) - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B214905 - SW-846 3050B										
Blank (B214905-BLK1)				Prepared: 10/16/18 Analyzed: 10/18/18						
Antimony	ND	1.6	mg/Kg wet							
Arsenic	ND	1.6	mg/Kg wet							
Barium	ND	1.6	mg/Kg wet							
Beryllium	ND	0.16	mg/Kg wet							
Cadmium	ND	0.16	mg/Kg wet							
Chromium	ND	0.32	mg/Kg wet							
Lead	ND	0.48	mg/Kg wet							
Nickel	ND	0.32	mg/Kg wet							
Selenium	ND	3.2	mg/Kg wet							
Silver	ND	0.32	mg/Kg wet							
Thallium	ND	1.6	mg/Kg wet							
Vanadium	ND	0.64	mg/Kg wet							
Zinc	ND	0.64	mg/Kg wet							
LCS (B214905-BS1)				Prepared: 10/16/18 Analyzed: 10/18/18						
Antimony	50.5	4.9	mg/Kg wet	75.5		66.9	3.8-196			
Arsenic	158	4.9	mg/Kg wet	161		98.1	83.2-116.8			
Barium	247	4.9	mg/Kg wet	260		95.0	82.7-117.3			
Beryllium	96.2	0.49	mg/Kg wet	97.6		98.6	83.4-116.8			
Cadmium	201	0.49	mg/Kg wet	211		95.3	83.4-116.6			
Chromium	129	0.98	mg/Kg wet	136		94.9	82.4-117.6			
Lead	106	1.5	mg/Kg wet	111		95.5	83-117.1			
Nickel	88.6	0.98	mg/Kg wet	91.9		96.4	82.9-117.5			
Selenium	186	9.8	mg/Kg wet	191		97.3	79.6-120.9			
Silver	42.6	0.98	mg/Kg wet	43.3		98.3	79.9-119.9			
Thallium	156	4.9	mg/Kg wet	156		99.9	81.4-119.2			
Vanadium	49.6	2.0	mg/Kg wet	56.7		87.5	79-121.2			
Zinc	192	2.0	mg/Kg wet	199		96.4	81.4-119.1			
LCS Dup (B214905-BSD1)				Prepared: 10/16/18 Analyzed: 10/18/18						
Antimony	51.9	5.0	mg/Kg wet	75.5		68.7	3.8-196	2.71	30	
Arsenic	160	5.0	mg/Kg wet	161		99.3	83.2-116.8	1.17	30	
Barium	258	5.0	mg/Kg wet	260		99.4	82.7-117.3	4.47	30	
Beryllium	97.6	0.50	mg/Kg wet	97.6		100	83.4-116.8	1.40	30	
Cadmium	205	0.50	mg/Kg wet	211		96.9	83.4-116.6	1.67	30	
Chromium	132	1.0	mg/Kg wet	136		96.9	82.4-117.6	2.04	30	
Lead	107	1.5	mg/Kg wet	111		96.0	83-117.1	0.522	30	
Nickel	90.6	1.0	mg/Kg wet	91.9		98.6	82.9-117.5	2.25	30	
Selenium	185	10	mg/Kg wet	191		97.1	79.6-120.9	0.250	30	
Silver	43.1	1.0	mg/Kg wet	43.3		99.6	79.9-119.9	1.29	30	
Thallium	159	5.0	mg/Kg wet	156		102	81.4-119.2	2.29	30	
Vanadium	49.8	2.0	mg/Kg wet	56.7		87.9	79-121.2	0.448	30	
Zinc	195	2.0	mg/Kg wet	199		97.8	81.4-119.1	1.53	30	

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QUALITY CONTROL

Metals Analyses (Total) - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes
Batch B214905 - SW-846 3050B											
Duplicate (B214905-DUP1)	**Source: 18J0650-02**			Prepared: 10/16/18 Analyzed: 10/18/18							
Antimony	ND	1.8	mg/Kg dry		ND				NC	35	
Arsenic	ND	1.8	mg/Kg dry		ND				NC	35	
Barium	23.5	1.8	mg/Kg dry		26.7				12.9	35	
Beryllium	0.376	0.18	mg/Kg dry		0.407				7.83	35	
Cadmium	ND	0.18	mg/Kg dry		ND				NC	35	
Chromium	14.7	0.35	mg/Kg dry		16.5				11.2	35	
Lead	8.24	0.53	mg/Kg dry		9.05				9.38	35	
Nickel	8.08	0.35	mg/Kg dry		8.56				5.69	35	
Selenium	ND	3.5	mg/Kg dry		ND				NC	35	
Silver	ND	0.35	mg/Kg dry		ND				NC	35	
Thallium	ND	1.8	mg/Kg dry		ND				NC	35	
Vanadium	23.2	0.71	mg/Kg dry		24.3				4.80	35	
Zinc	95.7	0.71	mg/Kg dry		99.1				3.53	35	
MRL Check (B214905-MRL1)				Prepared: 10/16/18 Analyzed: 10/18/18							
Lead	0.491	0.48	mg/Kg wet	0.479		103		80-120			
Matrix Spike (B214905-MS1)	**Source: 18J0650-02**			Prepared: 10/16/18 Analyzed: 10/18/18							
Antimony	8.94	1.8	mg/Kg dry	17.9	ND	**49.9**	*	75-125			MS-07
Arsenic	16.8	1.8	mg/Kg dry	17.9	ND	93.6		75-125			
Barium	43.2	1.8	mg/Kg dry	17.9	26.7	92.4		75-125			
Beryllium	18.2	0.18	mg/Kg dry	17.9	0.407	99.3		75-125			
Cadmium	17.7	0.18	mg/Kg dry	17.9	ND	98.6		75-125			
Chromium	32.2	0.36	mg/Kg dry	17.9	16.5	87.9		75-125			
Lead	25.5	0.54	mg/Kg dry	17.9	9.05	91.9		75-125			
Nickel	25.3	0.36	mg/Kg dry	17.9	8.56	93.6		75-125			
Selenium	15.8	3.6	mg/Kg dry	17.9	ND	88.1		75-125			
Silver	17.2	0.36	mg/Kg dry	17.9	ND	96.1		75-125			
Thallium	24.3	1.8	mg/Kg dry	17.9	ND	**136**	*	75-125			MS-14
Vanadium	42.0	0.72	mg/Kg dry	17.9	24.3	98.9		75-125			
Zinc	130	0.72	mg/Kg dry	35.8	99.1	86.1		75-125			
Batch B214921 - SW-846 7471											
Blank (B214921-BLK1)				Prepared: 10/16/18 Analyzed: 10/17/18							
Mercury	ND	0.025	mg/Kg wet								
LCS (B214921-BS1)				Prepared: 10/16/18 Analyzed: 10/17/18							
Mercury	12.6	1.9	mg/Kg wet	11.5		109		71.6-127.8			
LCS Dup (B214921-BSD1)				Prepared: 10/16/18 Analyzed: 10/17/18							
Mercury	11.7	1.9	mg/Kg wet	11.5		102		71.6-127.8	7.18	30	

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QUALITY CONTROL

Metals Analyses (Total) - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B214921 - SW-846 7471										
Duplicate (B214921-DUP1)	**Source: 18J0650-02**			Prepared: 10/16/18 Analyzed: 10/17/18						
Mercury	ND	0.026	mg/Kg dry		ND			NC	35	
Matrix Spike (B214921-MS1)	**Source: 18J0650-02**			Prepared: 10/16/18 Analyzed: 10/17/18						
Mercury	0.173	0.025	mg/Kg dry	0.168	0.00629	99.5	75-125			
Batch B215021 - SW-846 3050B										
Blank (B215021-BLK1)				Prepared: 10/17/18 Analyzed: 10/18/18						
Antimony	ND	1.7	mg/Kg wet							
Arsenic	ND	1.7	mg/Kg wet							
Barium	ND	1.7	mg/Kg wet							
Beryllium	ND	0.17	mg/Kg wet							
Cadmium	ND	0.17	mg/Kg wet							
Chromium	ND	0.33	mg/Kg wet							
Lead	ND	0.50	mg/Kg wet							
Nickel	ND	0.33	mg/Kg wet							
Selenium	ND	3.3	mg/Kg wet							
Silver	ND	0.33	mg/Kg wet							
Thallium	ND	1.7	mg/Kg wet							
Vanadium	ND	0.67	mg/Kg wet							
Zinc	ND	0.67	mg/Kg wet							
LCS (B215021-BS1)				Prepared: 10/17/18 Analyzed: 10/18/18						
Antimony	60.5	5.0	mg/Kg wet	75.5		80.2	3.8-196			
Arsenic	154	5.0	mg/Kg wet	161		95.9	83.2-116.8			
Barium	251	5.0	mg/Kg wet	260		96.7	82.7-117.3			
Beryllium	94.8	0.50	mg/Kg wet	97.6		97.1	83.4-116.8			
Cadmium	201	0.50	mg/Kg wet	211		95.4	83.4-116.6			
Chromium	130	1.0	mg/Kg wet	136		95.3	82.4-117.6			
Lead	101	1.5	mg/Kg wet	111		91.4	83-117.1			
Nickel	88.9	1.0	mg/Kg wet	91.9		96.7	82.9-117.5			
Selenium	183	10	mg/Kg wet	191		95.7	79.6-120.9			
Silver	41.8	1.0	mg/Kg wet	43.3		96.6	79.9-119.9			
Thallium	154	5.0	mg/Kg wet	156		99.0	81.4-119.2			
Vanadium	51.6	2.0	mg/Kg wet	56.7		91.0	79-121.2			
Zinc	193	2.0	mg/Kg wet	199		96.8	81.4-119.1			
LCS Dup (B215021-BSD1)				Prepared: 10/17/18 Analyzed: 10/18/18						
Antimony	61.2	4.9	mg/Kg wet	75.5		81.1	3.8-196	1.13	30	
Arsenic	150	4.9	mg/Kg wet	161		93.0	83.2-116.8	3.04	30	
Barium	236	4.9	mg/Kg wet	260		90.9	82.7-117.3	6.18	30	
Beryllium	91.5	0.49	mg/Kg wet	97.6		93.7	83.4-116.8	3.59	30	
Cadmium	192	0.49	mg/Kg wet	211		91.0	83.4-116.6	4.75	30	
Chromium	124	0.98	mg/Kg wet	136		91.4	82.4-117.6	4.13	30	
Lead	98.9	1.5	mg/Kg wet	111		89.1	83-117.1	2.55	30	
Nickel	85.0	0.98	mg/Kg wet	91.9		92.5	82.9-117.5	4.48	30	
Selenium	175	9.8	mg/Kg wet	191		91.4	79.6-120.9	4.67	30	
Silver	39.8	0.98	mg/Kg wet	43.3		92.0	79.9-119.9	4.88	30	
Thallium	146	4.9	mg/Kg wet	156		93.6	81.4-119.2	5.61	30	
Vanadium	50.3	2.0	mg/Kg wet	56.7		88.7	79-121.2	2.59	30	
Zinc	185	2.0	mg/Kg wet	199		92.8	81.4-119.1	4.30	30	

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QUALITY CONTROL

Metals Analyses (Total) - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B215021 - SW-846 3050B										
MRL Check (B215021-MRL1)				Prepared: 10/17/18 Analyzed: 10/18/18						
Lead	0.532	0.49	mg/Kg wet	0.486		110	80-120			
Batch B215065 - SW-846 7471										
Blank (B215065-BLK1)				Prepared: 10/17/18 Analyzed: 10/18/18						
Mercury	ND	0.025	mg/Kg wet							
LCS (B215065-BS1)				Prepared: 10/17/18 Analyzed: 10/18/18						
Mercury	12.7	1.9	mg/Kg wet	11.5		110	71.6-127.8			
LCS Dup (B215065-BSD1)				Prepared: 10/17/18 Analyzed: 10/18/18						
Mercury	12.3	1.9	mg/Kg wet	11.5		107	71.6-127.8	2.54	30	

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QUALITY CONTROL

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total) - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B214769 - % Solids										
Duplicate (B214769-DUP6)	**Source: 18J0650-12**			Prepared: 10/15/18 Analyzed: 10/16/18						
% Solids	91.7		% Wt		90.8			0.963	20	
Duplicate (B214769-DUP7)	**Source: 18J0650-21**			Prepared: 10/15/18 Analyzed: 10/16/18						
% Solids	91.1		% Wt		91.7			0.606	20	

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

LCS

Lab Sample ID: B214859-BS1 Date(s) Analyzed: 10/18/2018 10/18/2018

Instrument ID (1): ECD4 Instrument ID (2): ECD4

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%RPD
			FROM	TO		
Aroclor-1016	1	0.000	-0.030	0.030	0.18	
	2	0.000	-0.030	0.030	0.18	0.0
Aroclor-1260	1	0.000	-0.030	0.030	0.19	
	2	0.000	-0.030	0.030	0.17	11.1

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

LCS Dup

Lab Sample ID: B214859-BSD1 Date(s) Analyzed: 10/18/2018 10/18/2018

Instrument ID (1): ECD4 Instrument ID (2): ECD4

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%RPD
			FROM	TO		
Aroclor-1016	1	0.000	-0.030	0.030	0.18	
	2	0.000	-0.030	0.030	0.18	0.0
Aroclor-1260	1	0.000	-0.030	0.030	0.19	
	2	0.000	-0.030	0.030	0.17	11.1

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

Matrix Spike

Lab Sample ID: B214859-MS1 Date(s) Analyzed: 10/19/2018 10/19/2018

Instrument ID (1): ECD4 Instrument ID (2): ECD4

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%RPD
			FROM	TO		
Aroclor-1016	1	0.000	-0.030	0.030	0.18	
	2	0.000	-0.030	0.030	0.20	10.5
Aroclor-1260	1	0.000	-0.030	0.030	0.19	
	2	0.000	-0.030	0.030	0.19	0.0

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

Matrix Spike Dup

Lab Sample ID: B214859-MSD1 Date(s) Analyzed: 10/19/2018 10/19/2018

Instrument ID (1): ECD4 Instrument ID (2): ECD4

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%RPD
			FROM	TO		
Aroclor-1016	1	0.000	-0.030	0.030	0.18	
	2	0.000	-0.030	0.030	0.20	10.5
Aroclor-1260	1	0.000	-0.030	0.030	0.19	
	2	0.000	-0.030	0.030	0.20	5.1

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

LCS

Lab Sample ID: B214861-BS1 Date(s) Analyzed: 10/18/2018 10/18/2018

Instrument ID (1): ECD10 Instrument ID (2): ECD10

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%RPD
			FROM	TO		
Aroclor-1016	1	0.000	-0.030	0.030	0.19	
	2	0.000	-0.030	0.030	0.20	5.1
Aroclor-1260	1	0.000	-0.030	0.030	0.18	
	2	0.000	-0.030	0.030	0.21	15.4

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

LCS Dup

Lab Sample ID: B214861-BSD1 Date(s) Analyzed: 10/18/2018 10/18/2018

Instrument ID (1): ECD10 Instrument ID (2): ECD10

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%RPD
			FROM	TO		
Aroclor-1016	1	0.000	-0.030	0.030	0.18	
	2	0.000	-0.030	0.030	0.20	10.5
Aroclor-1260	1	0.000	-0.030	0.030	0.17	
	2	0.000	-0.030	0.030	0.20	16.2

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

Matrix Spike

Lab Sample ID: B214861-MS1 Date(s) Analyzed: 10/18/2018 10/18/2018

Instrument ID (1): ECD10 Instrument ID (2): ECD10

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%RPD
			FROM	TO		
Aroclor-1016	1	0.000	-0.030	0.030	0.19	
	2	0.000	-0.030	0.030	0.21	10.0
Aroclor-1260	1	0.000	-0.030	0.030	0.18	
	2	0.000	-0.030	0.030	0.21	15.4

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

Matrix Spike Dup

Lab Sample ID: B214861-MSD1 Date(s) Analyzed: 10/18/2018 10/18/2018

Instrument ID (1): ECD10 Instrument ID (2): ECD10

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%RPD
			FROM	TO		
Aroclor-1016	1	0.000	-0.030	0.030	0.20	
	2	0.000	-0.030	0.030	0.23	9.1
Aroclor-1260	1	0.000	-0.030	0.030	0.19	
	2	0.000	-0.030	0.030	0.22	14.6

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FLAG/QUALIFIER SUMMARY

*	QC result is outside of established limits.
†	Wide recovery limits established for difficult compound.
‡	Wide RPD limits established for difficult compound.
#	Data exceeded client recommended or regulatory level
ND	Not Detected
RL	Reporting Limit is at the level of quantitation (LOQ)
DL	Detection Limit is the lower limit of detection determined by the MDL study
MCL	Maximum Contaminant Level
	Percent recoveries and relative percent differences (RPDs) are determined by the software using values in the calculation which have not been rounded.
	No results have been blank subtracted unless specified in the case narrative section.
B	Analyte is found in the associated laboratory blank as well as in the sample.
L-07A	Either laboratory fortified blank/laboratory control sample or duplicate recovery is outside of control limits, but the other is within limits. RPD outside of control limits. Reduced precision anticipated for any reported result for this compound.
L-14	Compound classified by MA CAM as difficult with acceptable recoveries of 40-160%. Recovery does not meet 70-130% criteria but does meet difficult compound criteria.
MS-07	Matrix spike recovery is outside of control limits. Analysis is in control based on laboratory fortified blank recovery.Possibility of sample matrix effects that lead to low bias for reported result or non-homogeneous sample aliquot cannot be eliminated.
MS-09	Matrix spike recovery and/or matrix spike duplicate recovery outside of control limits. Possibility of sample matrix effects that lead to a low bias for reported result or non-homogeneous sample aliquots cannot be eliminated.
MS-14	Matrix spike recovery is outside of control limits. Data validation is not affected since sample result is "not detected" and recovery bias is on the high side for this compound.
O-32	A dilution was performed as part of the standard analytical procedure.
R-05	Laboratory fortified blank duplicate RPD is outside of control limits. Reduced precision is anticipated for any reported value for this compound.
RL-04	Elevated reporting limit due to sample matrix interference. Requested reporting limit not met.
V-06	Continuing calibration did not meet method specifications and was biased on the high side for this compound.
V-16	Response factor is less than method specified minimum acceptable value. Reduced precision and accuracy may be associated with reported result.
V-19	Initial calibration did not meet method specifications. Compound was calibrated using linear regression with correlation coefficient <0.99. Reported result is estimated.
V-20	Continuing calibration did not meet method specifications and was biased on the high side. Data validation is not affected since sample result was "not detected" for this compound.
V-34	Initial calibration verification (ICV) did not meet method specifications and was biased on the low side for this compound. Reported result is estimated.

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
MADEP-EPH-04-1.1 in Soil	
C9-C18 Aliphatics	CT,NC,ME,NH-P
C19-C36 Aliphatics	CT,NC,ME,NH-P
Unadjusted C11-C22 Aromatics	CT,NC,ME,NH-P
C11-C22 Aromatics	CT,NC,ME,NH-P
Acenaphthene	CT,NC,ME,NH-P
Acenaphthylene	CT,NC,ME,NH-P
Anthracene	CT,NC,ME,NH-P
Benzo(a)anthracene	CT,NC,ME,NH-P
Benzo(a)pyrene	CT,NC,ME,NH-P
Benzo(b)fluoranthene	CT,NC,ME,NH-P
Benzo(g,h,i)perylene	CT,NC,ME,NH-P
Benzo(k)fluoranthene	CT,NC,ME,NH-P
Chrysene	CT,NC,ME,NH-P
Dibenz(a,h)anthracene	CT,NC,ME,NH-P
Fluoranthene	CT,NC,ME,NH-P
Fluorene	CT,NC,ME
Indeno(1,2,3-cd)pyrene	CT,NC,ME,NH-P
2-Methylnaphthalene	CT,NC
Naphthalene	CT,NC,ME,NH-P
Phenanthrene	CT,NC,ME,NH-P
Pyrene	CT,NC,ME,NH-P
MADEP-VPH-Feb 2018 Rev 2.1 in Soil	
Unadjusted C5-C8 Aliphatics	CT,NC,ME,NH-P
C5-C8 Aliphatics	CT,NC,ME,NH-P
Unadjusted C9-C12 Aliphatics	CT,NC,ME,NH-P
C9-C12 Aliphatics	CT,NC,ME,NH-P
C9-C10 Aromatics	CT,NC,ME,NH-P
Benzene	CT,NC,ME,NH-P
Ethylbenzene	CT,NC,ME,NH-P
Methyl tert-Butyl Ether (MTBE)	CT,NC,ME,NH-P
Naphthalene	CT,NC,ME,NH-P
Toluene	CT,NC,ME,NH-P
m+p Xylene	CT,NC,ME,NH-P
o-Xylene	CT,NC,ME,NH-P
SW-846 6010D in Soil	
Antimony	CT,NH,NY,ME,VA,NC
Arsenic	CT,NH,NY,ME,VA,NC
Barium	CT,NH,NY,ME,VA,NC
Beryllium	CT,NH,NY,ME,VA,NC
Cadmium	CT,NH,NY,ME,VA,NC
Chromium	CT,NH,NY,ME,VA,NC
Lead	CT,NH,NY,AIHA,ME,VA,NC
Nickel	CT,NH,NY,ME,VA,NC
Selenium	CT,NH,NY,ME,VA,NC
Silver	CT,NH,NY,ME,VA,NC
Thallium	CT,NH,NY,ME,VA,NC

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SW-846 6010D in Soil	
Vanadium	CT,NH,NY,ME,VA,NC
Zinc	CT,NH,NY,ME,VA,NC
SW-846 7471B in Soil	
Mercury	CT,NH,NY,NC,ME,VA
SW-846 8082A in Soil	
Aroclor-1016	CT,NH,NY,ME,NC,VA
Aroclor-1016 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1221	CT,NH,NY,ME,NC,VA
Aroclor-1221 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1232	CT,NH,NY,ME,NC,VA
Aroclor-1232 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1242	CT,NH,NY,ME,NC,VA
Aroclor-1242 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1248	CT,NH,NY,ME,NC,VA
Aroclor-1248 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1254	CT,NH,NY,ME,NC,VA
Aroclor-1254 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1260	CT,NH,NY,ME,NC,VA
Aroclor-1260 [2C]	CT,NH,NY,ME,NC,VA
Aroclor-1262	NY,NC,VA
Aroclor-1262 [2C]	NY,NC,VA
Aroclor-1268	NY,NC,VA
Aroclor-1268 [2C]	NY,NC,VA
SW-846 8260C in Soil	
Acetone	CT,NH,NY,ME
Benzene	CT,NH,NY,ME
Bromobenzene	NH,NY,ME
Bromochloromethane	NH,NY,ME
Bromodichloromethane	CT,NH,NY,ME
Bromoform	CT,NH,NY,ME
Bromomethane	CT,NH,NY,ME
2-Butanone (MEK)	CT,NH,NY,ME
n-Butylbenzene	CT,NH,NY,ME
sec-Butylbenzene	CT,NH,NY,ME
tert-Butylbenzene	CT,NH,NY,ME
Carbon Disulfide	CT,NH,NY,ME
Carbon Tetrachloride	CT,NH,NY,ME
Chlorobenzene	CT,NH,NY,ME
Chlorodibromomethane	CT,NH,NY,ME
Chloroethane	CT,NH,NY,ME
Chloroform	CT,NH,NY,ME
Chloromethane	CT,NH,NY,ME
2-Chlorotoluene	CT,NH,NY,ME
4-Chlorotoluene	CT,NH,NY,ME
1,2-Dibromo-3-chloropropane (DBCP)	NY
Dibromomethane	NH,NY,ME

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SW-846 8260C in Soil	
1,2-Dichlorobenzene	CT,NH,NY,ME
1,3-Dichlorobenzene	CT,NH,NY,ME
1,4-Dichlorobenzene	CT,NH,NY,ME
Dichlorodifluoromethane (Freon 12)	NY,ME
1,1-Dichloroethane	CT,NH,NY,ME
1,2-Dichloroethane	CT,NH,NY,ME
1,1-Dichloroethylene	CT,NH,NY,ME
cis-1,2-Dichloroethylene	CT,NH,NY,ME
trans-1,2-Dichloroethylene	CT,NH,NY,ME
1,2-Dichloropropane	CT,NH,NY,ME
1,3-Dichloropropane	NH,NY,ME
2,2-Dichloropropane	NH,NY,ME
1,1-Dichloropropene	NH,NY,ME
cis-1,3-Dichloropropene	CT,NH,NY,ME
trans-1,3-Dichloropropene	CT,NH,NY,ME
Ethylbenzene	CT,NH,NY,ME
Hexachlorobutadiene	NH,NY,ME
2-Hexanone (MBK)	CT,NH,NY,ME
Isopropylbenzene (Cumene)	CT,NH,NY,ME
p-Isopropyltoluene (p-Cymene)	NH,NY
Methyl tert-Butyl Ether (MTBE)	NY
Methylene Chloride	CT,NH,NY,ME
4-Methyl-2-pentanone (MIBK)	CT,NH,NY
Naphthalene	NH,NY,ME
n-Propylbenzene	NH,NY
Styrene	CT,NH,NY,ME
1,1,1,2-Tetrachloroethane	CT,NH,NY,ME
1,1,2,2-Tetrachloroethane	CT,NH,NY,ME
Tetrachloroethylene	CT,NH,NY,ME
Toluene	CT,NH,NY,ME
1,2,3-Trichlorobenzene	ME
1,2,4-Trichlorobenzene	NH,NY,ME
1,1,1-Trichloroethane	CT,NH,NY,ME
1,1,2-Trichloroethane	CT,NH,NY,ME
Trichloroethylene	CT,NH,NY,ME
Trichlorofluoromethane (Freon 11)	CT,NH,NY,ME
1,2,3-Trichloropropane	NH,NY,ME
1,2,4-Trimethylbenzene	CT,NH,NY,ME
1,3,5-Trimethylbenzene	CT,NH,NY,ME
Vinyl Chloride	CT,NH,NY,ME
m+p Xylene	CT,NH,NY,ME
o-Xylene	CT,NH,NY,ME
SW-846 8270D in Soil	
Acenaphthene	CT,NY,NH
Acenaphthylene	CT,NY,NH
Acetophenone	NY,NH

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SW-846 8270D in Soil	
Aniline	NY,NH
Anthracene	CT,NY,NH
Benzo(a)anthracene	CT,NY,NH
Benzo(a)pyrene	CT,NY,NH
Benzo(b)fluoranthene	CT,NY,NH
Benzo(g,h,i)perylene	CT,NY,NH
Benzo(k)fluoranthene	CT,NY,NH
Bis(2-chloroethoxy)methane	CT,NY,NH
Bis(2-chloroethyl)ether	CT,NY,NH
Bis(2-chloroisopropyl)ether	CT,NY,NH
Bis(2-Ethylhexyl)phthalate	CT,NY,NH
4-Bromophenylphenylether	CT,NY,NH
Butylbenzylphthalate	CT,NY,NH
4-Chloroaniline	CT,NY,NH
2-Chloronaphthalene	CT,NY,NH
2-Chlorophenol	CT,NY,NH
Chrysene	CT,NY,NH
Dibenz(a,h)anthracene	CT,NY,NH
Dibenzofuran	CT,NY,NH
Di-n-butylphthalate	CT,NY,NH
1,2-Dichlorobenzene	NY,NH
1,3-Dichlorobenzene	NY,NH
1,4-Dichlorobenzene	NY,NH
3,3-Dichlorobenzidine	CT,NY,NH
2,4-Dichlorophenol	CT,NY,NH
Diethylphthalate	CT,NY,NH
2,4-Dimethylphenol	CT,NY,NH
Dimethylphthalate	CT,NY,NH
2,4-Dinitrophenol	CT,NY,NH
2,4-Dinitrotoluene	CT,NY,NH
2,6-Dinitrotoluene	CT,NY,NH
Di-n-octylphthalate	CT,NY,NH
1,2-Diphenylhydrazine (as Azobenzene)	NY,NH
Fluoranthene	CT,NY,NH
Fluorene	NY,NH
Hexachlorobenzene	CT,NY,NH
Hexachlorobutadiene	CT,NY,NH
Hexachloroethane	CT,NY,NH
Indeno(1,2,3-cd)pyrene	CT,NY,NH
Isophorone	CT,NY,NH
2-Methylnaphthalene	CT,NY,NH
2-Methylphenol	CT,NY,NH
3/4-Methylphenol	CT,NY,NH
Naphthalene	CT,NY,NH
Nitrobenzene	CT,NY,NH
2-Nitrophenol	CT,NY,NH
4-Nitrophenol	CT,NY,NH

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SW-846 8270D in Soil	
Pentachlorophenol	CT,NY,NH
Phenanthrene	CT,NY,NH
Phenol	CT,NY,NH
Pyrene	CT,NY,NH
1,2,4-Trichlorobenzene	CT,NY,NH
2,4,5-Trichlorophenol	CT,NY,NH
2,4,6-Trichlorophenol	CT,NY,NH
SW-846 8270D in Water	
Acenaphthene	CT,NY,NH
Acenaphthylene	CT,NY,NH
Acetophenone	NY
Aniline	CT,NY
Anthracene	CT,NY,NH
Benzo(a)anthracene	CT,NY,NH
Benzo(a)pyrene	CT,NY,NH
Benzo(b)fluoranthene	CT,NY,NH
Benzo(g,h,i)perylene	CT,NY,NH
Benzo(k)fluoranthene	CT,NY,NH
Bis(2-chloroethoxy)methane	CT,NY,NH
Bis(2-chloroethyl)ether	CT,NY,NH
Bis(2-chloroisopropyl)ether	CT,NY,NH
Bis(2-Ethylhexyl)phthalate	CT,NY,NH
4-Bromophenylphenylether	CT,NY,NH
Butylbenzylphthalate	CT,NY,NH
4-Chloroaniline	CT,NY,NH
2-Chloronaphthalene	CT,NY,NH
2-Chlorophenol	CT,NY,NH
Chrysene	CT,NY,NH
Dibenz(a,h)anthracene	CT,NY,NH
Dibenzofuran	CT,NY,NH
Di-n-butylphthalate	CT,NY,NH
1,2-Dichlorobenzene	CT,NY,NH
1,3-Dichlorobenzene	CT,NY,NH
1,4-Dichlorobenzene	CT,NY,NH
3,3-Dichlorobenzidine	CT,NY,NH
2,4-Dichlorophenol	CT,NY,NH
Diethylphthalate	CT,NY,NH
2,4-Dimethylphenol	CT,NY,NH
Dimethylphthalate	CT,NY,NH
2,4-Dinitrophenol	CT,NY,NH
2,4-Dinitrotoluene	CT,NY,NH
2,6-Dinitrotoluene	CT,NY,NH
Di-n-octylphthalate	CT,NY,NH
1,2-Diphenylhydrazine (as Azobenzene)	NY
Fluoranthene	CT,NY,NH
Fluorene	NY,NH

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SW-846 8270D in Water	
Hexachlorobenzene	CT,NY,NH
Hexachlorobutadiene	CT,NY,NH
Hexachloroethane	CT,NY,NH
Indeno(1,2,3-cd)pyrene	CT,NY,NH
Isophorone	CT,NY,NH
2-Methylnaphthalene	CT,NY,NH
2-Methylphenol	CT,NY,NH
3/4-Methylphenol	CT,NY,NH
Naphthalene	CT,NY,NH
Nitrobenzene	CT,NY,NH
2-Nitrophenol	CT,NY,NH
4-Nitrophenol	CT,NY,NH
Pentachlorophenol	CT,NY,NH
Phenanthrene	CT,NY,NH
Phenol	CT,NY,NH
Pyrene	CT,NY,NH
1,2,4-Trichlorobenzene	CT,NY,NH
2,4,5-Trichlorophenol	CT,NY,NH
2,4,6-Trichlorophenol	CT,NY,NH

The CON-TEST Environmental Laboratory operates under the following certifications and accreditations:

Code	Description	Number	Expires
AIHA	AIHA-LAP, LLC - ISO17025:2005	100033	03/1/2020
MA	Massachusetts DEP	M-MA100	06/30/2019
CT	Connecticut Department of Publilc Health	PH-0567	09/30/2019
NY	New York State Department of Health	10899 NELAP	04/1/2019
NH-S	New Hampshire Environmental Lab	2516 NELAP	02/5/2019
RI	Rhode Island Department of Health	LAO00112	12/30/2018
NC	North Carolina Div. of Water Quality	652	12/31/2018
NJ	New Jersey DEP	MA007 NELAP	06/30/2019
FL	Florida Department of Health	E871027 NELAP	06/30/2019
VT	Vermont Department of Health Lead Laboratory	LL015036	07/30/2019
ME	State of Maine	2011028	06/9/2019
VA	Commonwealth of Virginia	460217	12/14/2018
NH-P	New Hampshire Environmental Lab	2557 NELAP	09/6/2019
VT-DW	Vermont Department of Health Drinking Water	VT-255716	06/12/2019
NC-DW	North Carolina Department of Health	25703	07/31/2019

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con-test ANALYTICAL LABORATORY

Phone: 413-525-2332
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Email: info@contestlabs.com

1810650

http://www.contestlabs.com Doc # 381 Rev 1_03242017

CHAIN OF CUSTODY RECORD

39 Spruce Street
East Longmeadow, MA 01028

Page 1 of 3

Company Name: EFI Global
Address: 155 West St Suite#6 Willmington, MA
Phone: 800-659-1202
Project Name: Fernalco School Cottage
Project Location: 200 Trapelo Rd. Waltham, MA
Project Number: 020.00107
Project Manager: John Vaz
Con-Test Quote Name/Number:
Invoice Recipient:
Sampled By: Derrick Cabano

Requested Turnaround Time
7-Day ☐ 10-Day ☐
Due Date: 5 day TAT

Rush Approval Required
1-Day ☐ 3-Day ☐
2-Day ☐ 4-Day ☐

Data Delivery
Format: PDF ☒ EXCEL ☒
Other:
CLP Like Data Pkg Required: ☐
Email To: John.vaz@
Fax To #: EFIGlobal.com

ANALYSIS REQUESTED

Con-Test Work Order#	Client Sample ID / Description	Beginning Date/Time	Ending Date/Time	Composite	Grab	[1]Matrix Code	Conc Code	MCP 14 metals	SVOC	PCBs	EPH	VPH	# of Containers	[2] Preservation Code	[3] Container Code
1	2001 0-5'	10/2	930		X	S	A	X	X	X					
2	2001 5-10'	10/2	930												
3	2005 0-5	10/2	1500												
4	2005 5-7'	10/2	1500												
5	2009 0-5'	10/3	1030												
6	2009 5-10'	10/3	1030												
7	2010 0-5'	10/3	1200												
8	2010 5-10'	10/3	1200												
9	2011 0-5'	10/3	1300												
10	2011 5-10'	10/3	1300												

Comments:
Also send to → Sean.Cassidy / Lynda.Cedermoth@EFIGlobal.com

Please use the following codes to indicate possible sample concentration within the **Conc Code** column above:
H - High; M - Medium; L - Low; C - Clean; U - Unknown

Dissolved Metals Samples
○ Field Filtered
○ Lab to Filter

Orthophosphate Samples
○ Field Filtered
○ Lab to Filter

[1] Matrix Codes:
GW = Ground Water
WW = Waste Water
DW = Drinking Water
A = Air
S = Soil
SL = Sludge
SOL = Solid
O = Other (please define)

[2] Preservation Codes:
I = Iced
H = HCL
M = Methanol
N = Nitric Acid
S = Sulfuric Acid
B = Sodium Bisulfate
X = Sodium Hydroxide
T = Sodium Thiosulfate
O = Other (please define)

[3] Container Codes:
A = Amber Glass
G = Glass
P = Plastic
ST = Sterile
V = Vial
S = Summa Canister
T = Tedlar Bag
O = Other (please define)

Relinquished by: (signature)	Date/Time:
	10/12/18 1000
Received by: (signature)	Date/Time:
	10/12/18 1000
Relinquished by: (signature)	Date/Time:
	10/12/18 1746
Received by: (signature)	Date/Time:
4.0	10/12/18 17:46
Relinquished by: (signature)	Date/Time:
Received by: (signature)	Date/Time:

Detection Limit Requirements
MA
Other

Special Requirements
☐ MA MCP Required
MCP Certification Form Required
☐ CT RCP Required
RCP Certification Form Required
☐ MA State DW Required
PWSID #

con-test ANALYTICAL LABORATORY www.contestlabs.com
NELAC and AIHA-LAP, LLC Accredited

Project Entity
☐ Government ☐ Municipality ☐ MWRA ☐ WRTA
☐ Federal ☐ 21 J ☐ School
☐ City ☐ Brownfield ☐ MBTA

Other
☐ Chromatogram
☐ *AIHA-LAP, LLC*

PCB ONLY
☐ Soxhlet
☐ Non Soxhlet

Table of Contents

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con-test ANALYTICAL LABORATORY

Phone: 413-525-2332 18J0640
Fax: 413-525-6405
Email: info@contestlabs.com

http://www.contestlabs.com Doc # 381 Rev 1_03242017

CHAIN OF CUSTODY RECORD

39 Spruce Street
East Longmeadow, MA 01028

Company Name: EFI Global
Address: 155 West St. Suite#6 Willmington, MA
Phone: 800-659-1202
Project Name: Fernald School Cottage
Project Location: 200 Trapelo Rd Waltham, MA
Project Number: 020.00107
Project Manager: John Vaz
Con-Test Quote Name/Number:
Invoice Recipient:
Sampled By: Derrick Calvario

Requested Turnaround Time
7-Day ☐ 10-Day ☐
Due Date: 5 day TAT

Rush Approval Required
1-Day ☐ 3-Day ☐
2-Day ☐ 4-Day ☐

Data Delivery
Format: PDF ☒ EXCEL ☒
Other:
CLP Like Data Pkg Required: ☐
Email To: John.vaz@EFIglobal.com
Fax To #:

ANALYSIS REQUESTED

Con-Test Work Order#	Client Sample ID / Description	Beginning Date/Time	Ending Date/Time	Composite	Grab	*Matrix Code	Conc Code	MCP 14 metals	RCRA 8	SVOC	VOC	EPH	VPH
11	2012 0-5'	10/3	1400		X	S	A						
12	2012 5-10'	10/3	1400										
13	2017 0-5'	10/4	1120										
14	2017 5-9'	10/4	1120										
15	2019 0-5'	10/4	1310										
16	2019 5-10'	10/4	1310								X	X	X
17	2019 10-15' (HOLD)	10/4	130								X	X	X
18	2020 0-5'	10/4	1500										
19	2020 5-10'	10/4	1500										

# of Containers
[2] Preservation Code
[3] Container Code

Dissolved Metals Samples
○ Field Filtered
○ Lab to Filter

Organic/Inorganic Samples
○ Field Filtered
○ Lab to Filter

[1] **Matrix Codes:**
GW = Ground Water
WW = Waste Water
DW = Drinking Water
A = Air
S = Soil
SL = Sludge
SOL = Solid
O = Other (please define)

[2] **Preservation Codes:**
I = Iced
H = HCL
M = Methanol
N = Nitric Acid
S = Sulfuric Acid
B = Sodium Bisulfate
X = Sodium Hydroxide
T = Sodium Thiosulfate
O = Other (please define)

[3] **Container Codes:**
A = Amber Glass
G = Glass
P = Plastic
ST = Sterile
V = Vial
S = Summa Canister
T = Tedlar Bag
O = Other (please define)

Comments:
Also Send to: Sean.Cassidy @ EFIGlobal.com
Lynda.McDermott

Please use the following codes to indicate possible sample concentration within the **Conc Code** column above:
H - High; M - Medium; L - Low; C - Clean; U - Unknown

Relinquished by: (signature)	Date/Time:
	10/12/18 1000
Received by: (signature)	Date/Time:
	10/12/18 1000
Relinquished by: (signature)	Date/Time:
	10/12/18 1740
Received by: (signature)	Date/Time:
4.0	10/12/18 17:40
Relinquished by: (signature)	Date/Time:
Received by: (signature)	Date/Time:

Detection Limit Requirements
MA
Other
PWSID #

Special Requirements
☐ MA MCP Required
☐ MCP Certification Form Required
☐ CT RCP Required
☐ RCP Certification Form Required
☐ MA State DW Required

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Project Entity
☐ Government ☐ Municipality ☐ MWRA ☐ WRTA
☐ Federal ☐ 21 J ☐ School
☐ City ☐ Brownfield ☐ MBTA

Other
☐ Chromatogram
☐ *AIHA-LAP, LLC*

PCB ONLY
☐ Soxhlet
☐ Non Soxhlet

Table of Contents

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http://www.contestlabs.com

Doc # 381 Rev 1_03242017

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Fax: 413-525-6405
Email: info@contestlabs.com

CHAIN OF CUSTODY RECORD

39 Spruce Street
East Longmeadow, MA 01028

Company Name: EFI Global
Address: 155 West St. Suite #6 Willmington, MA
Phone: 800-659-1202
Project Name: Fernaldo School Cottage
Project Location: 200 Trapelo Rd Waltham, MA
Project Number: 020.0010?
Project Manager: John Vuz
Con-Test Quote Name/Number:
Invoice Recipient:
Sampled By: Derrick Calvario

Requested Turnaround Time
7-Day ☐ 10-Day ☐
Due Date: 5 Day TAT

Rush Approval Required
1-Day ☐ 3-Day ☐
2-Day ☐ 4-Day ☐

Data Delivery
Format: PDF ☒ EXCEL ☒
Other:
CLP Like Data Pkg Required: ☐
Email To: John.Vuz@EFIGlobal.com
Fax To #:

ANALYSIS REQUESTED

Con-Test Work Order#	Client Sample ID / Description	Beginning Date/Time	Ending Date/Time	Composite	Grab	[1]Matrix Code	Conc Code	MCP 14 metals	PAHs	VOCs	# of Containers
20	2023 0-5'	10/4	1700		X	S	A				
21	2023 5-10'	10/4	1700								
22	2024 0-5'	10/4	1730								
23	2024 5-10'	10/4	1730								
24	SB/MW-2 0-5'	10/3	1530								
25	SB/MW-2 5-10'	10/3	1530								

[2] Preservation Code
[3] Container Code

Dissolved Metals Samples
○ Field Filtered
○ Lab to Filter

Orthophosphate Samples
○ Field Filtered
○ Lab to Filter

[1] Matrix Codes:
GW = Ground Water
WW = Waste Water
DW = Drinking Water
A = Air
S = Soil
SL = Sludge
SOL = Solid
O = Other (please define)

[2] Preservation Codes:
I = Iced
H = HCL
M = Methanol
N = Nitric Acid
S = Sulfuric Acid
B = Sodium Bisulfate
X = Sodium Hydroxide
T = Sodium Thiosulfate
O = Other (please define)

[3] Container Codes:
A = Amber Glass
G = Glass
P = Plastic
ST = Sterile
V = Vial
S = Summa Canister
T = Tedlar Bag
O = Other (please define)

Comments:
Also send to: Sean.Cassidy
Lynda.McDermott@EFIGlobal.com

Please use the following codes to indicate possible sample concentration within the **Conc Code** column above:
H - High; M - Medium; L - Low; C - Clean; U - Unknown

Relinquished by: (signature)	Date/Time: 10/12/18	10%
Received by: (signature)	Date/Time: 10/12/18	10%
Relinquished by: (signature)	Date/Time: 10/12/18	1745
Received by: (signature) 4.0	Date/Time: 10/12/18 17:40	
Relinquished by: (signature)	Date/Time:	
Received by: (signature)	Date/Time:	

Detection Limit Requirements
MA
RCP
Other

Special Requirements
☐ MA MCP Required
MCP Certification Form Required
☐ CT RCP Required
RCP Certification Form Required
☐ MA State DW Required
PWSID #

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NELAC and AIHA-LAP, LLC Accredited

Project Entity
☐ Government ☐ Municipality ☐ MWRA ☐ WRTA
☐ Federal ☐ 21 J ☐ School
☐ City ☐ Brownfield ☐ MBTA

Other
☐ Chromatogram
☐ AIHA-LAP,LLC

PCB ONLY
☐ Soxhlet
☐ Non Soxhlet

Table of Contents

I Have Not Confirmed Sample Container Numbers With Lab Staff Before Relinquishing Over Samples_____

con-test® ANALYTICAL LABORATORY

Doc# 277 Rev 5 2017

Login Sample Receipt Checklist - (Rejection Criteria Listing - Using Acceptance Policy) Any False Statement will be brought to the attention of the Client - State True or False

Client EFI

Received By NP Date 10/12/18 Time 17:40

How were the samples received? In Cooler T No Cooler _____ On Ice T No Ice _____ Direct from Sampling _____ Ambient _____ Melted Ice _____

Were samples within Temperature? 2-6°C T By Gun # 557 Actual Temp - 4.0 By Blank # _____ Actual Temp - _____

Was Custody Seal Intact? N/A Were Samples Tampered with? N/A

Was COC Relinquished ? T Does Chain Agree With Samples? T

Are there broken/leaking/loose caps on any samples? F

Is COC in ink/ Legible? T Were samples received within holding time? T

Did COC include all pertinent Information? Client T Analysis T Sampler Name T Project T ID's T Collection Dates/Times T

Are Sample labels filled out and legible? T

Are there Lab to Filters? F Who was notified? _____

Are there Rushes? F Who was notified? _____

Are there Short Holds? F Who was notified? _____

Is there enough Volume? T

Is there Headspace where applicable? N/A MS/MSD? F

Proper Media/Containers Used? T Is splitting samples required? F

Were trip blanks received? F On COC? F

Do all samples have the proper pH? N/A Acid _____ Base _____

Vials	#	Containers:	#		#		#
Unp-		1 Liter Amb.		1 Liter Plastic		16 oz Amb.	
HCL-		500 mL Amb.		500 mL Plastic		8oz Amb/Clear	26
Meoh-	4	250 mL Amb.		250 mL Plastic		4oz Amb/Clear	
Bisulfate-		Col./Bacteria		Flashpoint		2oz Amb/Clear	
DI-		Other Plastic		Other Glass		Encore	
Thiosulfate-		SOC Kit		Plastic Bag		Frozen:	
Sulfuric-		Perchlorate		Ziplock			

Unused Media

Vials	#	Containers:	#		#		#
Unp-		1 Liter Amb.		1 Liter Plastic		16 oz Amb.	
HCL-		500 mL Amb.		500 mL Plastic		8oz Amb/Clear	
Meoh-		250 mL Amb.		250 mL Plastic		4oz Amb/Clear	
Bisulfate-		Col./Bacteria		Flashpoint		2oz Amb/Clear	
DI-		Other Plastic		Other Glass		Encore	
Thiosulfate-		SOC Kit		Plastic Bag		Frozen:	
Sulfuric-		Perchlorate		Ziplock			

Comments:

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November 9, 2018

Scott Parker
EFI Global
155 West Street, Suite 6
Wilmington, MA 01887

Project Location: Waltham, MA
Client Job Number:
Project Number: 020.00107
Laboratory Work Order Number: 18J1518

Enclosed are results of analyses for samples received by the laboratory on October 31, 2018. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Kerry K. McGee
Project Manager

Table of Contents

Sample Summary 3

Case Narrative 4

Sample Results 8

18J1518-01 8

18J1518-02 13

18J1518-03 18

Sample Preparation Information 23

QC Data 24

Volatile Organic Compounds by GC/MS 24

B216477 24

Semivolatile Organic Compounds by GC/MS 29

B216486 29

B216603 32

Petroleum Hydrocarbons Analyses 35

B216347 35

Flag/Qualifier Summary 36

Certifications 37

Chain of Custody/Sample Receipt 42

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EFI Global
155 West Street, Suite 6
Wilmington, MA 01887
ATTN: Scott Parker

REPORT DATE: 11/9/2018

PURCHASE ORDER NUMBER:

PROJECT NUMBER: 020.00107

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 18J1518

The results of analyses performed on the following samples submitted to the CON-TEST Analytical Laboratory are found in this report.

PROJECT LOCATION: Waltham, MA

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
MW-1	18J1518-01	Ground Water		SW-846 8015C	
				SW-846 8260C	
				SW-846 8270D	
MW-2	18J1518-02	Ground Water		SW-846 8015C	
				SW-846 8260C	
				SW-846 8270D	
MW-3	18J1518-03	Ground Water		SW-846 8015C	
				SW-846 8260C	
				SW-846 8270D	

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CASE NARRATIVE SUMMARY

All reported results are within defined laboratory quality control objectives unless listed below or otherwise qualified in this report.

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

SW-846 8260C

Qualifications:

L-04

Laboratory fortified blank/laboratory control sample recovery and duplicate recovery are outside of control limits. Reported value for this compound is likely to be biased on the low side.

Analyte & Samples(s) Qualified:

1,2-Dibromo-3-chloropropane (DB
18J1518-01[MW-1], 18J1518-02[MW-2], 18J1518-03[MW-3], B216477-BLK1, B216477-BS1, B216477-BSD1

tert-Amyl Methyl Ether (TAME)
18J1518-01[MW-1], 18J1518-02[MW-2], 18J1518-03[MW-3], B216477-BLK1, B216477-BS1, B216477-BSD1

tert-Butyl Ethyl Ether (TBEE)
18J1518-01[MW-1], 18J1518-02[MW-2], 18J1518-03[MW-3], B216477-BLK1, B216477-BS1, B216477-BSD1

R-05

Laboratory fortified blank duplicate RPD is outside of control limits. Reduced precision is anticipated for any reported value for this compound.

Analyte & Samples(s) Qualified:

2-Butanone (MEK)
18J1518-01[MW-1], 18J1518-02[MW-2], 18J1518-03[MW-3], B216477-BLK1, B216477-BS1, B216477-BSD1, S029148-CCV1

2-Hexanone (MBK)
18J1518-01[MW-1], 18J1518-02[MW-2], 18J1518-03[MW-3], B216477-BLK1, B216477-BS1, B216477-BSD1, S029148-CCV1

Acetone
18J1518-01[MW-1], 18J1518-02[MW-2], 18J1518-03[MW-3], B216477-BLK1, B216477-BS1, B216477-BSD1, S029148-CCV1

RL-07

Elevated reporting limit based on lowest point in calibration.
MA CAM reporting limit not met.

Analyte & Samples(s) Qualified:

1,2,3-Trichlorobenzene
18J1518-01[MW-1], 18J1518-02[MW-2], 18J1518-03[MW-3]

Carbon Disulfide
18J1518-01[MW-1], 18J1518-02[MW-2], 18J1518-03[MW-3]

Methylene Chloride
18J1518-01[MW-1], 18J1518-02[MW-2], 18J1518-03[MW-3]

Naphthalene
18J1518-01[MW-1], 18J1518-02[MW-2], 18J1518-03[MW-3]

V-05

Continuing calibration did not meet method specifications and was biased on the low side for this compound.

Analyte & Samples(s) Qualified:

1,2-Dibromo-3-chloropropane (DB
18J1518-01[MW-1], 18J1518-02[MW-2], 18J1518-03[MW-3], B216477-BLK1, B216477-BS1, B216477-BSD1, S029148-CCV1

1,4-Dioxane
18J1518-01[MW-1], 18J1518-02[MW-2], 18J1518-03[MW-3], B216477-BLK1, B216477-BS1, B216477-BSD1, S029148-CCV1

2-Hexanone (MBK)
18J1518-01[MW-1], 18J1518-02[MW-2], 18J1518-03[MW-3], B216477-BLK1, B216477-BS1, B216477-BSD1, S029148-CCV1

Naphthalene
18J1518-01[MW-1], 18J1518-02[MW-2], 18J1518-03[MW-3], B216477-BLK1, B216477-BS1, B216477-BSD1, S029148-CCV1

tert-Amyl Methyl Ether (TAME)
18J1518-01[MW-1], 18J1518-02[MW-2], 18J1518-03[MW-3], B216477-BLK1, B216477-BS1, B216477-BSD1, S029148-CCV1

tert-Butyl Ethyl Ether (TBEE)
18J1518-01[MW-1], 18J1518-02[MW-2], 18J1518-03[MW-3], B216477-BLK1, B216477-BS1, B216477-BSD1, S029148-CCV1

V-16

Response factor is less than method specified minimum acceptable value. Reduced precision and accuracy may be associated with reported result.

Analyte & Samples(s) Qualified:

1,4-Dioxane
18J1518-01[MW-1], 18J1518-02[MW-2], 18J1518-03[MW-3], B216477-BLK1, B216477-BS1, B216477-BSD1, S029148-CCV1

SW-846 8270D

Qualifications:

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L-07

Either laboratory fortified blank/laboratory control sample or duplicate recovery is outside of control limits, but the other is within limits. RPD between the two LFB/LCS results is within method specified criteria.

Analyte & Samples(s) Qualified:

1,3-Dichlorobenzene
B216486-BS1

1,4-Dichlorobenzene
B216486-BS1

Hexachloroethane
B216486-BS1

R-05

Laboratory fortified blank duplicate RPD is outside of control limits. Reduced precision is anticipated for any reported value for this compound.

Analyte & Samples(s) Qualified:

Naphthalene (SIM)
18J1518-01[MW-1], 18J1518-02[MW-2], 18J1518-03[MW-3], B216603-BLK1, B216603-BS1, B216603-BSD1

RL-08

Elevated reporting limit due to sample matrix interference. MA CAM reporting limit not met.

Analyte & Samples(s) Qualified:

18J1518-01[MW-1]

S-07

One associated surrogate standard recovery is outside of control limits but the other(s) is/are within limits. All recoveries are > 10%.

Analyte & Samples(s) Qualified:

2,4,6-Tribromophenol
18J1518-01[MW-1]

V-05

Continuing calibration did not meet method specifications and was biased on the low side for this compound.

Analyte & Samples(s) Qualified:

Aniline
18J1518-01[MW-1], 18J1518-02[MW-2], 18J1518-03[MW-3], B216486-BLK1, B216486-BS1, B216486-BSD1

V-06

Continuing calibration did not meet method specifications and was biased on the high side for this compound.

Analyte & Samples(s) Qualified:

4-Nitrophenol
B216486-BS1, B216486-BSD1

V-19

Initial calibration did not meet method specifications. Compound was calibrated using linear regression with correlation coefficient <0.99. Reported result is estimated.

Analyte & Samples(s) Qualified:

2,4-Dinitrophenol
18J1518-01[MW-1], 18J1518-02[MW-2], 18J1518-03[MW-3], B216486-BLK1, B216486-BS1, B216486-BSD1

V-20

Continuing calibration did not meet method specifications and was biased on the high side. Data validation is not affected since sample result was "not detected" for this compound.

Analyte & Samples(s) Qualified:

4-Nitrophenol
18J1518-01[MW-1], 18J1518-02[MW-2], 18J1518-03[MW-3], B216486-BLK1

V-34

Initial calibration verification (ICV) did not meet method specifications and was biased on the low side for this compound. Reported result is estimated.

Analyte & Samples(s) Qualified:

4-Chloroaniline
18J1518-01[MW-1], 18J1518-02[MW-2], 18J1518-03[MW-3], B216486-BLK1, B216486-BS1, B216486-BSD1

Aniline
18J1518-01[MW-1], 18J1518-02[MW-2], 18J1518-03[MW-3], B216486-BLK1, B216486-BS1, B216486-BSD1

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SW-846 8015C

Diesel Range Organics (C10-C28) is quantitated against a calibration made with a #2 fuel oil standard.

SW-846 8260C

Laboratory control sample recoveries for required MCP Data Enhancement 8260 compounds were all within limits specified by the method except for “difficult analytes” where recovery control limits of 40-160% are used and/or unless otherwise listed in this narrative. Difficult analytes: MIBK, MEK, acetone, 1,4-dioxane, chloromethane, dichlorodifluoromethane, 2-hexanone, and bromomethane.

SW-846 8270D

Laboratory control sample recoveries for required MCP Data Enhancement 8270 compounds were all within control limits specified by the method, 40-140% for base/neutrals and 30-130% for acids except for “difficult analytes” listed below and/or otherwise listed in this narrative. Difficult analytes limits are 15 and 140%: 2,4-dinitrophenol, 4-chloroaniline, 4-nitrophenol, and phenol.

The results of analyses reported only relate to samples submitted to the Con-Test Analytical Laboratory for testing.
I certify that the analyses listed above, unless specifically listed as subcontracted, if any, were performed under my direction according to the approved methodologies listed in this document, and that based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

Tod E. Kopyscinski
Laboratory Director

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Project Location: Waltham, MA | Sample Description: | Work Order: 18J1518

Date Received: 10/31/2018

Field Sample #: MW-1 | Sampled: 10/30/2018 15:00

Sample ID: 18J1518-01

Sample Matrix: Ground Water

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acetone	ND	10	µg/L	1	R-05	SW-846 8260C	11/6/18	11/7/18 14:37	EEH
tert-Amyl Methyl Ether (TAME)	ND	2.0	µg/L	1	L-04, V-05	SW-846 8260C	11/6/18	11/7/18 14:37	EEH
Benzene	1.1	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
Bromobenzene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
Bromochloromethane	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
Bromodichloromethane	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
Bromoform	ND	2.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
Bromomethane	ND	2.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
2-Butanone (MEK)	ND	10	µg/L	1	R-05	SW-846 8260C	11/6/18	11/7/18 14:37	EEH
n-Butylbenzene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
sec-Butylbenzene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
tert-Butylbenzene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
tert-Butyl Ethyl Ether (TBEE)	ND	1.0	µg/L	1	L-04, V-05	SW-846 8260C	11/6/18	11/7/18 14:37	EEH
Carbon Disulfide	ND	5.0	µg/L	1	RL-07	SW-846 8260C	11/6/18	11/7/18 14:37	EEH
Carbon Tetrachloride	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
Chlorobenzene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
Chlorodibromomethane	ND	0.50	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
Chloroethane	ND	2.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
Chloroform	ND	2.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
Chloromethane	ND	2.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
2-Chlorotoluene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
4-Chlorotoluene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
1,2-Dibromo-3-chloropropane (DBCP)	ND	2.0	µg/L	1	L-04, V-05	SW-846 8260C	11/6/18	11/7/18 14:37	EEH
1,2-Dibromoethane (EDB)	ND	0.50	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
Dibromomethane	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
1,2-Dichlorobenzene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
1,3-Dichlorobenzene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
1,4-Dichlorobenzene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
Dichlorodifluoromethane (Freon 12)	ND	2.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
1,1-Dichloroethane	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
1,2-Dichloroethane	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
1,1-Dichloroethylene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
cis-1,2-Dichloroethylene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
trans-1,2-Dichloroethylene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
1,2-Dichloropropane	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
1,3-Dichloropropane	ND	0.50	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
2,2-Dichloropropane	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
1,1-Dichloropropene	ND	0.50	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
cis-1,3-Dichloropropene	ND	0.40	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
trans-1,3-Dichloropropene	ND	0.40	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
Diethyl Ether	ND	2.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
Diisopropyl Ether (DIPE)	ND	0.50	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
1,4-Dioxane	ND	50	µg/L	1	V-05, V-16	SW-846 8260C	11/6/18	11/7/18 14:37	EEH
Ethylbenzene	1.2	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH

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Project Location: Waltham, MA | Sample Description: | Work Order: 18J1518

Date Received: 10/31/2018

Field Sample #: MW-1 | Sampled: 10/30/2018 15:00

Sample ID: 18J1518-01

Sample Matrix: Ground Water

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Hexachlorobutadiene	ND	2.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
2-Hexanone (MBK)	ND	10	µg/L	1	R-05, V-05	SW-846 8260C	11/6/18	11/7/18 14:37	EEH
Isopropylbenzene (Cumene)	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
p-Isopropyltoluene (p-Cymene)	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
Methyl tert-Butyl Ether (MTBE)	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
Methylene Chloride	ND	5.0	µg/L	1	RL-07	SW-846 8260C	11/6/18	11/7/18 14:37	EEH
4-Methyl-2-pentanone (MIBK)	ND	10	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
Naphthalene	ND	5.0	µg/L	1	RL-07, V-05	SW-846 8260C	11/6/18	11/7/18 14:37	EEH
n-Propylbenzene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
Styrene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
1,1,1,2-Tetrachloroethane	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
1,1,2,2-Tetrachloroethane	ND	0.50	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
Tetrachloroethylene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
Tetrahydrofuran	ND	2.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
Toluene	5.4	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
1,2,3-Trichlorobenzene	ND	5.0	µg/L	1	RL-07	SW-846 8260C	11/6/18	11/7/18 14:37	EEH
1,2,4-Trichlorobenzene	ND	2.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
1,1,1-Trichloroethane	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
1,1,2-Trichloroethane	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
Trichloroethylene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
Trichlorofluoromethane (Freon 11)	ND	2.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
1,2,3-Trichloropropane	ND	2.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
1,2,4-Trimethylbenzene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
1,3,5-Trimethylbenzene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
Vinyl Chloride	ND	2.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
m+p Xylene	3.2	2.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH
o-Xylene	1.6	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 14:37	EEH

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
1,2-Dichloroethane-d4	90.3	70-130		11/7/18 14:37
Toluene-d8	100	70-130		11/7/18 14:37
4-Bromofluorobenzene	98.8	70-130		11/7/18 14:37

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Project Location: Waltham, MA | Sample Description: | Work Order: 18J1518

Date Received: 10/31/2018

Field Sample #: MW-1 | Sampled: 10/30/2018 15:00

Sample ID: 18J1518-01

Sample Matrix: Ground Water

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	ND	5.1	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
Acenaphthene (SIM)	ND	1.2	µg/L	4		SW-846 8270D	11/6/18	11/8/18 1:16	IMR
Acenaphthylene	ND	5.1	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
Acenaphthylene (SIM)	ND	0.81	µg/L	4		SW-846 8270D	11/6/18	11/8/18 1:16	IMR
Acetophenone	ND	10	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
Aniline	ND	5.1	µg/L	1	V-05, V-34	SW-846 8270D	11/6/18	11/8/18 11:40	CDT
Anthracene	ND	5.1	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
Anthracene (SIM)	ND	0.81	µg/L	4		SW-846 8270D	11/6/18	11/8/18 1:16	IMR
Benzo(a)anthracene	ND	5.1	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
Benzo(a)anthracene (SIM)	ND	0.20	µg/L	4		SW-846 8270D	11/6/18	11/8/18 1:16	IMR
Benzo(a)pyrene	ND	5.1	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
Benzo(a)pyrene (SIM)	ND	0.40	µg/L	4		SW-846 8270D	11/6/18	11/8/18 1:16	IMR
Benzo(b)fluoranthene	ND	5.1	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
Benzo(b)fluoranthene (SIM)	ND	0.20	µg/L	4		SW-846 8270D	11/6/18	11/8/18 1:16	IMR
Benzo(g,h,i)perylene	ND	5.1	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
Benzo(g,h,i)perylene (SIM)	ND	2.0	µg/L	4		SW-846 8270D	11/6/18	11/8/18 1:16	IMR
Benzo(k)fluoranthene	ND	5.1	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
Benzo(k)fluoranthene (SIM)	ND	0.81	µg/L	4		SW-846 8270D	11/6/18	11/8/18 1:16	IMR
Bis(2-chloroethoxy)methane	ND	10	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
Bis(2-chloroethyl)ether	ND	10	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
Bis(2-chloroisopropyl)ether	ND	10	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
Bis(2-Ethylhexyl)phthalate	ND	10	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
4-Bromophenylphenylether	ND	10	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
Butylbenzylphthalate	ND	10	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
4-Chloroaniline	ND	10	µg/L	1	V-34	SW-846 8270D	11/6/18	11/8/18 11:40	CDT
2-Chloronaphthalene	ND	10	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
2-Chlorophenol	ND	10	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
Chrysene	ND	5.1	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
Chrysene (SIM)	ND	0.81	µg/L	4		SW-846 8270D	11/6/18	11/8/18 1:16	IMR
Dibenz(a,h)anthracene	ND	5.1	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
Dibenz(a,h)anthracene (SIM)	ND	0.40	µg/L	4		SW-846 8270D	11/6/18	11/8/18 1:16	IMR
Dibenzofuran	ND	5.1	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
Di-n-butylphthalate	ND	10	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
1,2-Dichlorobenzene	ND	5.1	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
1,3-Dichlorobenzene	ND	5.1	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
1,4-Dichlorobenzene	ND	5.1	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
3,3-Dichlorobenzidine	ND	10	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
2,4-Dichlorophenol	ND	10	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
Diethylphthalate	ND	10	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
2,4-Dimethylphenol	ND	10	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
Dimethylphthalate	ND	10	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
2,4-Dinitrophenol	ND	10	µg/L	1	V-19	SW-846 8270D	11/6/18	11/8/18 11:40	CDT
2,4-Dinitrotoluene	ND	10	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
2,6-Dinitrotoluene	ND	10	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Waltham, MA | Sample Description: | Work Order: 18J1518

Date Received: 10/31/2018

Field Sample #: MW-1 | Sampled: 10/30/2018 15:00

Sample ID: 18J1518-01

Sample Matrix: Ground Water

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Di-n-octylphthalate	ND	10	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
1,2-Diphenylhydrazine (as Azobenzene)	ND	10	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
Fluoranthene	ND	5.1	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
Fluoranthene (SIM)	ND	2.0	µg/L	4		SW-846 8270D	11/6/18	11/8/18 1:16	IMR
Fluorene	ND	5.1	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
Fluorene (SIM)	ND	4.0	µg/L	4		SW-846 8270D	11/6/18	11/8/18 1:16	IMR
Hexachlorobenzene	ND	10	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
Hexachlorobutadiene	ND	10	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
Hexachloroethane	ND	10	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
Indeno(1,2,3-cd)pyrene	ND	5.1	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
Indeno(1,2,3-cd)pyrene (SIM)	ND	0.40	µg/L	4		SW-846 8270D	11/6/18	11/8/18 1:16	IMR
Isophorone	ND	10	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
2-Methylnaphthalene	ND	5.1	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
2-Methylnaphthalene (SIM)	ND	4.0	µg/L	4		SW-846 8270D	11/6/18	11/8/18 1:16	IMR
2-Methylphenol	ND	10	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
3/4-Methylphenol	ND	10	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
Naphthalene	ND	5.1	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
Naphthalene (SIM)	ND	4.0	µg/L	4	R-05	SW-846 8270D	11/6/18	11/8/18 1:16	IMR
Nitrobenzene	ND	10	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
2-Nitrophenol	ND	10	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
4-Nitrophenol	ND	10	µg/L	1	V-20	SW-846 8270D	11/6/18	11/8/18 11:40	CDT
Pentachlorophenol	ND	10	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
Phenanthrene	ND	5.1	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
Phenanthrene (SIM)	ND	0.20	µg/L	4		SW-846 8270D	11/6/18	11/8/18 1:16	IMR
Phenol	ND	10	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
Pyrene	ND	5.1	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
Pyrene (SIM)	ND	4.0	µg/L	4		SW-846 8270D	11/6/18	11/8/18 1:16	IMR
1,2,4-Trichlorobenzene	ND	5.1	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
2,4,5-Trichlorophenol	ND	10	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT
2,4,6-Trichlorophenol	ND	10	µg/L	1		SW-846 8270D	11/6/18	11/8/18 11:40	CDT

Surrogates	% Recovery		Recovery Limits	Flag/Qual		
2-Fluorophenol	51.8		15-110		11/8/18 11:40	
Phenol-d6	40.9		15-110		11/8/18 11:40	
Nitrobenzene-d5	91.7		30-130		11/8/18 11:40	
Nitrobenzene-d5	76.5		30-130		11/8/18 1:16	
2-Fluorobiphenyl	77.1		30-130		11/8/18 11:40	
2-Fluorobiphenyl	55.5		30-130		11/8/18 1:16	
2,4,6-Tribromophenol	**112**	*	15-110	S-07	11/8/18 11:40	
p-Terphenyl-d14	84.5		30-130		11/8/18 11:40	
p-Terphenyl-d14	66.9		30-130		11/8/18 1:16	

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Waltham, MA | Sample Description: | Work Order: 18J1518

Date Received: 10/31/2018

Field Sample #: MW-1 | Sampled: 10/30/2018 15:00

Sample ID: 18J1518-01

Sample Matrix: Ground Water

Petroleum Hydrocarbons Analyses

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Diesel Range Organics	0.42	0.20	mg/L	1		SW-846 8015C	11/4/18	11/7/18 18:13	RMW

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2-Fluorobiphenyl	102	40-140		11/7/18 18:13

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Waltham, MA | Sample Description: | Work Order: 18J1518

Date Received: 10/31/2018

Field Sample #: MW-2 | Sampled: 10/30/2018 15:30

Sample ID: 18J1518-02

Sample Matrix: Ground Water

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acetone	ND	10	µg/L	1	R-05	SW-846 8260C	11/6/18	11/7/18 15:05	EEH
tert-Amyl Methyl Ether (TAME)	ND	2.0	µg/L	1	L-04, V-05	SW-846 8260C	11/6/18	11/7/18 15:05	EEH
Benzene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
Bromobenzene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
Bromochloromethane	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
Bromodichloromethane	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
Bromoform	ND	2.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
Bromomethane	ND	2.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
2-Butanone (MEK)	ND	10	µg/L	1	R-05	SW-846 8260C	11/6/18	11/7/18 15:05	EEH
n-Butylbenzene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
sec-Butylbenzene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
tert-Butylbenzene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
tert-Butyl Ethyl Ether (TBEE)	ND	1.0	µg/L	1	L-04, V-05	SW-846 8260C	11/6/18	11/7/18 15:05	EEH
Carbon Disulfide	ND	5.0	µg/L	1	RL-07	SW-846 8260C	11/6/18	11/7/18 15:05	EEH
Carbon Tetrachloride	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
Chlorobenzene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
Chlorodibromomethane	ND	0.50	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
Chloroethane	ND	2.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
Chloroform	ND	2.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
Chloromethane	ND	2.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
2-Chlorotoluene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
4-Chlorotoluene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
1,2-Dibromo-3-chloropropane (DBCP)	ND	2.0	µg/L	1	L-04, V-05	SW-846 8260C	11/6/18	11/7/18 15:05	EEH
1,2-Dibromoethane (EDB)	ND	0.50	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
Dibromomethane	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
1,2-Dichlorobenzene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
1,3-Dichlorobenzene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
1,4-Dichlorobenzene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
Dichlorodifluoromethane (Freon 12)	ND	2.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
1,1-Dichloroethane	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
1,2-Dichloroethane	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
1,1-Dichloroethylene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
cis-1,2-Dichloroethylene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
trans-1,2-Dichloroethylene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
1,2-Dichloropropane	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
1,3-Dichloropropane	ND	0.50	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
2,2-Dichloropropane	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
1,1-Dichloropropene	ND	0.50	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
cis-1,3-Dichloropropene	ND	0.40	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
trans-1,3-Dichloropropene	ND	0.40	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
Diethyl Ether	ND	2.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
Diisopropyl Ether (DIPE)	ND	0.50	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
1,4-Dioxane	ND	50	µg/L	1	V-05, V-16	SW-846 8260C	11/6/18	11/7/18 15:05	EEH
Ethylbenzene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Waltham, MA | Sample Description: | Work Order: 18J1518

Date Received: 10/31/2018

Field Sample #: MW-2 | Sampled: 10/30/2018 15:30

Sample ID: 18J1518-02

Sample Matrix: Ground Water

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Hexachlorobutadiene	ND	2.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
2-Hexanone (MBK)	ND	10	µg/L	1	R-05, V-05	SW-846 8260C	11/6/18	11/7/18 15:05	EEH
Isopropylbenzene (Cumene)	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
p-Isopropyltoluene (p-Cymene)	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
Methyl tert-Butyl Ether (MTBE)	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
Methylene Chloride	ND	5.0	µg/L	1	RL-07	SW-846 8260C	11/6/18	11/7/18 15:05	EEH
4-Methyl-2-pentanone (MIBK)	ND	10	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
Naphthalene	ND	5.0	µg/L	1	RL-07, V-05	SW-846 8260C	11/6/18	11/7/18 15:05	EEH
n-Propylbenzene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
Styrene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
1,1,1,2-Tetrachloroethane	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
1,1,2,2-Tetrachloroethane	ND	0.50	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
Tetrachloroethylene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
Tetrahydrofuran	ND	2.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
Toluene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
1,2,3-Trichlorobenzene	ND	5.0	µg/L	1	RL-07	SW-846 8260C	11/6/18	11/7/18 15:05	EEH
1,2,4-Trichlorobenzene	ND	2.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
1,1,1-Trichloroethane	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
1,1,2-Trichloroethane	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
Trichloroethylene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
Trichlorofluoromethane (Freon 11)	ND	2.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
1,2,3-Trichloropropane	ND	2.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
1,2,4-Trimethylbenzene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
1,3,5-Trimethylbenzene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
Vinyl Chloride	ND	2.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
m+p Xylene	ND	2.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH
o-Xylene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:05	EEH

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
1,2-Dichloroethane-d4	89.8	70-130		11/7/18 15:05
Toluene-d8	98.8	70-130		11/7/18 15:05
4-Bromofluorobenzene	98.8	70-130		11/7/18 15:05

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Waltham, MA | Sample Description: | Work Order: 18J1518

Date Received: 10/31/2018

Field Sample #: MW-2 | Sampled: 10/30/2018 15:30

Sample ID: 18J1518-02

Sample Matrix: Ground Water

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	ND	4.9	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
Acenaphthene (SIM)	ND	0.29	µg/L	1		SW-846 8270D	11/6/18	11/8/18 1:45	IMR
Acenaphthylene	ND	4.9	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
Acenaphthylene (SIM)	ND	0.20	µg/L	1		SW-846 8270D	11/6/18	11/8/18 1:45	IMR
Acetophenone	ND	9.8	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
Aniline	ND	4.9	µg/L	1	V-05, V-34	SW-846 8270D	11/6/18	11/8/18 12:09	CDT
Anthracene	ND	4.9	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
Anthracene (SIM)	ND	0.20	µg/L	1		SW-846 8270D	11/6/18	11/8/18 1:45	IMR
Benzo(a)anthracene	ND	4.9	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
Benzo(a)anthracene (SIM)	ND	0.049	µg/L	1		SW-846 8270D	11/6/18	11/8/18 1:45	IMR
Benzo(a)pyrene	ND	4.9	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
Benzo(a)pyrene (SIM)	ND	0.098	µg/L	1		SW-846 8270D	11/6/18	11/8/18 1:45	IMR
Benzo(b)fluoranthene	ND	4.9	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
Benzo(b)fluoranthene (SIM)	ND	0.049	µg/L	1		SW-846 8270D	11/6/18	11/8/18 1:45	IMR
Benzo(g,h,i)perylene	ND	4.9	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
Benzo(g,h,i)perylene (SIM)	ND	0.49	µg/L	1		SW-846 8270D	11/6/18	11/8/18 1:45	IMR
Benzo(k)fluoranthene	ND	4.9	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
Benzo(k)fluoranthene (SIM)	ND	0.20	µg/L	1		SW-846 8270D	11/6/18	11/8/18 1:45	IMR
Bis(2-chloroethoxy)methane	ND	9.8	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
Bis(2-chloroethyl)ether	ND	9.8	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
Bis(2-chloroisopropyl)ether	ND	9.8	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
Bis(2-Ethylhexyl)phthalate	ND	9.8	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
4-Bromophenylphenylether	ND	9.8	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
Butylbenzylphthalate	ND	9.8	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
4-Chloroaniline	ND	9.8	µg/L	1	V-34	SW-846 8270D	11/6/18	11/8/18 12:09	CDT
2-Chloronaphthalene	ND	9.8	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
2-Chlorophenol	ND	9.8	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
Chrysene	ND	4.9	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
Chrysene (SIM)	ND	0.20	µg/L	1		SW-846 8270D	11/6/18	11/8/18 1:45	IMR
Dibenz(a,h)anthracene	ND	4.9	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
Dibenz(a,h)anthracene (SIM)	ND	0.098	µg/L	1		SW-846 8270D	11/6/18	11/8/18 1:45	IMR
Dibenzofuran	ND	4.9	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
Di-n-butylphthalate	ND	9.8	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
1,2-Dichlorobenzene	ND	4.9	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
1,3-Dichlorobenzene	ND	4.9	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
1,4-Dichlorobenzene	ND	4.9	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
3,3-Dichlorobenzidine	ND	9.8	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
2,4-Dichlorophenol	ND	9.8	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
Diethylphthalate	ND	9.8	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
2,4-Dimethylphenol	ND	9.8	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
Dimethylphthalate	ND	9.8	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
2,4-Dinitrophenol	ND	9.8	µg/L	1	V-19	SW-846 8270D	11/6/18	11/8/18 12:09	CDT
2,4-Dinitrotoluene	ND	9.8	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
2,6-Dinitrotoluene	ND	9.8	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Waltham, MA | Sample Description: | Work Order: 18J1518

Date Received: 10/31/2018

Field Sample #: MW-2 | Sampled: 10/30/2018 15:30

Sample ID: 18J1518-02

Sample Matrix: Ground Water

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Di-n-octylphthalate	ND	9.8	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
1,2-Diphenylhydrazine (as Azobenzene)	ND	9.8	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
Fluoranthene	ND	4.9	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
Fluoranthene (SIM)	ND	0.49	µg/L	1		SW-846 8270D	11/6/18	11/8/18 1:45	IMR
Fluorene	ND	4.9	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
Fluorene (SIM)	ND	0.98	µg/L	1		SW-846 8270D	11/6/18	11/8/18 1:45	IMR
Hexachlorobenzene	ND	9.8	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
Hexachlorobutadiene	ND	9.8	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
Hexachloroethane	ND	9.8	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
Indeno(1,2,3-cd)pyrene	ND	4.9	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
Indeno(1,2,3-cd)pyrene (SIM)	ND	0.098	µg/L	1		SW-846 8270D	11/6/18	11/8/18 1:45	IMR
Isophorone	ND	9.8	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
2-Methylnaphthalene	ND	4.9	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
2-Methylnaphthalene (SIM)	ND	0.98	µg/L	1		SW-846 8270D	11/6/18	11/8/18 1:45	IMR
2-Methylphenol	ND	9.8	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
3/4-Methylphenol	ND	9.8	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
Naphthalene	ND	4.9	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
Naphthalene (SIM)	ND	0.98	µg/L	1	R-05	SW-846 8270D	11/6/18	11/8/18 1:45	IMR
Nitrobenzene	ND	9.8	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
2-Nitrophenol	ND	9.8	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
4-Nitrophenol	ND	9.8	µg/L	1	V-20	SW-846 8270D	11/6/18	11/8/18 12:09	CDT
Pentachlorophenol	ND	9.8	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
Phenanthrene	ND	4.9	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
Phenanthrene (SIM)	ND	0.049	µg/L	1		SW-846 8270D	11/6/18	11/8/18 1:45	IMR
Phenol	ND	9.8	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
Pyrene	ND	4.9	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
Pyrene (SIM)	ND	0.98	µg/L	1		SW-846 8270D	11/6/18	11/8/18 1:45	IMR
1,2,4-Trichlorobenzene	ND	4.9	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
2,4,5-Trichlorophenol	ND	9.8	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT
2,4,6-Trichlorophenol	ND	9.8	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:09	CDT

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2-Fluorophenol	34.5	15-110		11/8/18 12:09
Phenol-d6	27.6	15-110		11/8/18 12:09
Nitrobenzene-d5	57.6	30-130		11/8/18 12:09
Nitrobenzene-d5	53.9	30-130		11/8/18 1:45
2-Fluorobiphenyl	54.8	30-130		11/8/18 12:09
2-Fluorobiphenyl	41.5	30-130		11/8/18 1:45
2,4,6-Tribromophenol	87.2	15-110		11/8/18 12:09
p-Terphenyl-d14	60.0	30-130		11/8/18 1:45
p-Terphenyl-d14	68.8	30-130		11/8/18 12:09

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Waltham, MA | Sample Description: | Work Order: 18J1518

Date Received: 10/31/2018

Field Sample #: MW-2 | Sampled: 10/30/2018 15:30

Sample ID: 18J1518-02

Sample Matrix: Ground Water

Petroleum Hydrocarbons Analyses

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Diesel Range Organics	ND	0.20	mg/L	1		SW-846 8015C	11/4/18	11/7/18 16:09	RMW

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2-Fluorobiphenyl	92.4	40-140		11/7/18 16:09

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Waltham, MA | Sample Description: | Work Order: 18J1518

Date Received: 10/31/2018

Field Sample #: MW-3 | Sampled: 10/31/2018 12:20

Sample ID: 18J1518-03

Sample Matrix: Ground Water

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acetone	ND	10	µg/L	1	R-05	SW-846 8260C	11/6/18	11/7/18 15:32	EEH
tert-Amyl Methyl Ether (TAME)	ND	2.0	µg/L	1	L-04, V-05	SW-846 8260C	11/6/18	11/7/18 15:32	EEH
Benzene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
Bromobenzene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
Bromochloromethane	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
Bromodichloromethane	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
Bromoform	ND	2.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
Bromomethane	ND	2.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
2-Butanone (MEK)	ND	10	µg/L	1	R-05	SW-846 8260C	11/6/18	11/7/18 15:32	EEH
n-Butylbenzene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
sec-Butylbenzene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
tert-Butylbenzene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
tert-Butyl Ethyl Ether (TBEE)	ND	1.0	µg/L	1	L-04, V-05	SW-846 8260C	11/6/18	11/7/18 15:32	EEH
Carbon Disulfide	ND	5.0	µg/L	1	RL-07	SW-846 8260C	11/6/18	11/7/18 15:32	EEH
Carbon Tetrachloride	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
Chlorobenzene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
Chlorodibromomethane	ND	0.50	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
Chloroethane	ND	2.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
Chloroform	ND	2.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
Chloromethane	ND	2.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
2-Chlorotoluene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
4-Chlorotoluene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
1,2-Dibromo-3-chloropropane (DBCP)	ND	2.0	µg/L	1	L-04, V-05	SW-846 8260C	11/6/18	11/7/18 15:32	EEH
1,2-Dibromoethane (EDB)	ND	0.50	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
Dibromomethane	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
1,2-Dichlorobenzene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
1,3-Dichlorobenzene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
1,4-Dichlorobenzene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
Dichlorodifluoromethane (Freon 12)	ND	2.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
1,1-Dichloroethane	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
1,2-Dichloroethane	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
1,1-Dichloroethylene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
cis-1,2-Dichloroethylene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
trans-1,2-Dichloroethylene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
1,2-Dichloropropane	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
1,3-Dichloropropane	ND	0.50	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
2,2-Dichloropropane	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
1,1-Dichloropropene	ND	0.50	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
cis-1,3-Dichloropropene	ND	0.40	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
trans-1,3-Dichloropropene	ND	0.40	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
Diethyl Ether	ND	2.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
Diisopropyl Ether (DIPE)	ND	0.50	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
1,4-Dioxane	ND	50	µg/L	1	V-05, V-16	SW-846 8260C	11/6/18	11/7/18 15:32	EEH
Ethylbenzene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Waltham, MA | Sample Description: | Work Order: 18J1518

Date Received: 10/31/2018

Field Sample #: MW-3 | Sampled: 10/31/2018 12:20

Sample ID: 18J1518-03

Sample Matrix: Ground Water

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Hexachlorobutadiene	ND	2.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
2-Hexanone (MBK)	ND	10	µg/L	1	R-05, V-05	SW-846 8260C	11/6/18	11/7/18 15:32	EEH
Isopropylbenzene (Cumene)	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
p-Isopropyltoluene (p-Cymene)	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
Methyl tert-Butyl Ether (MTBE)	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
Methylene Chloride	ND	5.0	µg/L	1	RL-07	SW-846 8260C	11/6/18	11/7/18 15:32	EEH
4-Methyl-2-pentanone (MIBK)	ND	10	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
Naphthalene	ND	5.0	µg/L	1	RL-07, V-05	SW-846 8260C	11/6/18	11/7/18 15:32	EEH
n-Propylbenzene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
Styrene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
1,1,1,2-Tetrachloroethane	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
1,1,2,2-Tetrachloroethane	ND	0.50	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
Tetrachloroethylene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
Tetrahydrofuran	ND	2.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
Toluene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
1,2,3-Trichlorobenzene	ND	5.0	µg/L	1	RL-07	SW-846 8260C	11/6/18	11/7/18 15:32	EEH
1,2,4-Trichlorobenzene	ND	2.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
1,1,1-Trichloroethane	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
1,1,2-Trichloroethane	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
Trichloroethylene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
Trichlorofluoromethane (Freon 11)	2.3	2.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
1,2,3-Trichloropropane	ND	2.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
1,2,4-Trimethylbenzene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
1,3,5-Trimethylbenzene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
Vinyl Chloride	ND	2.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
m+p Xylene	ND	2.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH
o-Xylene	ND	1.0	µg/L	1		SW-846 8260C	11/6/18	11/7/18 15:32	EEH

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
1,2-Dichloroethane-d4	88.9	70-130		11/7/18 15:32
Toluene-d8	99.4	70-130		11/7/18 15:32
4-Bromofluorobenzene	96.0	70-130		11/7/18 15:32

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Waltham, MA | Sample Description: | Work Order: 18J1518

Date Received: 10/31/2018

Field Sample #: MW-3 | Sampled: 10/31/2018 12:20

Sample ID: 18J1518-03

Sample Matrix: Ground Water

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acenaphthene	ND	4.9	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
Acenaphthene (SIM)	ND	0.29	µg/L	1		SW-846 8270D	11/6/18	11/8/18 2:13	IMR
Acenaphthylene	ND	4.9	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
Acenaphthylene (SIM)	ND	0.19	µg/L	1		SW-846 8270D	11/6/18	11/8/18 2:13	IMR
Acetophenone	ND	9.7	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
Aniline	ND	4.9	µg/L	1	V-05, V-34	SW-846 8270D	11/6/18	11/8/18 12:36	CDT
Anthracene	ND	4.9	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
Anthracene (SIM)	ND	0.19	µg/L	1		SW-846 8270D	11/6/18	11/8/18 2:13	IMR
Benzo(a)anthracene	ND	4.9	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
Benzo(a)anthracene (SIM)	ND	0.049	µg/L	1		SW-846 8270D	11/6/18	11/8/18 2:13	IMR
Benzo(a)pyrene	ND	4.9	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
Benzo(a)pyrene (SIM)	ND	0.097	µg/L	1		SW-846 8270D	11/6/18	11/8/18 2:13	IMR
Benzo(b)fluoranthene	ND	4.9	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
Benzo(b)fluoranthene (SIM)	ND	0.049	µg/L	1		SW-846 8270D	11/6/18	11/8/18 2:13	IMR
Benzo(g,h,i)perylene	ND	4.9	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
Benzo(g,h,i)perylene (SIM)	ND	0.49	µg/L	1		SW-846 8270D	11/6/18	11/8/18 2:13	IMR
Benzo(k)fluoranthene	ND	4.9	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
Benzo(k)fluoranthene (SIM)	ND	0.19	µg/L	1		SW-846 8270D	11/6/18	11/8/18 2:13	IMR
Bis(2-chloroethoxy)methane	ND	9.7	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
Bis(2-chloroethyl)ether	ND	9.7	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
Bis(2-chloroisopropyl)ether	ND	9.7	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
Bis(2-Ethylhexyl)phthalate	ND	9.7	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
4-Bromophenylphenylether	ND	9.7	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
Butylbenzylphthalate	ND	9.7	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
4-Chloroaniline	ND	9.7	µg/L	1	V-34	SW-846 8270D	11/6/18	11/8/18 12:36	CDT
2-Chloronaphthalene	ND	9.7	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
2-Chlorophenol	ND	9.7	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
Chrysene	ND	4.9	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
Chrysene (SIM)	ND	0.19	µg/L	1		SW-846 8270D	11/6/18	11/8/18 2:13	IMR
Dibenz(a,h)anthracene	ND	4.9	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
Dibenz(a,h)anthracene (SIM)	ND	0.097	µg/L	1		SW-846 8270D	11/6/18	11/8/18 2:13	IMR
Dibenzofuran	ND	4.9	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
Di-n-butylphthalate	ND	9.7	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
1,2-Dichlorobenzene	ND	4.9	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
1,3-Dichlorobenzene	ND	4.9	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
1,4-Dichlorobenzene	ND	4.9	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
3,3-Dichlorobenzidine	ND	9.7	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
2,4-Dichlorophenol	ND	9.7	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
Diethylphthalate	ND	9.7	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
2,4-Dimethylphenol	ND	9.7	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
Dimethylphthalate	ND	9.7	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
2,4-Dinitrophenol	ND	9.7	µg/L	1	V-19	SW-846 8270D	11/6/18	11/8/18 12:36	CDT
2,4-Dinitrotoluene	ND	9.7	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
2,6-Dinitrotoluene	ND	9.7	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Waltham, MA | Sample Description: | Work Order: 18J1518

Date Received: 10/31/2018

Field Sample #: MW-3 | Sampled: 10/31/2018 12:20

Sample ID: 18J1518-03

Sample Matrix: Ground Water

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Di-n-octylphthalate	ND	9.7	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
1,2-Diphenylhydrazine (as Azobenzene)	ND	9.7	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
Fluoranthene	ND	4.9	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
Fluoranthene (SIM)	ND	0.49	µg/L	1		SW-846 8270D	11/6/18	11/8/18 2:13	IMR
Fluorene	ND	4.9	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
Fluorene (SIM)	ND	0.97	µg/L	1		SW-846 8270D	11/6/18	11/8/18 2:13	IMR
Hexachlorobenzene	ND	9.7	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
Hexachlorobutadiene	ND	9.7	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
Hexachloroethane	ND	9.7	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
Indeno(1,2,3-cd)pyrene	ND	4.9	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
Indeno(1,2,3-cd)pyrene (SIM)	ND	0.097	µg/L	1		SW-846 8270D	11/6/18	11/8/18 2:13	IMR
Isophorone	ND	9.7	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
2-Methylnaphthalene	ND	4.9	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
2-Methylnaphthalene (SIM)	ND	0.97	µg/L	1		SW-846 8270D	11/6/18	11/8/18 2:13	IMR
2-Methylphenol	ND	9.7	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
3/4-Methylphenol	ND	9.7	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
Naphthalene	ND	4.9	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
Naphthalene (SIM)	ND	0.97	µg/L	1	R-05	SW-846 8270D	11/6/18	11/8/18 2:13	IMR
Nitrobenzene	ND	9.7	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
2-Nitrophenol	ND	9.7	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
4-Nitrophenol	ND	9.7	µg/L	1	V-20	SW-846 8270D	11/6/18	11/8/18 12:36	CDT
Pentachlorophenol	ND	9.7	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
Phenanthrene	ND	4.9	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
Phenanthrene (SIM)	ND	0.049	µg/L	1		SW-846 8270D	11/6/18	11/8/18 2:13	IMR
Phenol	ND	9.7	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
Pyrene	ND	4.9	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
Pyrene (SIM)	ND	0.97	µg/L	1		SW-846 8270D	11/6/18	11/8/18 2:13	IMR
1,2,4-Trichlorobenzene	ND	4.9	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
2,4,5-Trichlorophenol	ND	9.7	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT
2,4,6-Trichlorophenol	ND	9.7	µg/L	1		SW-846 8270D	11/6/18	11/8/18 12:36	CDT

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2-Fluorophenol	22.7	15-110		11/8/18 12:36
Phenol-d6	18.9	15-110		11/8/18 12:36
Nitrobenzene-d5	40.7	30-130		11/8/18 2:13
Nitrobenzene-d5	45.2	30-130		11/8/18 12:36
2-Fluorobiphenyl	32.0	30-130		11/8/18 2:13
2-Fluorobiphenyl	41.3	30-130		11/8/18 12:36
2,4,6-Tribromophenol	73.3	15-110		11/8/18 12:36
p-Terphenyl-d14	54.4	30-130		11/8/18 2:13
p-Terphenyl-d14	62.8	30-130		11/8/18 12:36

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Waltham, MA | Sample Description: | Work Order: 18J1518

Date Received: 10/31/2018

Field Sample #: MW-3 | Sampled: 10/31/2018 12:20

Sample ID: 18J1518-03

Sample Matrix: Ground Water

Petroleum Hydrocarbons Analyses

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Diesel Range Organics	ND	0.20	mg/L	1		SW-846 8015C	11/4/18	11/7/18 16:27	RMW

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2-Fluorobiphenyl	90.7	40-140		11/7/18 16:27

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Sample Extraction Data

Prep Method: SW-846 3510C-SW-846 8015C

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
18J1518-01 [MW-1]	B216347	1000	1.00	11/04/18
18J1518-02 [MW-2]	B216347	1000	1.00	11/04/18
18J1518-03 [MW-3]	B216347	1000	1.00	11/04/18

Prep Method: SW-846 5030B-SW-846 8260C

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
18J1518-01 [MW-1]	B216477	5	5.00	11/06/18
18J1518-02 [MW-2]	B216477	5	5.00	11/06/18
18J1518-03 [MW-3]	B216477	5	5.00	11/06/18

Prep Method: SW-846 3510C-SW-846 8270D

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
18J1518-01 [MW-1]	B216486	990	1.00	11/06/18
18J1518-02 [MW-2]	B216486	1020	1.00	11/06/18
18J1518-03 [MW-3]	B216486	1030	1.00	11/06/18

Prep Method: SW-846 3510C-SW-846 8270D

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
18J1518-01 [MW-1]	B216603	990	1.00	11/06/18
18J1518-02 [MW-2]	B216603	1020	1.00	11/06/18
18J1518-03 [MW-3]	B216603	1030	1.00	11/06/18

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

QUALITY CONTROL

Volatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B216477 - SW-846 5030B										
Blank (B216477-BLK1)				Prepared: 11/06/18 Analyzed: 11/07/18						
Acetone	ND	10	µg/L							R-05
tert-Amyl Methyl Ether (TAME)	ND	0.50	µg/L							L-04, V-05
Benzene	ND	1.0	µg/L							
Bromobenzene	ND	1.0	µg/L							
Bromochloromethane	ND	1.0	µg/L							
Bromodichloromethane	ND	1.0	µg/L							
Bromoform	ND	1.0	µg/L							
Bromomethane	ND	2.0	µg/L							
2-Butanone (MEK)	ND	10	µg/L							R-05
n-Butylbenzene	ND	1.0	µg/L							
sec-Butylbenzene	ND	1.0	µg/L							
tert-Butylbenzene	ND	1.0	µg/L							
tert-Butyl Ethyl Ether (TBEE)	ND	0.50	µg/L							L-04, V-05
Carbon Disulfide	ND	5.0	µg/L							
Carbon Tetrachloride	ND	1.0	µg/L							
Chlorobenzene	ND	1.0	µg/L							
Chlorodibromomethane	ND	0.50	µg/L							
Chloroethane	ND	2.0	µg/L							
Chloroform	ND	2.0	µg/L							
Chloromethane	ND	2.0	µg/L							
2-Chlorotoluene	ND	1.0	µg/L							
4-Chlorotoluene	ND	1.0	µg/L							
1,2-Dibromo-3-chloropropane (DBCP)	ND	2.0	µg/L							V-05, L-04
1,2-Dibromoethane (EDB)	ND	0.50	µg/L							
Dibromomethane	ND	1.0	µg/L							
1,2-Dichlorobenzene	ND	1.0	µg/L							
1,3-Dichlorobenzene	ND	1.0	µg/L							
1,4-Dichlorobenzene	ND	1.0	µg/L							
Dichlorodifluoromethane (Freon 12)	ND	2.0	µg/L							
1,1-Dichloroethane	ND	1.0	µg/L							
1,2-Dichloroethane	ND	1.0	µg/L							
1,1-Dichloroethylene	ND	1.0	µg/L							
cis-1,2-Dichloroethylene	ND	1.0	µg/L							
trans-1,2-Dichloroethylene	ND	1.0	µg/L							
1,2-Dichloropropane	ND	1.0	µg/L							
1,3-Dichloropropane	ND	0.50	µg/L							
2,2-Dichloropropane	ND	1.0	µg/L							
1,1-Dichloropropene	ND	0.50	µg/L							
cis-1,3-Dichloropropene	ND	0.40	µg/L							
trans-1,3-Dichloropropene	ND	0.40	µg/L							
Diethyl Ether	ND	2.0	µg/L							
Diisopropyl Ether (DIPE)	ND	0.50	µg/L							
1,4-Dioxane	ND	50	µg/L							V-05, V-16
Ethylbenzene	ND	1.0	µg/L							
Hexachlorobutadiene	ND	0.60	µg/L							
2-Hexanone (MBK)	ND	10	µg/L							R-05, V-05
Isopropylbenzene (Cumene)	ND	1.0	µg/L							
p-Isopropyltoluene (p-Cymene)	ND	1.0	µg/L							
Methyl tert-Butyl Ether (MTBE)	ND	1.0	µg/L							
Methylene Chloride	ND	5.0	µg/L							
4-Methyl-2-pentanone (MIBK)	ND	10	µg/L							
Naphthalene	ND	2.0	µg/L							V-05

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QUALITY CONTROL

Volatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes	
Batch B216477 - SW-846 5030B												
Blank (B216477-BLK1)				Prepared: 11/06/18 Analyzed: 11/07/18								
n-Propylbenzene	ND	1.0	µg/L									
Styrene	ND	1.0	µg/L									
1,1,1,2-Tetrachloroethane	ND	1.0	µg/L									
1,1,2,2-Tetrachloroethane	ND	0.50	µg/L									
Tetrachloroethylene	ND	1.0	µg/L									
Tetrahydrofuran	ND	2.0	µg/L									
Toluene	ND	1.0	µg/L									
1,2,3-Trichlorobenzene	ND	2.0	µg/L									
1,2,4-Trichlorobenzene	ND	1.0	µg/L									
1,1,1-Trichloroethane	ND	1.0	µg/L									
1,1,2-Trichloroethane	ND	1.0	µg/L									
Trichloroethylene	ND	1.0	µg/L									
Trichlorofluoromethane (Freon 11)	ND	2.0	µg/L									
1,2,3-Trichloropropane	ND	2.0	µg/L									
1,2,4-Trimethylbenzene	ND	1.0	µg/L									
1,3,5-Trimethylbenzene	ND	1.0	µg/L									
Vinyl Chloride	ND	2.0	µg/L									
m+p Xylene	ND	2.0	µg/L									
o-Xylene	ND	1.0	µg/L									
Surrogate: 1,2-Dichloroethane-d4	*22.0*		µg/L	25.0		88.0		70-130				
Surrogate: Toluene-d8	*25.3*		µg/L	25.0		101		70-130				
Surrogate: 4-Bromofluorobenzene	*24.6*		µg/L	25.0		98.3		70-130				
LCS (B216477-BS1)				Prepared: 11/06/18 Analyzed: 11/07/18								
Acetone	106	10	µg/L	100		106		40-160			R-05	†
tert-Amyl Methyl Ether (TAME)	5.87	0.50	µg/L	10.0		**58.7**	*	70-130			L-04, V-05	
Benzene	9.63	1.0	µg/L	10.0		96.3		70-130				
Bromobenzene	10.1	1.0	µg/L	10.0		101		70-130				
Bromochloromethane	11.2	1.0	µg/L	10.0		112		70-130				
Bromodichloromethane	10.9	1.0	µg/L	10.0		109		70-130				
Bromoform	8.99	1.0	µg/L	10.0		89.9		70-130				
Bromomethane	6.18	2.0	µg/L	10.0		61.8		40-160			L-14	†
2-Butanone (MEK)	84.9	10	µg/L	100		84.9		40-160			R-05	†
n-Butylbenzene	9.46	1.0	µg/L	10.0		94.6		70-130				
sec-Butylbenzene	9.80	1.0	µg/L	10.0		98.0		70-130				
tert-Butylbenzene	9.04	1.0	µg/L	10.0		90.4		70-130				
tert-Butyl Ethyl Ether (TBEE)	5.79	0.50	µg/L	10.0		**57.9**	*	70-130			L-04, V-05	
Carbon Disulfide	11.4	5.0	µg/L	10.0		114		70-130				
Carbon Tetrachloride	11.1	1.0	µg/L	10.0		111		70-130				
Chlorobenzene	10.2	1.0	µg/L	10.0		102		70-130				
Chlorodibromomethane	11.7	0.50	µg/L	10.0		117		70-130				
Chloroethane	9.57	2.0	µg/L	10.0		95.7		70-130				
Chloroform	10.1	2.0	µg/L	10.0		101		70-130				
Chloromethane	10.2	2.0	µg/L	10.0		102		40-160				†
2-Chlorotoluene	9.18	1.0	µg/L	10.0		91.8		70-130				
4-Chlorotoluene	10.4	1.0	µg/L	10.0		104		70-130				
1,2-Dibromo-3-chloropropane (DBCP)	6.79	2.0	µg/L	10.0		**67.9**	*	70-130			L-04, V-05	
1,2-Dibromoethane (EDB)	10.1	0.50	µg/L	10.0		101		70-130				
Dibromomethane	11.1	1.0	µg/L	10.0		111		70-130				
1,2-Dichlorobenzene	9.40	1.0	µg/L	10.0		94.0		70-130				
1,3-Dichlorobenzene	9.59	1.0	µg/L	10.0		95.9		70-130				
1,4-Dichlorobenzene	9.29	1.0	µg/L	10.0		92.9		70-130				

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QUALITY CONTROL

Volatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes	
Batch B216477 - SW-846 5030B											
LCS (B216477-BS1)				Prepared: 11/06/18 Analyzed: 11/07/18							
Dichlorodifluoromethane (Freon 12)	9.21	2.0	µg/L	10.0		92.1	40-160				†
1,1-Dichloroethane	10.8	1.0	µg/L	10.0		108	70-130				
1,2-Dichloroethane	10.4	1.0	µg/L	10.0		104	70-130				
1,1-Dichloroethylene	10.2	1.0	µg/L	10.0		102	70-130				
cis-1,2-Dichloroethylene	10.4	1.0	µg/L	10.0		104	70-130				
trans-1,2-Dichloroethylene	10.7	1.0	µg/L	10.0		107	70-130				
1,2-Dichloropropane	10.3	1.0	µg/L	10.0		103	70-130				
1,3-Dichloropropane	9.55	0.50	µg/L	10.0		95.5	70-130				
2,2-Dichloropropane	9.67	1.0	µg/L	10.0		96.7	70-130				
1,1-Dichloropropene	10.3	0.50	µg/L	10.0		103	70-130				
cis-1,3-Dichloropropene	11.3	0.40	µg/L	10.0		113	70-130				
trans-1,3-Dichloropropene	11.4	0.40	µg/L	10.0		114	70-130				
Diethyl Ether	10.1	2.0	µg/L	10.0		101	70-130				
Diisopropyl Ether (DIPE)	10.0	0.50	µg/L	10.0		100	70-130				
1,4-Dioxane	52.4	50	µg/L	100		52.4	40-160			L-14, V-05, V-16	†
Ethylbenzene	10.1	1.0	µg/L	10.0		101	70-130				
Hexachlorobutadiene	10.7	0.60	µg/L	10.0		107	70-130				
2-Hexanone (MBK)	84.2	10	µg/L	100		84.2	40-160			R-05, V-05	†
Isopropylbenzene (Cumene)	10.4	1.0	µg/L	10.0		104	70-130				
p-Isopropyltoluene (p-Cymene)	9.00	1.0	µg/L	10.0		90.0	70-130				
Methyl tert-Butyl Ether (MTBE)	7.34	1.0	µg/L	10.0		73.4	70-130				
Methylene Chloride	10.4	5.0	µg/L	10.0		104	70-130				
4-Methyl-2-pentanone (MIBK)	76.2	10	µg/L	100		76.2	40-160				†
Naphthalene	7.67	2.0	µg/L	10.0		76.7	70-130			V-05	
n-Propylbenzene	10.1	1.0	µg/L	10.0		101	70-130				
Styrene	10.2	1.0	µg/L	10.0		102	70-130				
1,1,1,2-Tetrachloroethane	10.5	1.0	µg/L	10.0		105	70-130				
1,1,2,2-Tetrachloroethane	8.47	0.50	µg/L	10.0		84.7	70-130				
Tetrachloroethylene	11.1	1.0	µg/L	10.0		111	70-130				
Tetrahydrofuran	7.51	2.0	µg/L	10.0		75.1	70-130				
Toluene	10.6	1.0	µg/L	10.0		106	70-130				
1,2,3-Trichlorobenzene	8.94	2.0	µg/L	10.0		89.4	70-130				
1,2,4-Trichlorobenzene	8.04	1.0	µg/L	10.0		80.4	70-130				
1,1,1-Trichloroethane	11.0	1.0	µg/L	10.0		110	70-130				
1,1,2-Trichloroethane	10.2	1.0	µg/L	10.0		102	70-130				
Trichloroethylene	11.2	1.0	µg/L	10.0		112	70-130				
Trichlorofluoromethane (Freon 11)	9.45	2.0	µg/L	10.0		94.5	70-130				
1,2,3-Trichloropropane	8.13	2.0	µg/L	10.0		81.3	70-130				
1,2,4-Trimethylbenzene	9.09	1.0	µg/L	10.0		90.9	70-130				
1,3,5-Trimethylbenzene	9.92	1.0	µg/L	10.0		99.2	70-130				
Vinyl Chloride	12.6	2.0	µg/L	10.0		126	70-130				
m+p Xylene	20.4	2.0	µg/L	20.0		102	70-130				
o-Xylene	10.5	1.0	µg/L	10.0		105	70-130				
Surrogate: 1,2-Dichloroethane-d4	*22.2*		µg/L	25.0		88.8	70-130				
Surrogate: Toluene-d8	*25.4*		µg/L	25.0		101	70-130				
Surrogate: 4-Bromofluorobenzene	*26.4*		µg/L	25.0		106	70-130				

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

QUALITY CONTROL

Volatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD		RPD Limit	Notes	
Batch B216477 - SW-846 5030B													
LCS Dup (B216477-BSD1)				Prepared: 11/06/18 Analyzed: 11/07/18									
Acetone	154	10	µg/L	100		154		40-160	**36.8**	*	20	L-14, R-05	†
tert-Amyl Methyl Ether (TAME)	5.89	0.50	µg/L	10.0		**58.9**	*	70-130	0.340		20	L-04, V-05	
Benzene	9.68	1.0	µg/L	10.0		96.8		70-130	0.518		20		
Bromobenzene	9.94	1.0	µg/L	10.0		99.4		70-130	1.30		20		
Bromochloromethane	11.6	1.0	µg/L	10.0		116		70-130	3.16		20		
Bromodichloromethane	11.0	1.0	µg/L	10.0		110		70-130	0.732		20		
Bromoform	8.55	1.0	µg/L	10.0		85.5		70-130	5.02		20		
Bromomethane	7.49	2.0	µg/L	10.0		74.9		40-160	19.2		20		†
2-Butanone (MEK)	111	10	µg/L	100		111		40-160	**26.3**	*	20	R-05	†
n-Butylbenzene	10.2	1.0	µg/L	10.0		102		70-130	7.92		20		
sec-Butylbenzene	10.6	1.0	µg/L	10.0		106		70-130	7.65		20		
tert-Butylbenzene	9.82	1.0	µg/L	10.0		98.2		70-130	8.27		20		
tert-Butyl Ethyl Ether (TBEE)	6.05	0.50	µg/L	10.0		**60.5**	*	70-130	4.39		20	L-04, V-05	
Carbon Disulfide	10.6	5.0	µg/L	10.0		106		70-130	7.27		20		
Carbon Tetrachloride	11.2	1.0	µg/L	10.0		112		70-130	0.898		20		
Chlorobenzene	10.4	1.0	µg/L	10.0		104		70-130	1.75		20		
Chlorodibromomethane	11.5	0.50	µg/L	10.0		115		70-130	1.55		20		
Chloroethane	10.0	2.0	µg/L	10.0		100		70-130	4.49		20		
Chloroform	10.6	2.0	µg/L	10.0		106		70-130	4.35		20		
Chloromethane	9.59	2.0	µg/L	10.0		95.9		40-160	5.87		20		†
2-Chlorotoluene	9.39	1.0	µg/L	10.0		93.9		70-130	2.26		20		
4-Chlorotoluene	10.4	1.0	µg/L	10.0		104		70-130	0.00		20		
1,2-Dibromo-3-chloropropane (DBCP)	6.38	2.0	µg/L	10.0		**63.8**	*	70-130	6.23		20	L-04, V-05	
1,2-Dibromoethane (EDB)	9.97	0.50	µg/L	10.0		99.7		70-130	1.59		20		
Dibromomethane	11.2	1.0	µg/L	10.0		112		70-130	0.269		20		
1,2-Dichlorobenzene	9.94	1.0	µg/L	10.0		99.4		70-130	5.58		20		
1,3-Dichlorobenzene	10.0	1.0	µg/L	10.0		100		70-130	4.58		20		
1,4-Dichlorobenzene	9.70	1.0	µg/L	10.0		97.0		70-130	4.32		20		
Dichlorodifluoromethane (Freon 12)	10.0	2.0	µg/L	10.0		100		40-160	8.42		20		†
1,1-Dichloroethane	10.8	1.0	µg/L	10.0		108		70-130	0.557		20		
1,2-Dichloroethane	10.6	1.0	µg/L	10.0		106		70-130	2.28		20		
1,1-Dichloroethylene	10.6	1.0	µg/L	10.0		106		70-130	4.23		20		
cis-1,2-Dichloroethylene	10.6	1.0	µg/L	10.0		106		70-130	1.82		20		
trans-1,2-Dichloroethylene	11.0	1.0	µg/L	10.0		110		70-130	2.67		20		
1,2-Dichloropropane	10.5	1.0	µg/L	10.0		105		70-130	1.92		20		
1,3-Dichloropropane	9.51	0.50	µg/L	10.0		95.1		70-130	0.420		20		
2,2-Dichloropropane	9.60	1.0	µg/L	10.0		96.0		70-130	0.727		20		
1,1-Dichloropropene	10.6	0.50	µg/L	10.0		106		70-130	2.20		20		
cis-1,3-Dichloropropene	11.1	0.40	µg/L	10.0		111		70-130	1.16		20		
trans-1,3-Dichloropropene	11.4	0.40	µg/L	10.0		114		70-130	0.438		20		
Diethyl Ether	10.3	2.0	µg/L	10.0		103		70-130	2.45		20		
Diisopropyl Ether (DIPE)	9.99	0.50	µg/L	10.0		99.9		70-130	0.499		20		
1,4-Dioxane	56.7	50	µg/L	100		56.7		40-160	7.75		20	L-14, V-05, V-16	†
Ethylbenzene	10.3	1.0	µg/L	10.0		103		70-130	1.76		20		
Hexachlorobutadiene	11.3	0.60	µg/L	10.0		113		70-130	5.28		20		
2-Hexanone (MBK)	114	10	µg/L	100		114		40-160	**29.8**	*	20	R-05, V-05	†
Isopropylbenzene (Cumene)	10.7	1.0	µg/L	10.0		107		70-130	2.57		20		
p-Isopropyltoluene (p-Cymene)	9.60	1.0	µg/L	10.0		96.0		70-130	6.45		20		
Methyl tert-Butyl Ether (MTBE)	7.37	1.0	µg/L	10.0		73.7		70-130	0.408		20		
Methylene Chloride	10.7	5.0	µg/L	10.0		107		70-130	3.04		20		
4-Methyl-2-pentanone (MIBK)	78.7	10	µg/L	100		78.7		40-160	3.11		20		†
Naphthalene	7.85	2.0	µg/L	10.0		78.5		70-130	2.32		20	V-05	

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

QUALITY CONTROL

Volatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B216477 - SW-846 5030B										
LCS Dup (B216477-BSD1)				Prepared: 11/06/18 Analyzed: 11/07/18						
n-Propylbenzene	10.6	1.0	µg/L	10.0		106	70-130	4.35	20	
Styrene	10.0	1.0	µg/L	10.0		100	70-130	1.78	20	
1,1,1,2-Tetrachloroethane	10.2	1.0	µg/L	10.0		102	70-130	2.99	20	
1,1,2,2-Tetrachloroethane	7.90	0.50	µg/L	10.0		79.0	70-130	6.96	20	
Tetrachloroethylene	11.4	1.0	µg/L	10.0		114	70-130	3.20	20	
Tetrahydrofuran	7.37	2.0	µg/L	10.0		73.7	70-130	1.88	20	
Toluene	10.7	1.0	µg/L	10.0		107	70-130	1.03	20	
1,2,3-Trichlorobenzene	8.76	2.0	µg/L	10.0		87.6	70-130	2.03	20	
1,2,4-Trichlorobenzene	7.95	1.0	µg/L	10.0		79.5	70-130	1.13	20	
1,1,1-Trichloroethane	11.0	1.0	µg/L	10.0		110	70-130	0.818	20	
1,1,2-Trichloroethane	10.4	1.0	µg/L	10.0		104	70-130	2.81	20	
Trichloroethylene	11.6	1.0	µg/L	10.0		116	70-130	3.34	20	
Trichlorofluoromethane (Freon 11)	10.4	2.0	µg/L	10.0		104	70-130	9.67	20	
1,2,3-Trichloropropane	7.71	2.0	µg/L	10.0		77.1	70-130	5.30	20	
1,2,4-Trimethylbenzene	9.64	1.0	µg/L	10.0		96.4	70-130	5.87	20	
1,3,5-Trimethylbenzene	10.2	1.0	µg/L	10.0		102	70-130	2.59	20	
Vinyl Chloride	13.0	2.0	µg/L	10.0		130	70-130	2.66	20	
m+p Xylene	20.9	2.0	µg/L	20.0		105	70-130	2.76	20	
o-Xylene	10.6	1.0	µg/L	10.0		106	70-130	1.24	20	
Surrogate: 1,2-Dichloroethane-d4	*22.2*		µg/L	25.0		88.7	70-130			
Surrogate: Toluene-d8	*25.3*		µg/L	25.0		101	70-130			
Surrogate: 4-Bromofluorobenzene	*26.5*		µg/L	25.0		106	70-130			

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

QUALITY CONTROL

Semivolatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B216486 - SW-846 3510C										
Blank (B216486-BLK1)				Prepared: 11/06/18 Analyzed: 11/08/18						
Acenaphthene	ND	5.0	µg/L							
Acenaphthylene	ND	5.0	µg/L							
Acetophenone	ND	10	µg/L							
Aniline	ND	5.0	µg/L							V-05, V-34
Anthracene	ND	5.0	µg/L							
Benzo(a)anthracene	ND	5.0	µg/L							
Benzo(a)pyrene	ND	5.0	µg/L							
Benzo(b)fluoranthene	ND	5.0	µg/L							
Benzo(g,h,i)perylene	ND	5.0	µg/L							
Benzo(k)fluoranthene	ND	5.0	µg/L							
Bis(2-chloroethoxy)methane	ND	10	µg/L							
Bis(2-chloroethyl)ether	ND	10	µg/L							
Bis(2-chloroisopropyl)ether	ND	10	µg/L							
Bis(2-Ethylhexyl)phthalate	ND	10	µg/L							
4-Bromophenylphenylether	ND	10	µg/L							
Butylbenzylphthalate	ND	10	µg/L							
4-Chloroaniline	ND	10	µg/L							V-34
2-Chloronaphthalene	ND	10	µg/L							
2-Chlorophenol	ND	10	µg/L							
Chrysene	ND	5.0	µg/L							
Dibenz(a,h)anthracene	ND	5.0	µg/L							
Dibenzofuran	ND	5.0	µg/L							
Di-n-butylphthalate	ND	10	µg/L							
1,2-Dichlorobenzene	ND	5.0	µg/L							
1,3-Dichlorobenzene	ND	5.0	µg/L							
1,4-Dichlorobenzene	ND	5.0	µg/L							
3,3-Dichlorobenzidine	ND	10	µg/L							
2,4-Dichlorophenol	ND	10	µg/L							
Diethylphthalate	ND	10	µg/L							
2,4-Dimethylphenol	ND	10	µg/L							
Dimethylphthalate	ND	10	µg/L							
2,4-Dinitrophenol	ND	10	µg/L							V-19
2,4-Dinitrotoluene	ND	10	µg/L							
2,6-Dinitrotoluene	ND	10	µg/L							
Di-n-octylphthalate	ND	10	µg/L							
1,2-Diphenylhydrazine (as Azobenzene)	ND	10	µg/L							
Fluoranthene	ND	5.0	µg/L							
Fluorene	ND	5.0	µg/L							
Hexachlorobenzene	ND	10	µg/L							
Hexachlorobutadiene	ND	10	µg/L							
Hexachloroethane	ND	10	µg/L							
Indeno(1,2,3-cd)pyrene	ND	5.0	µg/L							
Isophorone	ND	10	µg/L							
2-Methylnaphthalene	ND	5.0	µg/L							
2-Methylphenol	ND	10	µg/L							
3/4-Methylphenol	ND	10	µg/L							
Naphthalene	ND	5.0	µg/L							
Nitrobenzene	ND	10	µg/L							
2-Nitrophenol	ND	10	µg/L							
4-Nitrophenol	ND	10	µg/L							V-20
Pentachlorophenol	ND	10	µg/L							
Phenanthrene	ND	5.0	µg/L							

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

QUALITY CONTROL

Semivolatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes	
Batch B216486 - SW-846 3510C												
Blank (B216486-BLK1)				Prepared: 11/06/18 Analyzed: 11/08/18								
Phenol	ND	10	µg/L									
Pyrene	ND	5.0	µg/L									
1,2,4-Trichlorobenzene	ND	5.0	µg/L									
2,4,5-Trichlorophenol	ND	10	µg/L									
2,4,6-Trichlorophenol	ND	10	µg/L									
Surrogate: 2-Fluorophenol	*84.9*		µg/L	200		42.5		15-110				
Surrogate: Phenol-d6	*60.4*		µg/L	200		30.2		15-110				
Surrogate: Nitrobenzene-d5	*79.2*		µg/L	100		79.2		30-130				
Surrogate: 2-Fluorobiphenyl	*63.0*		µg/L	100		63.0		30-130				
Surrogate: 2,4,6-Tribromophenol	*190*		µg/L	200		95.0		15-110				
Surrogate: p-Terphenyl-d14	*76.7*		µg/L	100		76.7		30-130				
LCS (B216486-BS1)				Prepared: 11/06/18 Analyzed: 11/08/18								
Acenaphthene	27.6	5.0	µg/L	50.0		55.2		40-140				
Acenaphthylene	29.4	5.0	µg/L	50.0		58.8		40-140				
Acetophenone	28.9	10	µg/L	50.0		57.8		40-140				
Aniline	32.1	5.0	µg/L	50.0		64.3		40-140			V-05, V-34	
Anthracene	29.9	5.0	µg/L	50.0		59.8		40-140				
Benzo(a)anthracene	30.4	5.0	µg/L	50.0		60.9		40-140				
Benzo(a)pyrene	31.7	5.0	µg/L	50.0		63.4		40-140				
Benzo(b)fluoranthene	28.8	5.0	µg/L	50.0		57.7		40-140				
Benzo(g,h,i)perylene	33.2	5.0	µg/L	50.0		66.5		40-140				
Benzo(k)fluoranthene	30.3	5.0	µg/L	50.0		60.6		40-140				
Bis(2-chloroethoxy)methane	31.8	10	µg/L	50.0		63.7		40-140				
Bis(2-chloroethyl)ether	30.7	10	µg/L	50.0		61.4		40-140				
Bis(2-chloroisopropyl)ether	34.0	10	µg/L	50.0		68.0		40-140				
Bis(2-Ethylhexyl)phthalate	33.3	10	µg/L	50.0		66.5		40-140				
4-Bromophenylphenylether	32.0	10	µg/L	50.0		63.9		40-140				
Butylbenzylphthalate	30.8	10	µg/L	50.0		61.6		40-140				
4-Chloroaniline	33.1	10	µg/L	50.0		66.3		15-140			V-34	†
2-Chloronaphthalene	26.3	10	µg/L	50.0		52.6		40-140				
2-Chlorophenol	26.4	10	µg/L	50.0		52.8		30-130				
Chrysene	29.0	5.0	µg/L	50.0		58.1		40-140				
Dibenz(a,h)anthracene	33.2	5.0	µg/L	50.0		66.5		40-140				
Dibenzofuran	31.0	5.0	µg/L	50.0		62.1		40-140				
Di-n-butylphthalate	30.4	10	µg/L	50.0		60.7		40-140				
1,2-Dichlorobenzene	20.6	5.0	µg/L	50.0		41.1		40-140				
1,3-Dichlorobenzene	19.1	5.0	µg/L	50.0		**38.2**	*	40-140			L-07	
1,4-Dichlorobenzene	19.6	5.0	µg/L	50.0		**39.3**	*	40-140			L-07	
3,3-Dichlorobenzidine	38.2	10	µg/L	50.0		76.4		40-140				
2,4-Dichlorophenol	28.4	10	µg/L	50.0		56.7		30-130				
Diethylphthalate	34.4	10	µg/L	50.0		68.7		40-140				
2,4-Dimethylphenol	26.5	10	µg/L	50.0		53.0		30-130				
Dimethylphthalate	34.6	10	µg/L	50.0		69.2		40-140				
2,4-Dinitrophenol	34.6	10	µg/L	50.0		69.2		15-140			V-19	†
2,4-Dinitrotoluene	35.1	10	µg/L	50.0		70.1		40-140				
2,6-Dinitrotoluene	37.4	10	µg/L	50.0		74.8		40-140				
Di-n-octylphthalate	32.9	10	µg/L	50.0		65.8		40-140				
1,2-Diphenylhydrazine (as Azobenzene)	32.0	10	µg/L	50.0		64.0		40-140				
Fluoranthene	30.4	5.0	µg/L	50.0		60.8		40-140				
Fluorene	31.4	5.0	µg/L	50.0		62.7		40-140				
Hexachlorobenzene	32.4	10	µg/L	50.0		64.8		40-140				

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QUALITY CONTROL

Semivolatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes	
Batch B216486 - SW-846 3510C												
LCS (B216486-BS1)				Prepared: 11/06/18 Analyzed: 11/08/18								
Hexachlorobutadiene	21.9	10	µg/L	50.0		43.9		40-140				
Hexachloroethane	19.8	10	µg/L	50.0		**39.6**	*	40-140			L-07	
Indeno(1,2,3-cd)pyrene	34.9	5.0	µg/L	50.0		69.7		40-140				
Isophorone	31.6	10	µg/L	50.0		63.1		40-140				
2-Methylnaphthalene	26.4	5.0	µg/L	50.0		52.9		40-140				
2-Methylphenol	26.5	10	µg/L	50.0		53.0		30-130				
3/4-Methylphenol	26.1	10	µg/L	50.0		52.3		30-130				
Naphthalene	24.3	5.0	µg/L	50.0		48.7		40-140				
Nitrobenzene	28.6	10	µg/L	50.0		57.3		40-140				
2-Nitrophenol	29.2	10	µg/L	50.0		58.3		30-130				
4-Nitrophenol	23.0	10	µg/L	50.0		46.0		15-140			V-06	†
Pentachlorophenol	23.1	10	µg/L	50.0		46.1		30-130				
Phenanthrene	29.7	5.0	µg/L	50.0		59.4		40-140				
Phenol	12.5	10	µg/L	50.0		24.9		15-140				†
Pyrene	28.9	5.0	µg/L	50.0		57.8		40-140				
1,2,4-Trichlorobenzene	22.2	5.0	µg/L	50.0		44.3		40-140				
2,4,5-Trichlorophenol	31.8	10	µg/L	50.0		63.5		30-130				
2,4,6-Trichlorophenol	30.7	10	µg/L	50.0		61.4		30-130				
Surrogate: 2-Fluorophenol	*75.0*		µg/L	200		37.5		15-110				
Surrogate: Phenol-d6	*52.9*		µg/L	200		26.4		15-110				
Surrogate: Nitrobenzene-d5	*61.4*		µg/L	100		61.4		30-130				
Surrogate: 2-Fluorobiphenyl	*52.0*		µg/L	100		52.0		30-130				
Surrogate: 2,4,6-Tribromophenol	*162*		µg/L	200		81.0		15-110				
Surrogate: p-Terphenyl-d14	*65.0*		µg/L	100		65.0		30-130				
LCS Dup (B216486-BSD1)				Prepared: 11/06/18 Analyzed: 11/08/18								
Acenaphthene	30.4	5.0	µg/L	50.0		60.8		40-140	9.72	20		
Acenaphthylene	33.0	5.0	µg/L	50.0		66.0		40-140	11.5	20		
Acetophenone	34.1	10	µg/L	50.0		68.3		40-140	16.7	20		
Aniline	29.1	5.0	µg/L	50.0		58.2		40-140	9.89	20	V-05, V-34	
Anthracene	32.2	5.0	µg/L	50.0		64.4		40-140	7.37	20		
Benzo(a)anthracene	33.2	5.0	µg/L	50.0		66.5		40-140	8.79	20		
Benzo(a)pyrene	33.9	5.0	µg/L	50.0		67.8		40-140	6.77	20		
Benzo(b)fluoranthene	31.7	5.0	µg/L	50.0		63.3		40-140	9.32	20		
Benzo(g,h,i)perylene	35.2	5.0	µg/L	50.0		70.5		40-140	5.81	20		
Benzo(k)fluoranthene	32.0	5.0	µg/L	50.0		63.9		40-140	5.27	20		
Bis(2-chloroethoxy)methane	37.0	10	µg/L	50.0		74.0		40-140	15.0	20		
Bis(2-chloroethyl)ether	35.5	10	µg/L	50.0		70.9		40-140	14.3	20		
Bis(2-chloroisopropyl)ether	39.8	10	µg/L	50.0		79.6		40-140	15.7	20		
Bis(2-Ethylhexyl)phthalate	35.0	10	µg/L	50.0		70.0		40-140	5.10	20		
4-Bromophenylphenylether	32.7	10	µg/L	50.0		65.4		40-140	2.29	20		
Butylbenzylphthalate	32.6	10	µg/L	50.0		65.2		40-140	5.61	20		
4-Chloroaniline	31.6	10	µg/L	50.0		63.3		15-140	4.57	20	V-34	†
2-Chloronaphthalene	29.6	10	µg/L	50.0		59.1		40-140	11.7	20		
2-Chlorophenol	29.6	10	µg/L	50.0		59.2		30-130	11.4	20		
Chrysene	31.4	5.0	µg/L	50.0		62.8		40-140	7.88	20		
Dibenz(a,h)anthracene	35.7	5.0	µg/L	50.0		71.4		40-140	7.11	20		
Dibenzofuran	34.8	5.0	µg/L	50.0		69.5		40-140	11.4	20		
Di-n-butylphthalate	31.9	10	µg/L	50.0		63.8		40-140	4.92	20		
1,2-Dichlorobenzene	22.8	5.0	µg/L	50.0		45.6		40-140	10.3	20		
1,3-Dichlorobenzene	22.2	5.0	µg/L	50.0		44.4		40-140	15.1	20		
1,4-Dichlorobenzene	22.8	5.0	µg/L	50.0		45.5		40-140	14.7	20		

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QUALITY CONTROL

Semivolatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes	
Batch B216486 - SW-846 3510C											
LCS Dup (B216486-BSD1)				Prepared: 11/06/18 Analyzed: 11/08/18							
3,3-Dichlorobenzidine	38.4	10	µg/L	50.0		76.9	40-140	0.679	20		
2,4-Dichlorophenol	31.4	10	µg/L	50.0		62.8	30-130	10.2	20		
Diethylphthalate	36.9	10	µg/L	50.0		73.8	40-140	7.16	20		
2,4-Dimethylphenol	29.1	10	µg/L	50.0		58.2	30-130	9.32	20		
Dimethylphthalate	37.1	10	µg/L	50.0		74.2	40-140	6.98	20		
2,4-Dinitrophenol	36.9	10	µg/L	50.0		73.7	15-140	6.29	20	V-19	†
2,4-Dinitrotoluene	38.9	10	µg/L	50.0		77.8	40-140	10.3	20		
2,6-Dinitrotoluene	40.9	10	µg/L	50.0		81.8	40-140	8.92	20		
Di-n-octylphthalate	34.5	10	µg/L	50.0		69.0	40-140	4.69	20		
1,2-Diphenylhydrazine (as Azobenzene)	34.4	10	µg/L	50.0		68.7	40-140	7.17	20		
Fluoranthene	33.0	5.0	µg/L	50.0		65.9	40-140	8.05	20		
Fluorene	34.2	5.0	µg/L	50.0		68.4	40-140	8.63	20		
Hexachlorobenzene	32.2	10	µg/L	50.0		64.4	40-140	0.619	20		
Hexachlorobutadiene	24.4	10	µg/L	50.0		48.7	40-140	10.5	20		
Hexachloroethane	22.3	10	µg/L	50.0		44.5	40-140	11.7	20		
Indeno(1,2,3-cd)pyrene	36.7	5.0	µg/L	50.0		73.4	40-140	5.09	20		
Isophorone	36.6	10	µg/L	50.0		73.1	40-140	14.7	20		
2-Methylnaphthalene	31.4	5.0	µg/L	50.0		62.8	40-140	17.1	20		
2-Methylphenol	29.0	10	µg/L	50.0		58.0	30-130	8.90	20		
3/4-Methylphenol	28.2	10	µg/L	50.0		56.4	30-130	7.62	20		
Naphthalene	28.2	5.0	µg/L	50.0		56.4	40-140	14.7	20		
Nitrobenzene	33.5	10	µg/L	50.0		66.9	40-140	15.5	20		
2-Nitrophenol	34.0	10	µg/L	50.0		68.0	30-130	15.3	20		
4-Nitrophenol	23.8	10	µg/L	50.0		47.6	15-140	3.55	20	V-06	†
Pentachlorophenol	24.0	10	µg/L	50.0		48.1	30-130	4.16	20		
Phenanthrene	32.0	5.0	µg/L	50.0		64.1	40-140	7.55	20		
Phenol	13.5	10	µg/L	50.0		26.9	15-140	7.72	20		†
Pyrene	31.5	5.0	µg/L	50.0		63.0	40-140	8.68	20		
1,2,4-Trichlorobenzene	24.6	5.0	µg/L	50.0		49.1	40-140	10.3	20		
2,4,5-Trichlorophenol	35.4	10	µg/L	50.0		70.8	30-130	10.8	20		
2,4,6-Trichlorophenol	34.6	10	µg/L	50.0		69.1	30-130	11.9	20		
Surrogate: 2-Fluorophenol	*80.9*		µg/L	200		40.4	15-110				
Surrogate: Phenol-d6	*58.5*		µg/L	200		29.2	15-110				
Surrogate: Nitrobenzene-d5	*74.4*		µg/L	100		74.4	30-130				
Surrogate: 2-Fluorobiphenyl	*59.9*		µg/L	100		59.9	30-130				
Surrogate: 2,4,6-Tribromophenol	*178*		µg/L	200		89.0	15-110				
Surrogate: p-Terphenyl-d14	*71.3*		µg/L	100		71.3	30-130				
Batch B216603 - SW-846 3510C											
Blank (B216603-BLK1)				Prepared: 11/06/18 Analyzed: 11/07/18							
Acenaphthene (SIM)	ND	0.30	µg/L								
Acenaphthylene (SIM)	ND	0.20	µg/L								
Anthracene (SIM)	ND	0.20	µg/L								
Benzo(a)anthracene (SIM)	ND	0.050	µg/L								
Benzo(a)pyrene (SIM)	ND	0.10	µg/L								
Benzo(b)fluoranthene (SIM)	ND	0.050	µg/L								
Benzo(g,h,i)perylene (SIM)	ND	0.50	µg/L								
Benzo(k)fluoranthene (SIM)	ND	0.20	µg/L								
Chrysene (SIM)	ND	0.20	µg/L								
Dibenz(a,h)anthracene (SIM)	ND	0.10	µg/L								
Fluoranthene (SIM)	ND	0.50	µg/L								
Fluorene (SIM)	ND	1.0	µg/L								

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

QUALITY CONTROL

Semivolatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B216603 - SW-846 3510C										
Blank (B216603-BLK1)				Prepared: 11/06/18 Analyzed: 11/07/18						
Indeno(1,2,3-cd)pyrene (SIM)	ND	0.10	µg/L							
2-Methylnaphthalene (SIM)	ND	1.0	µg/L							
Naphthalene (SIM)	ND	1.0	µg/L							R-05
Phenanthrene (SIM)	ND	0.050	µg/L							
Pyrene (SIM)	ND	1.0	µg/L							
Surrogate: Nitrobenzene-d5	*74.9*		µg/L	100		74.9	30-130			
Surrogate: 2-Fluorobiphenyl	*51.8*		µg/L	100		51.8	30-130			
Surrogate: p-Terphenyl-d14	*67.3*		µg/L	100		67.3	30-130			
Blank (B216603-BLK2)				Prepared: 11/06/18 Analyzed: 11/07/18						
Benzo(k)fluoranthene (SIM)	ND	0.040	µg/L							
Surrogate: Nitrobenzene-d5	*57.1*		µg/L	100		57.1	30-130			
Surrogate: 2-Fluorobiphenyl	*33.0*		µg/L	100		33.0	30-130			
Surrogate: p-Terphenyl-d14	*57.2*		µg/L	100		57.2	30-130			
LCS (B216603-BS1)				Prepared: 11/06/18 Analyzed: 11/07/18						
Acenaphthene (SIM)	33.2	7.5	µg/L	50.0		66.4	40-140			
Acenaphthylene (SIM)	33.5	5.0	µg/L	50.0		67.0	40-140			
Anthracene (SIM)	37.0	5.0	µg/L	50.0		74.1	40-140			
Benzo(a)anthracene (SIM)	37.4	1.2	µg/L	50.0		74.9	40-140			
Benzo(a)pyrene (SIM)	41.1	2.5	µg/L	50.0		82.2	40-140			
Benzo(b)fluoranthene (SIM)	41.8	1.2	µg/L	50.0		83.7	40-140			
Benzo(g,h,i)perylene (SIM)	41.0	12	µg/L	50.0		81.9	40-140			
Benzo(k)fluoranthene (SIM)	40.9	5.0	µg/L	50.0		81.8	40-140			
Chrysene (SIM)	36.8	5.0	µg/L	50.0		73.5	40-140			
Dibenz(a,h)anthracene (SIM)	44.3	2.5	µg/L	50.0		88.6	40-140			
Fluoranthene (SIM)	36.8	12	µg/L	50.0		73.6	40-140			
Fluorene (SIM)	34.8	25	µg/L	50.0		69.6	40-140			
Indeno(1,2,3-cd)pyrene (SIM)	44.4	2.5	µg/L	50.0		88.9	40-140			
2-Methylnaphthalene (SIM)	31.6	25	µg/L	50.0		63.2	40-140			
Naphthalene (SIM)	29.6	25	µg/L	50.0		59.1	40-140			R-05
Phenanthrene (SIM)	36.4	1.2	µg/L	50.0		72.9	40-140			
Pyrene (SIM)	35.0	25	µg/L	50.0		70.1	40-140			
Surrogate: Nitrobenzene-d5	*74.4*		µg/L	100		74.4	30-130			
Surrogate: 2-Fluorobiphenyl	*57.1*		µg/L	100		57.1	30-130			
Surrogate: p-Terphenyl-d14	*63.5*		µg/L	100		63.5	30-130			
LCS Dup (B216603-BSD1)				Prepared: 11/06/18 Analyzed: 11/07/18						
Acenaphthene (SIM)	27.7	7.5	µg/L	50.0		55.4	40-140	18.2	20	
Acenaphthylene (SIM)	28.2	5.0	µg/L	50.0		56.4	40-140	17.2	20	
Anthracene (SIM)	31.7	5.0	µg/L	50.0		63.4	40-140	15.5	20	
Benzo(a)anthracene (SIM)	32.0	1.2	µg/L	50.0		64.0	40-140	15.8	20	
Benzo(a)pyrene (SIM)	34.8	2.5	µg/L	50.0		69.6	40-140	16.6	20	
Benzo(b)fluoranthene (SIM)	35.4	1.2	µg/L	50.0		70.9	40-140	16.6	20	
Benzo(g,h,i)perylene (SIM)	34.6	12	µg/L	50.0		69.3	40-140	16.7	20	
Benzo(k)fluoranthene (SIM)	34.7	5.0	µg/L	50.0		69.4	40-140	16.4	20	
Chrysene (SIM)	31.4	5.0	µg/L	50.0		62.7	40-140	15.9	20	
Dibenz(a,h)anthracene (SIM)	37.6	2.5	µg/L	50.0		75.2	40-140	16.3	20	
Fluoranthene (SIM)	31.0	12	µg/L	50.0		62.0	40-140	17.0	20	
Fluorene (SIM)	29.2	25	µg/L	50.0		58.4	40-140	17.3	20	
Indeno(1,2,3-cd)pyrene (SIM)	37.6	2.5	µg/L	50.0		75.2	40-140	16.7	20	‡
2-Methylnaphthalene (SIM)	26.0	25	µg/L	50.0		52.0	40-140	19.5	20	

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QUALITY CONTROL

Semivolatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD		RPD Limit	Notes
Batch B216603 - SW-846 3510C											
LCS Dup (B216603-BSD1)				Prepared: 11/06/18 Analyzed: 11/07/18							
Naphthalene (SIM)	24.1	25	µg/L	50.0		48.2	40-140	**20.2**	*	20	R-05
Phenanthrene (SIM)	31.1	1.2	µg/L	50.0		62.2	40-140	15.8		20	
Pyrene (SIM)	30.3	25	µg/L	50.0		60.6	40-140	14.5		20	
Surrogate: Nitrobenzene-d5	*59.1*		µg/L	100		59.1	30-130				
Surrogate: 2-Fluorobiphenyl	*44.5*		µg/L	100		44.5	30-130				
Surrogate: p-Terphenyl-d14	*52.1*		µg/L	100		52.1	30-130				

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B216347 - SW-846 3510C										
Blank (B216347-BLK1)				Prepared: 11/04/18 Analyzed: 11/05/18						
Diesel Range Organics	ND	0.20	mg/L							
Surrogate: 2-Fluorobiphenyl	*0.0822*		mg/L	0.100		82.2	40-140			
LCS (B216347-BS1)				Prepared: 11/04/18 Analyzed: 11/05/18						
Diesel Range Organics	0.954	0.20	mg/L	1.00		95.4	40-140			
Surrogate: 2-Fluorobiphenyl	*0.0843*		mg/L	0.100		84.3	40-140			
LCS Dup (B216347-BSD1)				Prepared: 11/04/18 Analyzed: 11/05/18						
Diesel Range Organics	0.936	0.20	mg/L	1.00		93.6	40-140	1.96		
Surrogate: 2-Fluorobiphenyl	*0.0814*		mg/L	0.100		81.4	40-140			

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FLAG/QUALIFIER SUMMARY

*	QC result is outside of established limits.
†	Wide recovery limits established for difficult compound.
‡	Wide RPD limits established for difficult compound.
#	Data exceeded client recommended or regulatory level
ND	Not Detected
RL	Reporting Limit is at the level of quantitation (LOQ)
DL	Detection Limit is the lower limit of detection determined by the MDL study
MCL	Maximum Contaminant Level
	Percent recoveries and relative percent differences (RPDs) are determined by the software using values in the calculation which have not been rounded.
	No results have been blank subtracted unless specified in the case narrative section.
L-04	Laboratory fortified blank/laboratory control sample recovery and duplicate recovery are outside of control limits. Reported value for this compound is likely to be biased on the low side.
L-07	Either laboratory fortified blank/laboratory control sample or duplicate recovery is outside of control limits, but the other is within limits. RPD between the two LFB/LCS results is within method specified criteria.
L-14	Compound classified by MA CAM as difficult with acceptable recoveries of 40-160%. Recovery does not meet 70-130% criteria but does meet difficult compound criteria.
R-05	Laboratory fortified blank duplicate RPD is outside of control limits. Reduced precision is anticipated for any reported value for this compound.
RL-07	Elevated reporting limit based on lowest point in calibration. MA CAM reporting limit not met.
RL-08	Elevated reporting limit due to sample matrix interference. MA CAM reporting limit not met.
S-07	One associated surrogate standard recovery is outside of control limits but the other(s) is/are within limits. All recoveries are > 10%.
V-05	Continuing calibration did not meet method specifications and was biased on the low side for this compound.
V-06	Continuing calibration did not meet method specifications and was biased on the high side for this compound.
V-16	Response factor is less than method specified minimum acceptable value. Reduced precision and accuracy may be associated with reported result.
V-19	Initial calibration did not meet method specifications. Compound was calibrated using linear regression with correlation coefficient <0.99. Reported result is estimated.
V-20	Continuing calibration did not meet method specifications and was biased on the high side. Data validation is not affected since sample result was "not detected" for this compound.
V-34	Initial calibration verification (ICV) did not meet method specifications and was biased on the low side for this compound. Reported result is estimated.

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SW-846 8015C in Water	
Diesel Range Organics	NY,VA,NH,NC
SW-846 8260C in Water	
Acetone	CT,NH,NY,ME
tert-Amyl Methyl Ether (TAME)	NH,NY,ME
Benzene	CT,NH,NY,ME
Bromobenzene	ME
Bromochloromethane	NH,NY,ME
Bromodichloromethane	CT,NH,NY,ME
Bromoform	CT,NH,NY,ME
Bromomethane	CT,NH,NY,ME
2-Butanone (MEK)	CT,NH,NY,ME
n-Butylbenzene	NY,ME
sec-Butylbenzene	NY,ME
tert-Butylbenzene	NY,ME
tert-Butyl Ethyl Ether (TBEE)	NH,NY,ME
Carbon Disulfide	CT,NH,NY,ME
Carbon Tetrachloride	CT,NH,NY,ME
Chlorobenzene	CT,NH,NY,ME
Chlorodibromomethane	CT,NH,NY,ME
Chloroethane	CT,NH,NY,ME
Chloroform	CT,NH,NY,ME
Chloromethane	CT,NH,NY,ME
2-Chlorotoluene	NY,ME
4-Chlorotoluene	NY,ME
1,2-Dibromo-3-chloropropane (DBCP)	NY
1,2-Dibromoethane (EDB)	NY
Dibromomethane	NH,NY,ME
1,2-Dichlorobenzene	CT,NY,ME
1,3-Dichlorobenzene	CT,NH,NY,ME
1,4-Dichlorobenzene	CT,NH,NY,ME
Dichlorodifluoromethane (Freon 12)	NH,NY,ME
1,1-Dichloroethane	CT,NH,NY,ME
1,2-Dichloroethane	CT,NH,NY,ME
1,1-Dichloroethylene	CT,NH,NY,ME
cis-1,2-Dichloroethylene	NY,ME
trans-1,2-Dichloroethylene	CT,NH,NY,ME
1,2-Dichloropropane	CT,NH,NY,ME
1,3-Dichloropropane	NY,ME
2,2-Dichloropropane	NH,NY,ME
1,1-Dichloropropene	NH,NY,ME
cis-1,3-Dichloropropene	CT,NH,NY,ME
trans-1,3-Dichloropropene	CT,NH,NY,ME
Diisopropyl Ether (DIPE)	NH,NY,ME
Ethylbenzene	CT,NH,NY,ME
Hexachlorobutadiene	CT,NH,NY,ME
2-Hexanone (MBK)	CT,NH,NY,ME

con-test® ANALYTICAL LABORATORY
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SW-846 8260C in Water	
Isopropylbenzene (Cumene)	NY,ME
p-Isopropyltoluene (p-Cymene)	CT,NH,NY,ME
Methyl tert-Butyl Ether (MTBE)	CT,NH,NY,ME
Methylene Chloride	CT,NH,NY,ME
4-Methyl-2-pentanone (MIBK)	CT,NH,NY,ME
Naphthalene	NH,NY,ME
n-Propylbenzene	CT,NH,NY,ME
Styrene	CT,NH,NY,ME
1,1,1,2-Tetrachloroethane	CT,NH,NY,ME
1,1,2,2-Tetrachloroethane	CT,NH,NY,ME
Tetrachloroethylene	CT,NH,NY,ME
Toluene	CT,NH,NY,ME
1,2,3-Trichlorobenzene	NH,NY,ME
1,2,4-Trichlorobenzene	CT,NH,NY,ME
1,1,1-Trichloroethane	CT,NH,NY,ME
1,1,2-Trichloroethane	CT,NH,NY,ME
Trichloroethylene	CT,NH,NY,ME
Trichlorofluoromethane (Freon 11)	CT,NH,NY,ME
1,2,3-Trichloropropane	NH,NY,ME
1,2,4-Trimethylbenzene	NY,ME
1,3,5-Trimethylbenzene	NY,ME
Vinyl Chloride	CT,NH,NY,ME
m+p Xylene	CT,NH,NY,ME
o-Xylene	CT,NH,NY,ME
SW-846 8270D in Soil	
Acenaphthene	CT,NY,NH
Acenaphthylene	CT,NY,NH
Acetophenone	NY,NH
Aniline	NY,NH
Anthracene	CT,NY,NH
Benzo(a)anthracene	CT,NY,NH
Benzo(a)pyrene	CT,NY,NH
Benzo(b)fluoranthene	CT,NY,NH
Benzo(g,h,i)perylene	CT,NY,NH
Benzo(k)fluoranthene	CT,NY,NH
Bis(2-chloroethoxy)methane	CT,NY,NH
Bis(2-chloroethyl)ether	CT,NY,NH
Bis(2-chloroisopropyl)ether	CT,NY,NH
Bis(2-Ethylhexyl)phthalate	CT,NY,NH
4-Bromophenylphenylether	CT,NY,NH
Butylbenzylphthalate	CT,NY,NH
4-Chloroaniline	CT,NY,NH
2-Chloronaphthalene	CT,NY,NH
2-Chlorophenol	CT,NY,NH
Chrysene	CT,NY,NH
Dibenz(a,h)anthracene	CT,NY,NH

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SW-846 8270D in Soil	
Dibenzofuran	CT,NY,NH
Di-n-butylphthalate	CT,NY,NH
1,2-Dichlorobenzene	NY,NH
1,3-Dichlorobenzene	NY,NH
1,4-Dichlorobenzene	NY,NH
3,3-Dichlorobenzidine	CT,NY,NH
2,4-Dichlorophenol	CT,NY,NH
Diethylphthalate	CT,NY,NH
2,4-Dimethylphenol	CT,NY,NH
Dimethylphthalate	CT,NY,NH
2,4-Dinitrophenol	CT,NY,NH
2,4-Dinitrotoluene	CT,NY,NH
2,6-Dinitrotoluene	CT,NY,NH
Di-n-octylphthalate	CT,NY,NH
1,2-Diphenylhydrazine (as Azobenzene)	NY,NH
Fluoranthene	CT,NY,NH
Fluorene	NY,NH
Hexachlorobenzene	CT,NY,NH
Hexachlorobutadiene	CT,NY,NH
Hexachloroethane	CT,NY,NH
Indeno(1,2,3-cd)pyrene	CT,NY,NH
Isophorone	CT,NY,NH
2-Methylnaphthalene	CT,NY,NH
2-Methylphenol	CT,NY,NH
3/4-Methylphenol	CT,NY,NH
Naphthalene	CT,NY,NH
Nitrobenzene	CT,NY,NH
2-Nitrophenol	CT,NY,NH
4-Nitrophenol	CT,NY,NH
Pentachlorophenol	CT,NY,NH
Phenanthrene	CT,NY,NH
Phenol	CT,NY,NH
Pyrene	CT,NY,NH
1,2,4-Trichlorobenzene	CT,NY,NH
2,4,5-Trichlorophenol	CT,NY,NH
2,4,6-Trichlorophenol	CT,NY,NH
SW-846 8270D in Water	
Acenaphthene	CT,NY,NH
Acenaphthylene	CT,NY,NH
Acetophenone	NY
Aniline	CT,NY
Anthracene	CT,NY,NH
Benzo(a)anthracene	CT,NY,NH
Benzo(a)pyrene	CT,NY,NH
Benzo(b)fluoranthene	CT,NY,NH
Benzo(g,h,i)perylene	CT,NY,NH

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SW-846 8270D in Water	
Benzo(k)fluoranthene	CT,NY,NH
Bis(2-chloroethoxy)methane	CT,NY,NH
Bis(2-chloroethyl)ether	CT,NY,NH
Bis(2-chloroisopropyl)ether	CT,NY,NH
Bis(2-Ethylhexyl)phthalate	CT,NY,NH
4-Bromophenylphenylether	CT,NY,NH
Butylbenzylphthalate	CT,NY,NH
4-Chloroaniline	CT,NY,NH
2-Chloronaphthalene	CT,NY,NH
2-Chlorophenol	CT,NY,NH
Chrysene	CT,NY,NH
Dibenz(a,h)anthracene	CT,NY,NH
Dibenzofuran	CT,NY,NH
Di-n-butylphthalate	CT,NY,NH
1,2-Dichlorobenzene	CT,NY,NH
1,3-Dichlorobenzene	CT,NY,NH
1,4-Dichlorobenzene	CT,NY,NH
3,3-Dichlorobenzidine	CT,NY,NH
2,4-Dichlorophenol	CT,NY,NH
Diethylphthalate	CT,NY,NH
2,4-Dimethylphenol	CT,NY,NH
Dimethylphthalate	CT,NY,NH
2,4-Dinitrophenol	CT,NY,NH
2,4-Dinitrotoluene	CT,NY,NH
2,6-Dinitrotoluene	CT,NY,NH
Di-n-octylphthalate	CT,NY,NH
1,2-Diphenylhydrazine (as Azobenzene)	NY
Fluoranthene	CT,NY,NH
Fluorene	NY,NH
Hexachlorobenzene	CT,NY,NH
Hexachlorobutadiene	CT,NY,NH
Hexachloroethane	CT,NY,NH
Indeno(1,2,3-cd)pyrene	CT,NY,NH
Isophorone	CT,NY,NH
2-Methylnaphthalene	CT,NY,NH
2-Methylphenol	CT,NY,NH
3/4-Methylphenol	CT,NY,NH
Naphthalene	CT,NY,NH
Nitrobenzene	CT,NY,NH
2-Nitrophenol	CT,NY,NH
4-Nitrophenol	CT,NY,NH
Pentachlorophenol	CT,NY,NH
Phenanthrene	CT,NY,NH
Phenol	CT,NY,NH
Pyrene	CT,NY,NH
1,2,4-Trichlorobenzene	CT,NY,NH
2,4,5-Trichlorophenol	CT,NY,NH

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SW-846 8270D in Water	
2,4,6-Trichlorophenol	CT,NY,NH

The CON-TEST Environmental Laboratory operates under the following certifications and accreditations:

Code	Description	Number	Expires
AIHA	AIHA-LAP, LLC - ISO17025:2005	100033	03/1/2020
MA	Massachusetts DEP	M-MA100	06/30/2019
CT	Connecticut Department of Publilc Health	PH-0567	09/30/2019
NY	New York State Department of Health	10899 NELAP	04/1/2019
NH-S	New Hampshire Environmental Lab	2516 NELAP	02/5/2019
RI	Rhode Island Department of Health	LAO00112	12/30/2018
NC	North Carolina Div. of Water Quality	652	12/31/2018
NJ	New Jersey DEP	MA007 NELAP	06/30/2019
FL	Florida Department of Health	E871027 NELAP	06/30/2019
VT	Vermont Department of Health Lead Laboratory	LL015036	07/30/2019
ME	State of Maine	2011028	06/9/2019
VA	Commonwealth of Virginia	460217	12/14/2018
NH-P	New Hampshire Environmental Lab	2557 NELAP	09/6/2019
VT-DW	Vermont Department of Health Drinking Water	VT-255716	06/12/2019
NC-DW	North Carolina Department of Health	25703	07/31/2019

con-test ANALYTICAL LABORATORY

Phone: 413-525-2332
Fax: 413-525-6405
Email: info@contestlabs.com

http://www.contestlabs.com

CHAIN OF CUSTODY RECORD

Doc # 381 Rev 1_03242017

39 Spruce Street
East Longmeadow, MA 01028

Page 1 of 1

KKM 187518

Company Name:	EFT Global
Address:	155 West St. Wilmington, MA
Phone:	(508) 570-3023
Project Name:	Fernald
Project Location:	Waltham, MA
Project Number:	020.00107
Project Manager:	Scott Parker
Con-Test Quote Name/Number:	
Invoice Recipient:	EFT
Sampled By:	Pat Ryan

Requested Turnaround Time
7-Day [X] 10-Day [ ]
Due Date:

Rush-Approval Required
1-Day [ ] 3-Day [ ]
2-Day [ ] 4-Day [ ]

Data Delivery
Format: PDF [X] EXCEL [X]
Other:
CLP Like Data Pkg Required: [ ]
Email To:
Fax To #:

Con-Test Work Order#	Client Sample ID / Description	Beginning Date/Time	Ending Date/Time	Composite	Grab	[1] Matrix Code	Conc Code	VOCs (8260)	SVOCs (8270)	TPH (DRO)	# of Containers	[2] Preservation Code	[3] Container Code
								3	1	1			
								✓	A	A			
								11	I	I			
01	MW-1	10/30/18	1500			GW	U/L	X	X	X			
02	MW-2	↓	1530			↓	↓	↓	↓	↓			
03	MW-3	10/31/18	1220			↓	↓	↓	↓	↓			

ANALYSIS REQUESTED

Dissolved Metals Samples
- O Field Filtered
- O Lab to Filter

Orthophosphate Samples
- O Field Filtered
- O Lab to Filter

Comments:

Please use the following codes to indicate possible sample concentration within the **Conc Code** column above:
H - High; M - Medium; L - Low; C - Clean; U - Unknown

[1] Matrix Codes:
GW = Ground Water
WW = Waste Water
DW = Drinking Water
A = Air
S = Soil
SL = Sludge
SOL = Solid
O = Other (please define)

[2] Preservation Codes:
I = Iced
H = HCL
M = Methanol
N = Nitric Acid
S = Sulfuric Acid
B = Sodium Bisulfate
X = Sodium Hydroxide
T = Sodium Thiosulfate
O = Other (please define)

[3] Container Codes:
A = Amber Glass
G = Glass
P = Plastic
ST = Sterile
V = Vial
S = Summa Canister
T = Tedlar Bag
O = Other (please define)

Relinquished by: (signature)	Date/Time:	10/31/18
Received by: (signature)	Date/Time:	10/31/18 1345
Relinquished by: (signature)	Date/Time:	10/31/18 1688
Received by: (signature)	Date/Time:	10/31/18 1600
Relinquished by: (signature)	Date/Time:	
Received by: (signature)	Date/Time:	

Detection Limit Requirements
MA
CT
Other:

Special Requirements
- [ ] MA MCP Required
- MCP Certification Form Required
- [ ] CT RCP Required
- RCP Certification Form Required
- [ ] MA State DW Required
- PWSID #

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NELAC and AIHA-LAP, LLC Accredited

Project Entity
[ ] Government [ ] Municipality [ ] MWRA [ ] WRTA
[ ] Federal [ ] 21 J [ ] School

Other
[ ] Chromatogram
[ ] *AIHA-LAP, LLC*

PCB ONLY
[ ] Soxhlet
[ ] Non Soxhlet

Table of Contents

I Have Not Confirmed Sample Container Numbers With Lab Staff Before Relinquishing Over Samples_____

con-test® ANALYTICAL LABORATORY

Doc# 277 Rev 5 2017

Login Sample Receipt Checklist - (Rejection Criteria Listing - Using Acceptance Policy) Any False Statement will be brought to the attention of the Client - State True or False

Client EFI Global

Received By RAP Date 10/31/18 Time 1600

How were the samples received? In Cooler T No Cooler _____ On Ice T No Ice _____

Direct from Sampling _____ Ambient _____ Melted Ice _____

Were samples within Temperature? 2-6°C T By Gun # 537 Actual Temp - 5.6

By Blank # _____ Actual Temp - _____

Was Custody Seal Intact? NA Were Samples Tampered with? NA

Was COC Relinquished ? T Does Chain Agree With Samples? T

Are there broken/leaking/loose caps on any samples? F

Is COC in ink/ Legible? T Were samples received within holding time? T

Did COC include all pertinent Information? Client T Project T Analysis T ID's T Sampler Name T Collection Dates/Times T

Are Sample labels filled out and legible? T

Are there Lab to Filters? F Who was notified? _____

Are there Rushes? F Who was notified? _____

Are there Short Holds? F Who was notified? _____

Is there enough Volume? T

Is there Headspace where applicable? F MS/MSD? F

Proper Media/Containers Used? T Is splitting samples required? F

Were trip blanks received? F On COC? F

Do all samples have the proper pH? NA Acid _____ Base _____

Vials	#	Containers:	#		#		#
Unp-		1 Liter Amb.	6	1 Liter Plastic		16 oz Amb.	
HCL-	9	500 mL Amb.		500 mL Plastic		8oz Amb/Clear	
Meoh-		250 mL Amb.		250 mL Plastic		4oz Amb/Clear	
Bisulfate-		Col./Bacteria		Flashpoint		2oz Amb/Clear	
DI-		Other Plastic		Other Glass		Encore	
Thiosulfate-		SOC Kit		Plastic Bag		Frozen:	
Sulfuric-		Perchlorate		Ziplock			

Unused Media

Vials	#	Containers:	#		#		#
Unp-		1 Liter Amb.		1 Liter Plastic		16 oz Amb.	
HCL-		500 mL Amb.		500 mL Plastic		8oz Amb/Clear	
Meoh-		250 mL Amb.		250 mL Plastic		4oz Amb/Clear	
Bisulfate-		Col./Bacteria		Flashpoint		2oz Amb/Clear	
DI-		Other Plastic		Other Glass		Encore	
Thiosulfate-		SOC Kit		Plastic Bag		Frozen:	
Sulfuric-		Perchlorate		Ziplock			

Comments:

ATTACHMENT E

ATTACHMENT E

Existing Utility Maps

100 0 100 200 300 400 500

GRAPHIC SCALE

FERNALD STATE SCHOOL
WALTHAM, MASSACHUSETTS
MASS. STATE PROJECT
NO. MR88-5 STU
UTILITIES MASTER PLAN

Source: GANTEAUME AND McMULLEN
ARCHITECTS · ENGINEERS
BOSTON, MASSACHUSETTS

EXISTING CONDITIONS BY BRYANT ASSOCIATES, INC.

EXISTING
STORM SEWER SYSTEM

FIGURE 4.6

FERNALD NOI DESIGN PLANS

SECTION 2

Plans

WALTER E. FERNALD DEVELOPMENTAL CENTER
WETLANDS RESTORATION & STREAM DAYLIGHTING
NOTICE OF INTENT FILING

WALTHAM, MA

MAYOR
JEANNETTE A. MCCARTHY

CITY ENGINEER
STEPHEN A CASAZZA, P.E.

LIST OF DRAWINGS

EX-1	EXISTING CONDITIONS PLAN
L-1	LAYOUT PLAN I
L-2	LAYOUT PLAN II
L-3	LAYOUT PLAN III
G-1	GRADING PLAN I
G-2	GRADING PLAN II
G-3	GRADING PLAN III
LA-1	LANDSCAPE PLAN I
LA-2	LANDSCAPE PLAN II
LA-3	LANDSCAPE PLAN III
LA-4	PLANTING SCHEDULE
P-1	STREAM PROFILE
S-1	CROSS SECTIONS I
S-2	CROSS SECTIONS II
D-1	DETAILS I
D-2	DETAILS II
D-3	DETAILS III

FEBRUARY 2019

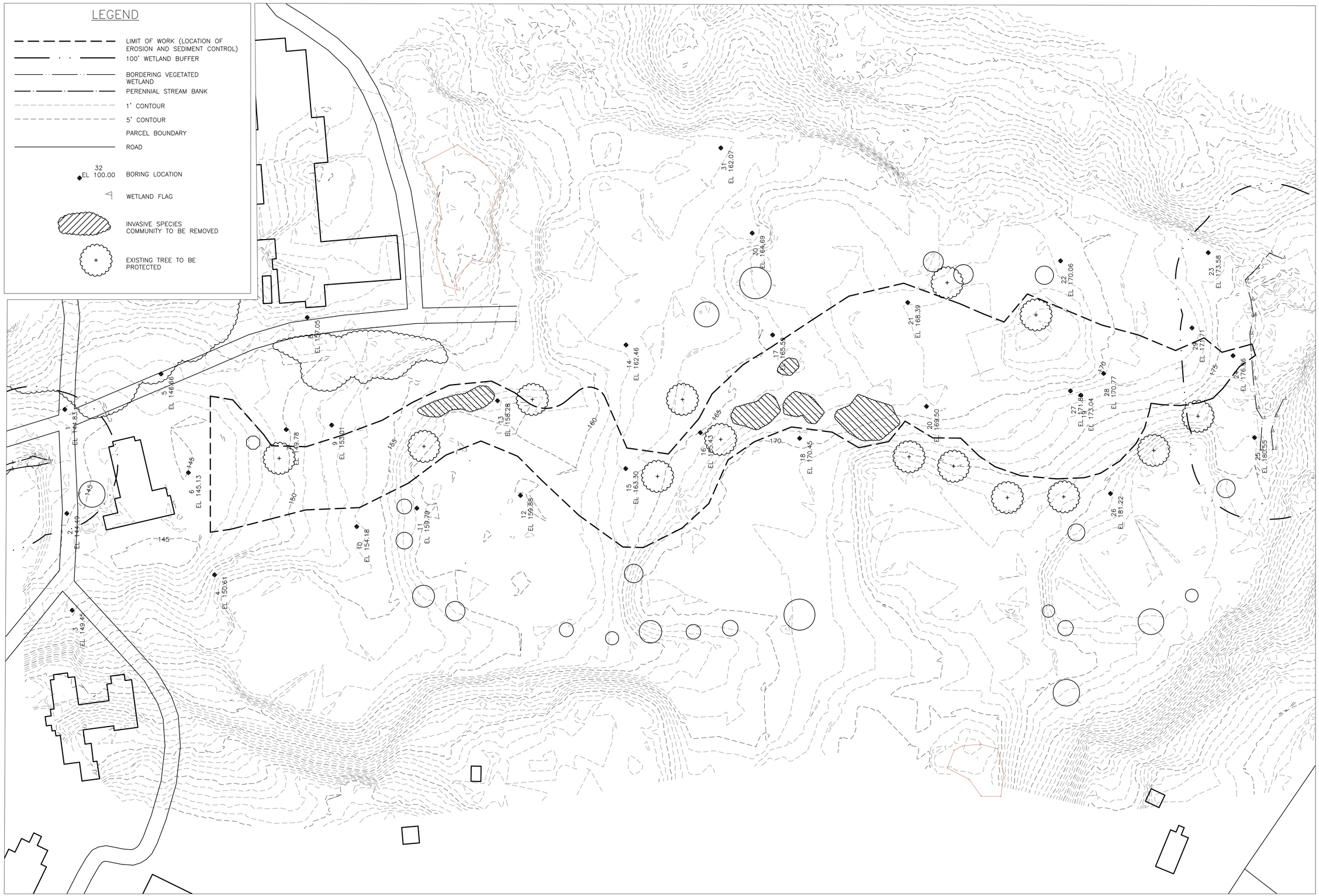
FOR PERMITTING PURPOSES ONLY

SSV ENGINEERING INC.
609 WINTER STREET
FRAMINGHAM MA

JCLA
JOSEPH COAN LANDSCAPE ARCHITECTURE
STURBRIDGE MA (413)-668-4553

LEGEND

- LIMIT OF WORK (LOCATION OF EROSION AND SEDIMENT CONTROL)
- 100' WETLAND BUFFER
- BORDERING VEGETATED WETLAND
- PERENNIAL STREAM BANK
- 1' CONTOUR
- 5' CONTOUR
- PARCEL BOUNDARY
- ROAD
- 32 EL 100.00 — BORING LOCATION
- WETLAND FLAG
- INVASIVE SPECIES COMMUNITY TO BE REMOVED
- EXISTING TREE TO BE PROTECTED



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SSV ENGINEERING INC.

JCLA
JOSEPH CLOHA LANDSCAPE ARCHITECTURE
STURBRIDGE MA | 413.668.4553

Proj. Mgr: SB
Designed : JC
Drawn : JC
Checked :
Scale : AS NOTED
Date : FEB 2019

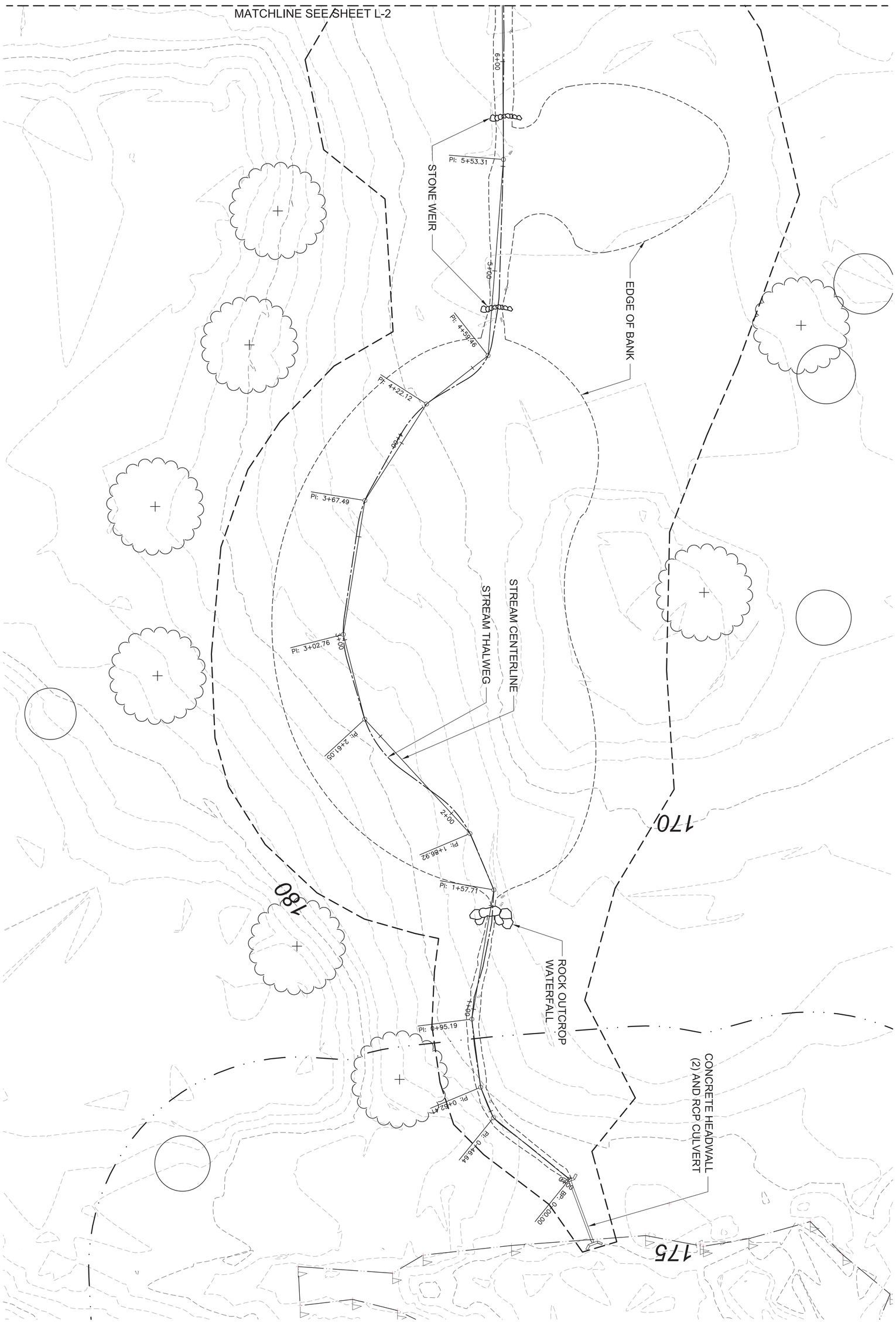
EXISTING CONDITIONS

FERNALD SCHOOL
WALTHAM MA

Proj. No.

Dwg. No.

EX-1



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Proj. No.	LAYOUT PLAN I	Proj. Mgr.: SB Designed : JC Drawn : JC Checked : Scale : AS NOTED Date : FEB 2019	JCLA JOSEPH CORIN LANDSCAPE ARCHITECTURE STURBRIDGE MA (413) 668-4553	SSV ENGINEERING INC.	REVISIONS
Dwg No. L-1	FERNALD SCHOOL WALTHAM MA				

MATCHLINE SEE SHEET L-3

MATCHLINE SEE SHEET L-1

155

160

165

BOULDER OUTCROP (TYP.)

STREAM CENTERLINE

STREAM THALWEG

EDGE OF BANK

PI: 7+13.53

7+00

PI: 7+63.95

8+00

PI: 7+90.34

PI: 8+45.01

PI: 8+90.01

9+00

PI: 9+79.25

10+00

PI: 10+16.18

PI: 11+09.67

11+00

PI: 11+84.81

12+00

PI: 12+68.15

PI: 13+20.62

13+00

PI: 13+67.69

14+00

PI: 13+96.41

14+28.87

1" = 20'

10 0 20

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JCLA

JOSEPH COMBA ASSOCIATES, ARCHITECTURE
STERLING MA | 413 644-4553

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Designed : JC
Drawn : JC
Checked :
Scale : AS NOTED
Date : FEB 2019

LAYOUT PLAN II

FERNALD SCHOOL
WALTHAM MA

Proj. No.

Dwg. No.

L-2

N

MATCHLINE SEE SHEET L-2

EXISTING GAZEBO TO REMAIN

CONCRETE HEADWALL RCP PIPE TO CONNECT TO EXISTING DRAIN

EXISTING RCP DRAIN

STREAM CENTERLINE

STREAM THALWEG

EDGE OF BANK

STONE WATERFALL

BOULDER OUTCROP (TYP.)

150

145

145

EP: 17+31.78

PI: 17+14.53

17+00

PI: 16+58.4

PI: 16+32.40

16+00

PI: 15+82.91

PI: 15+68.87

PI: 15+14.59

15+00

PI: 14+64.26

PI:

1" = 20'

10 0 20

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JOSEPH CORAL LANDSCAPE ARCHITECTURE
STURBRIDGE MA | (413) 668-4553

Proj. Mgr.: SB
Designed : JC
Drawn : JC
Checked :
Scale : AS NOTED
Date : FEB 2019

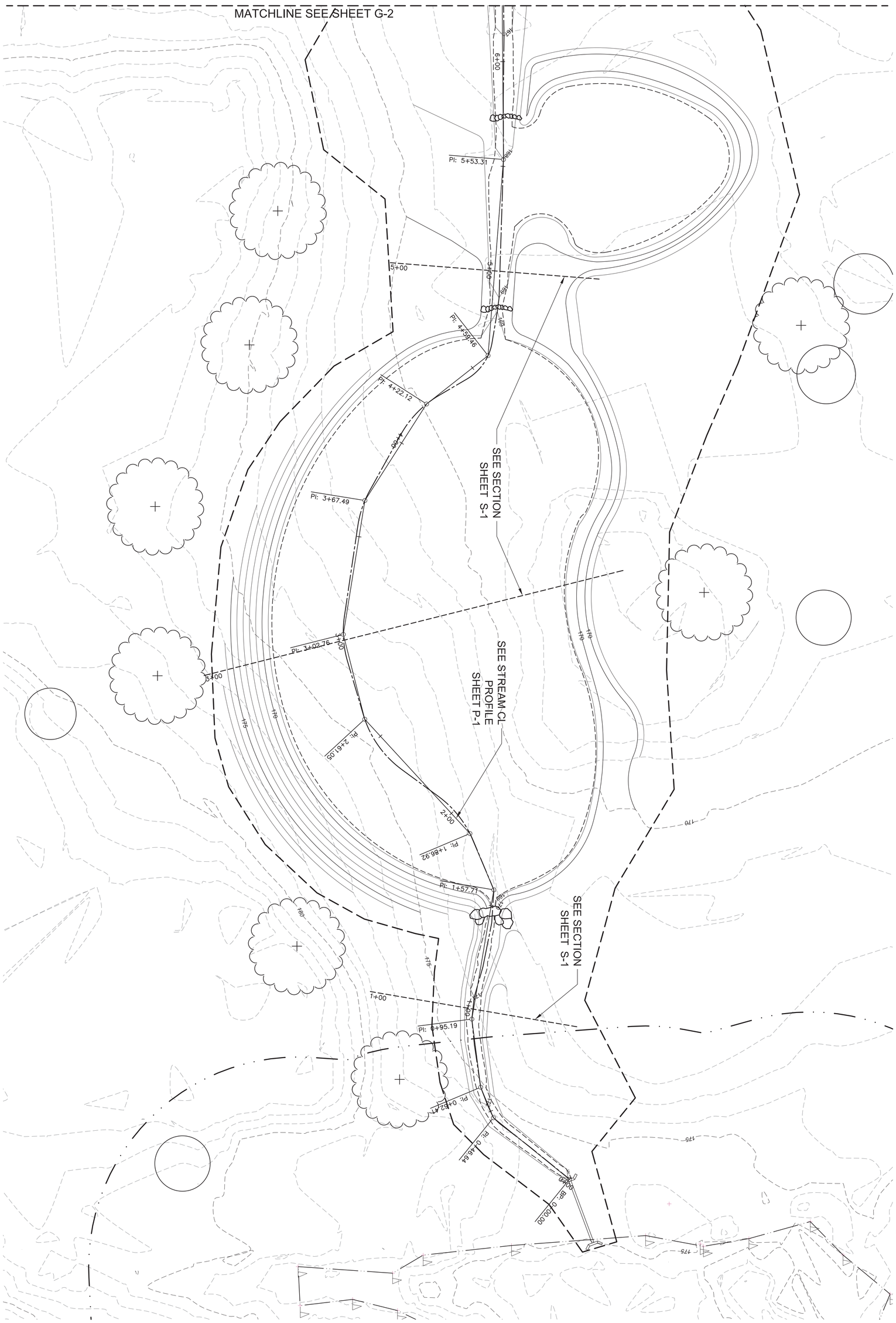
LAYOUT PLAN III

FERNALD SCHOOL
WALTHAM MA

Proj. No.

Dwg. No.

L-3



PROGRESS PRINT–NOT FOR CONSTRUCTION

Dwg No. G-1	Proj. No.	GRADING PLAN I FERNALD SCHOOL WALTHAM MA	Proj. Mgr.: SB Designed : JC Drawn : JC Checked : Scale : AS NOTED Date : FEB 2019	JCLA JOSEPH COAN LANDSCAPE ARCHITECTURE STURBRIDGE MA (413) 668-4553 SSV ENGINEERING INC. INCORPORATED A TOWN 1738 WALTHAM INCORPORATED A CITY 1884

REVISIONS

MATCHLINE SEE SHEET G-3

MATCHLINE SEE SHEET G-1

SEE SECTION
SHEET S-2

SEE SECTION
SHEET S-1

SEE SECTION
SHEET S-2

SEE SECTION
SHEET S-1

SEE STREAM CL
PROFILE
SHEET P-1

PROGRESS PRINT–NOT FOR CONSTRUCTION

1" = 20'
10 0 20

REVISIONS

SSV ENGINEERING INC.

JCLA
JOSEPH COHN LANDSCAPE ARCHITECTURE
STURBRIDGE MA | 413.668.4553

Proj. Mgr: SB
Designed : JC
Drawn : JC
Checked :
Scale : AS NOTED
Date : FEB 2019

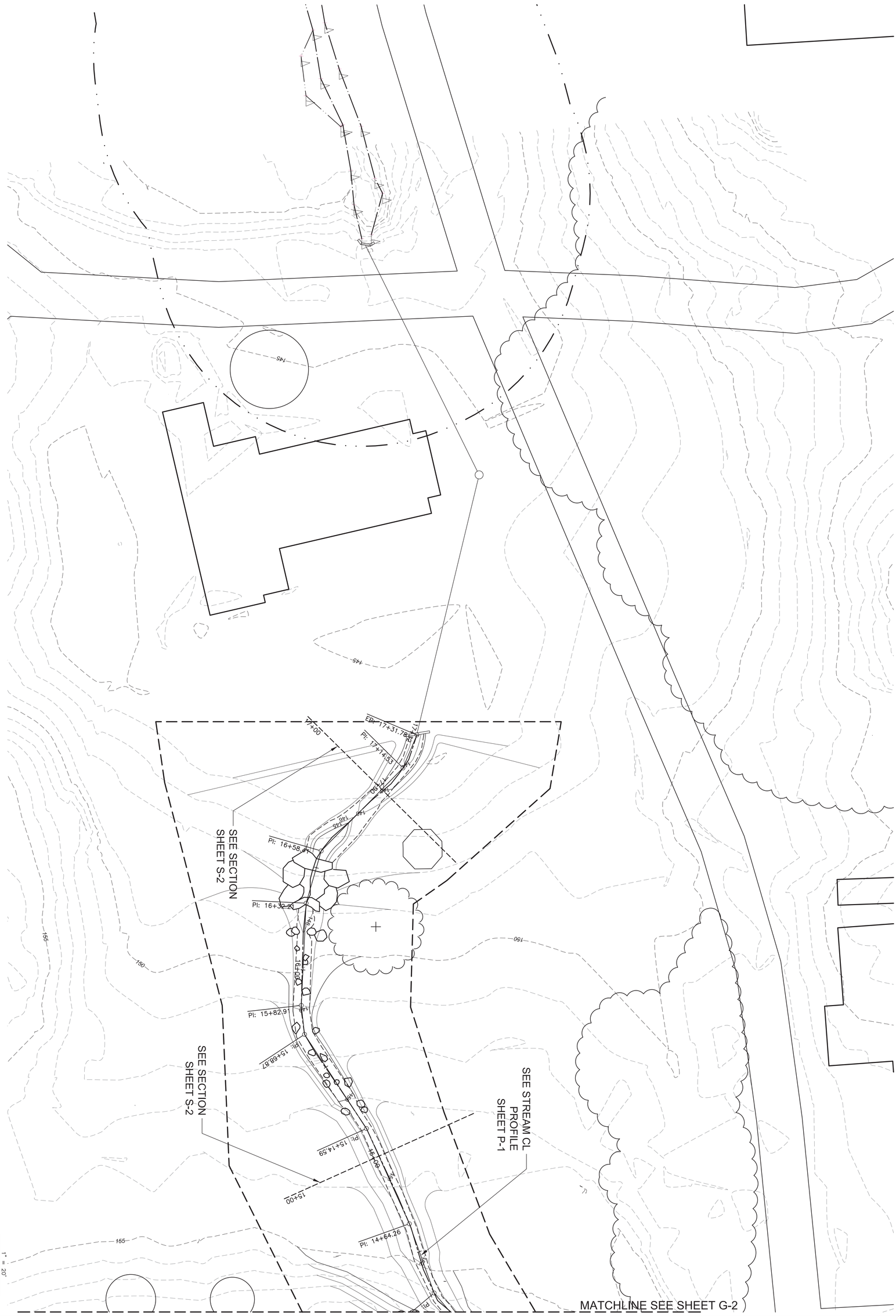
GRADING PLAN II

FERNALD SCHOOL
WALTHAM MA

Proj. No.

Dwg. No.

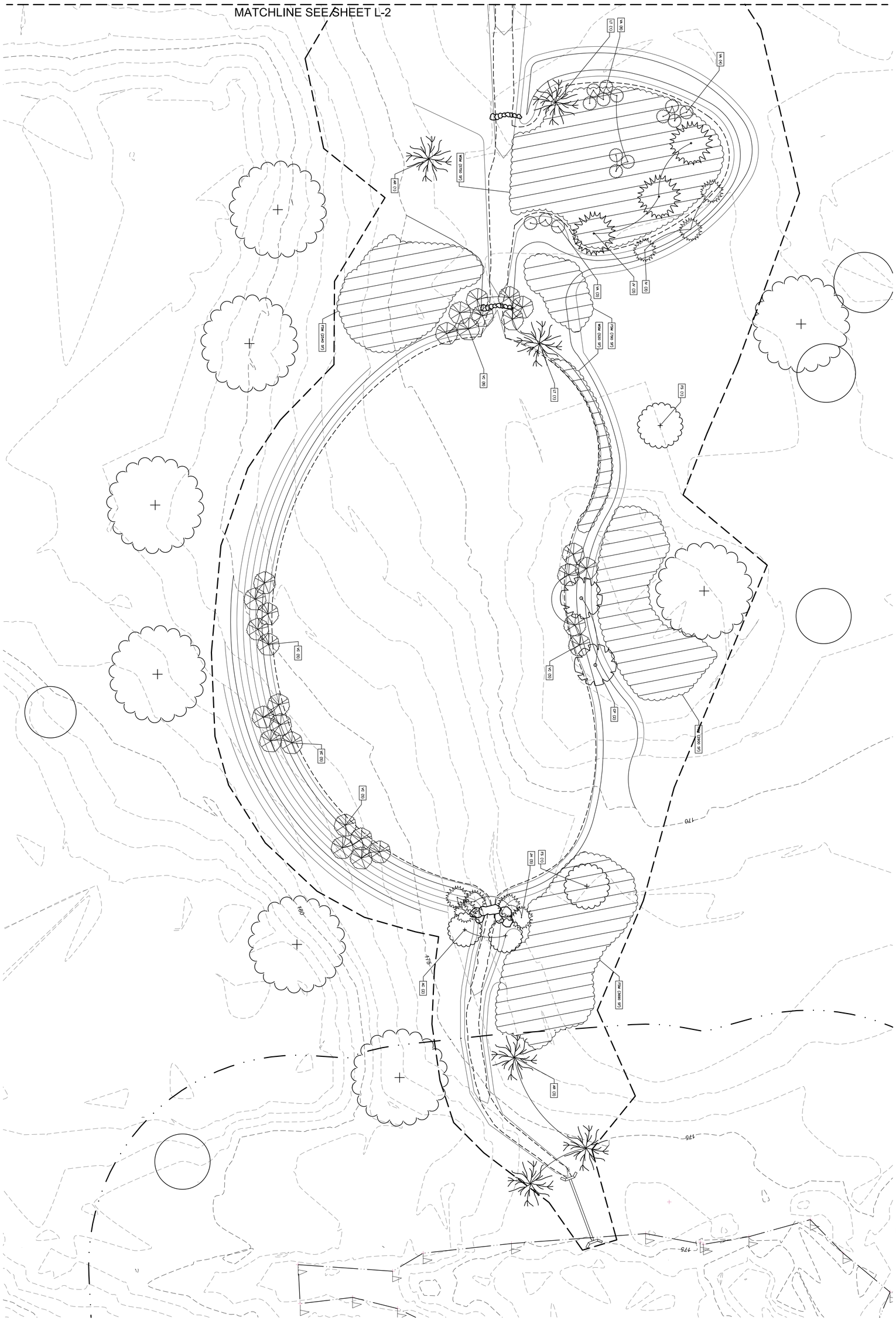
G-2



PROGRESS PRINT–NOT FOR CONSTRUCTION

Dwg No.	Proj. No.					
G-3		GRADING PLAN III FERNALD SCHOOL WALTHAM MA	Proj. Mgr.: SB Designed : JC Drawn : JC Checked : Scale : AS NOTED Date : FEB 2019	JCLA JOSEPH COAN LANDSCAPE ARCHITECTURE STURBRIDGE MA (413) 668-4553	SSV ENGINEERING INC.	WALTHAM INCORPORATED A TOWN 1738 INCORPORATED A CITY 1884

REVISIONS



PROGRESS PRINT–NOT FOR CONSTRUCTION

Dwg No. LA–1	PLANTING PLAN I	Proj. Mgr.: SB Designed : JC Drawn : JC Checked : Scale : AS NOTED Date : FEB 2019	JCLA JOSEPH CORIN LANDSCAPE ARCHITECTURE STURBRIDGE MA (413) 668-4553
Proj. No.	FERNALD SCHOOL WALTHAM MA		SSV ENGINEERING INC. WALTHAM INCORPORATED A TOWN 1738 INCORPORATED A CITY 1884

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PROGRESS PRINT–NOT FOR CONSTRUCTION

LA-2

Dwg No.

Proj. No.

PLANTING PLAN II

FERNALD SCHOOL
WALTHAM MA

Proj. Mgr.: SB
Designed : JC
Drawn : JC
Checked :
Scale : AS NOTED
Date : FEB 2019

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JOSEPH CORIN LANDSCAPE ARCHITECTURE
STURBRIDGE MA (413) 668-4553

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WALTHAM
INCORPORATED A CITY 1884

REVISIONS

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Dwg No. LA-3	PLANTING PLAN III	Proj. Mgr.: SB Designed : JC Drawn : JC Checked : Scale : AS NOTED Date : FEB 2019	JCLA JOSEPH CORIN LANDSCAPE ARCHITECTURE STURBRIDGE MA (413) 668-4553	SSV ENGINEERING INC.
Proj. No.	FERNALD SCHOOL WALTHAM MA			INCORPORATED A TOWN 1738 WALTHAM INCORPORATED A CITY 1884

REVISIONS

LANDSCAPE NOTES

1. UNLESS OTHERWISE NOTED, ALL EXISTING TREES AND OTHER PLANT MATERIAL TO BE PROTECTED FOR THE DURATION OF THE PROJECT.
2. PRIOR TO THE PRE-CONSTRUCTION MEETING, CONTRACTOR SHALL CALL "DIG-SAFE" TO HAVE EXISTING UTILITIES MARKED. CONTRACTOR SHALL MAINTAIN MARKINGS FOR THE DURATION OF THE PROJECT.
3. REFER TO ENGINEERING PLANS FOR ALL GRADING, DRAINAGE, AND ADDITIONAL MATERIALS AND LAYOUT INFORMATION.
4. THE CONTRACTOR SHALL SUPPLY ALL PLANT MATERIAL IN QUANTITIES SUFFICIENT TO COMPLETE THE PLANTING PLAN AS SHOWN ON THE PLANS.
5. ALL PLANT MATERIAL TO CONFORM TO THE GUIDELINES ESTABLISHED BY "THE AMERICAN STANDARD FOR NURSERY STOCK" PUBLISHED BY THE AMERICAN ASSOCIATION OF NURSERYMEN, INC. ANSI Z60.1 -LATEST EDITION.
6. ALL PLANT MATERIAL TO BE APPROVED BY THE LANDSCAPE ARCHITECT. SUBSTITUTIONS ARE NOT ALLOWED WITHOUT WRITTEN APPROVAL FROM LANDSCAPE ARCHITECT.
7. SEED MIXES SHALL BE "NEW ENGLAND WETMIX" AND "NEW ENGLAND SHOWY WILDFLOWER MIX" AS SOLD BY NEW ENGLAND WETLAND PLANTS, INC. 802 WEST STREET, AMHERST MA 01002. OR EQUAL. SEED MIXES SHALL BE SOWN AT THE RATE INDICATED BY THE MANUFACTURER.
8. STAKE LOCATIONS OF PLANT MATERIAL FOR APPROVAL BY LANDSCAPE ARCHITECT PRIOR TO COMMENCEMENT OF WORK. LANDSCAPE ARCHITECT MAY ADJUST PLANT LOCATIONS IN THE FIELD PRIOR TO PLANTING.
9. ALL MULCH BEDS SHALL CONSIST OF A 6" LAYER SCREENED LOAM, AND A 3" LAYER SHREDDED PINE BARK MULCH.
10. EDGE OF MULCH BEDS TO BE MECHANICALLY EDGED.
11. ALL TREES ADJACENT TO PEDESTRIAN AREAS SHALL NOT HAVE BRANCHING THAT EXTENDS INTO WALKWAYS.
12. ALL DISTURBED AREAS NOT SHOWN AS PAVEMENT, MULCH BEDS, OR OTHER SPECIFIED MATERIAL SHALL RECEIVE A MINIMUM 4" LAYER OF LOAM AND SEED.
13. LANDSCAPE CONTRACTOR TO GUARANTEE ALL PLANT MATERIAL FOR ONE FULL YEAR FROM DATE OF ACCEPTANCE.
14. CONTRACTOR SHALL REPAIR OR REPLACE ANY MATERIALS DAMAGED DURING CONSTRUCTION PRIOR TO FINAL ACCEPTANCE.
15. CONTRACTOR TO SUBMIT A WATERING SCHEDULE FOR THE SIXTY DAY MAINTENANCE PERIOD FOR REVIEW BY THE LANDSCAPE ARCHITECT AND OWNER FOR ALL PROPOSED PLANT MATERIAL.
16. SEE LANDSCAPE DETAILS FOR PLANTING INFORMATION.
17. IN THE EVENT OF A DISCREPANCY BETWEEN THE PLANT QUANTITIES SHOWN ON THE PLAN AND IN THE PLANT SCHEDULE, THE QUANTITY SHOWN ON THE PLAN SHALL TAKE PRECEDENCE. CONTRACTOR TO NOTIFY LANDSCAPE ARCHITECT IF ANY DISCREPANCY OCCURS.

TREE PLANTING

SHRUB PLANTING

PERENNIAL PLANTING

SYM	QTY.	BOTANICAL NAME	COMMON NAME	SIZE	ROOT	NOTES
TREES						
PS	10	PINUS STROBUS 'FASTIGIATA'	UPRIGHT WHITE PINE	7-8 FT.	BB	
JV	3	JUNIPERUS VIRGINIANA 'EMERALD SENTINEL'	EASTERN RED CEDAR	7-8 FT.	BB	
LT	2	LIRIODENDRON TULIPIFERA	TULIPTREE	3" CAL	BB	
AR	4	ACER RUBRUM 'RED SUNSET'	RED SUNSET RED MAPLE	3" CAL	BB	
NS	2	NYSSA SYLVATICA	BLACK GUM	3" CAL	BB	50% MALE
FS	3	FAGUS SYLVATICA 'RED OBELISK'	EUROPEAN BEECH	3" CAL	BB	
AC	8	AMELANCHIER CANADENSIS	SERVICEBERRY	8-10 FT.	BB	MULTI-STEM
QR	-	QUERCUS RUBRA	RED OAK	3" CAL	BB	
CP	2	CARPINUS CAROLINIANA	AMERICAN HORNBEAM	2" CAL	BB	
SHRUBS						
IV	3	ILEX VERTICILLATA	COMMON WINTERBERRY	2-2.5 FT.	BB	
JH	13	JUNIPERUS HORIZONTALIS 'MONBER'	MONBER CREEPING JUNIPER	#5 POT	BB	
VC	41	VACCINIUM CORYMBOSUM	HIGHBUSH BLUEBERRY	2-2.5 FT.	BB	
KL	18	KALMIA LATIFOLIA	MOUNTAIN LAUREL	2-2.5 FT.	BB	
VA	15	VACCINIUM ANGUSTIFOLIUM	LOWBUSH BLUEBERRY	#4 POT		
PERENNIALS AND GROUND COVERS						
WSM	6270 SF	WETLAND SEED MIX				
FSM	13430 SF	WILDFLOWER SEED MIX				

PROGRESS PRINT-NOT FOR CONSTRUCTION

REVISIONS

SSV ENGINEERING INC.

JCLA
JOSEPH CLAM LANDSCAPE ARCHITECTURE
CUMBERLAND, RI (401) 658-4553

Proj. Mgr: SB
Designed: JC
Drawn: JC
Checked:
Scale: AS NOTED
Date: FEB 2019

PLANTING SCHEDULE

FERNALD SCHOOL
WALTHAM MA

Proj. No.

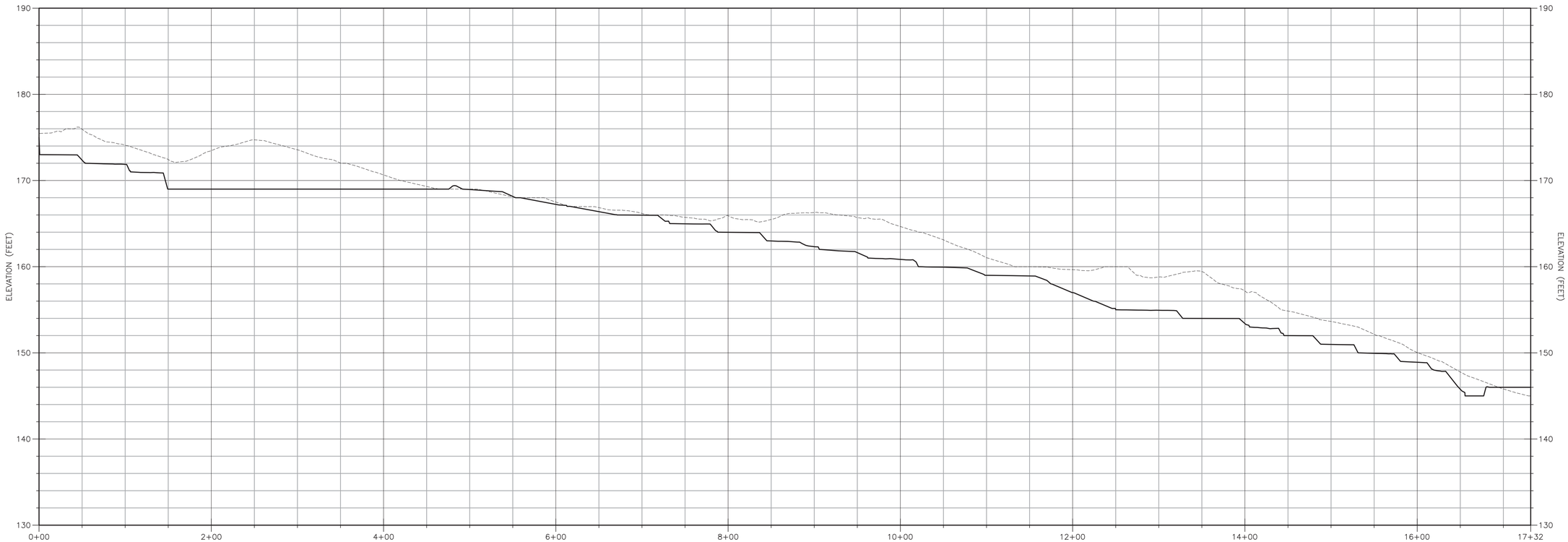
Dwg. No.

LA-4

LEGEND

EXISTING GROUND SURFACE

PROPOSED STREAM CHANNEL



1" = 60'

30 0 60

PROGRESS PRINT–NOT FOR CONSTRUCTION

REVISIONS

SSV ENGINEERING INC.

JCLA
JOSEPH COAN LANDSCAPE ARCHITECTURE
STURBRIDGE MA | (413) 668-4553

Proj. Mgr: SB
Designed : JC
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STREAM PROFILE

FERNALD SCHOOL
WALTHAM MA

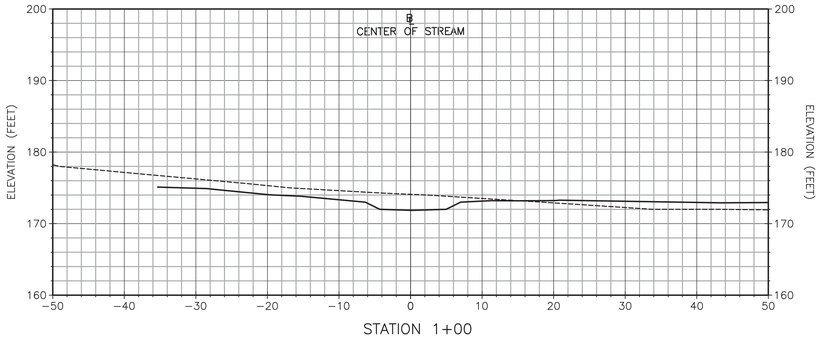
Proj. No.

Dwg. No.

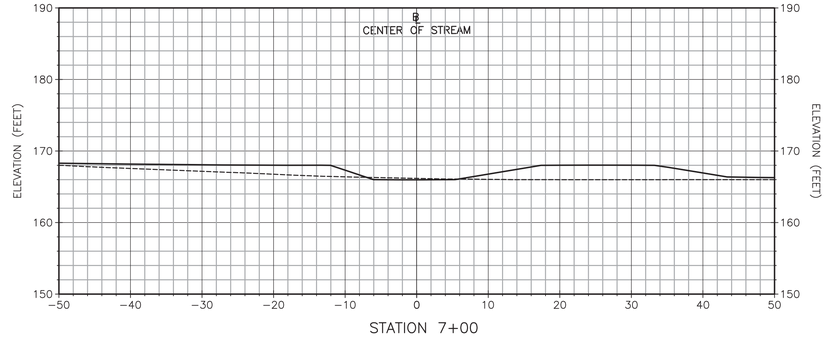
P-1

LEGEND

EXISTING GROUND SURFACE
PROPOSED STREAM CHANNEL



STATION 1+00



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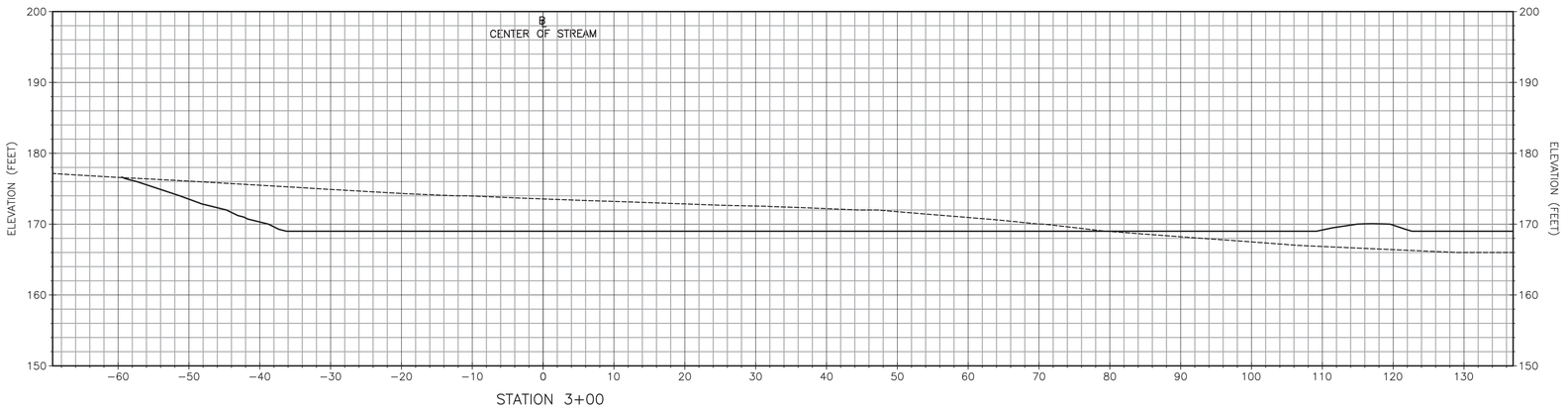

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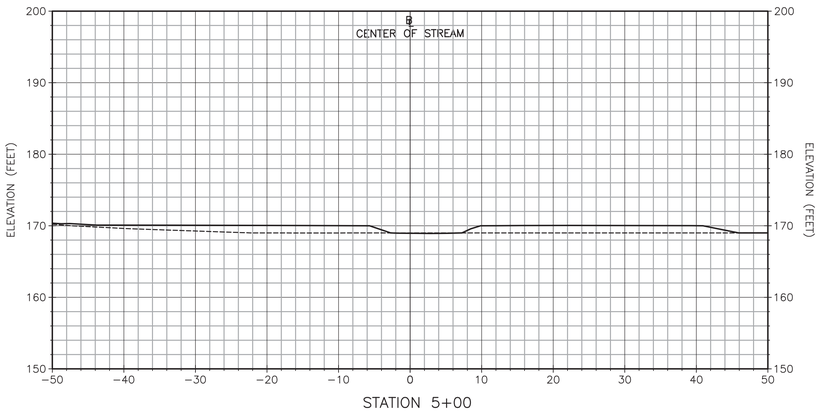
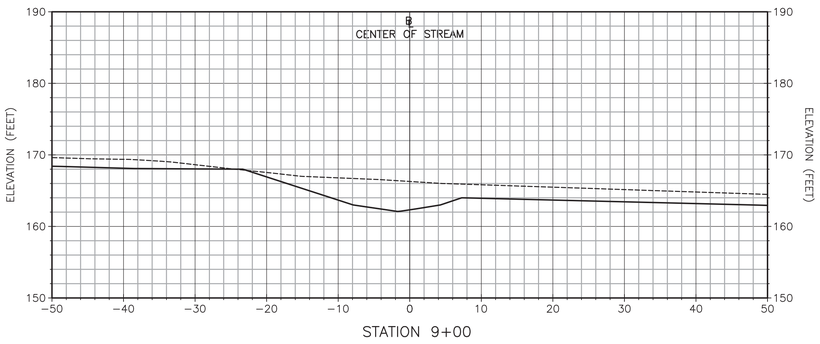


STATION 5+00



STATION 9+00

1" = 10'
5 0 10

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JOSEPH CLORAN LANDSCAPE ARCHITECTURE
STURBRIDGE MA | (413) 668-6553

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CROSS SECTIONS I

FERNALD SCHOOL
WALTHAM MA

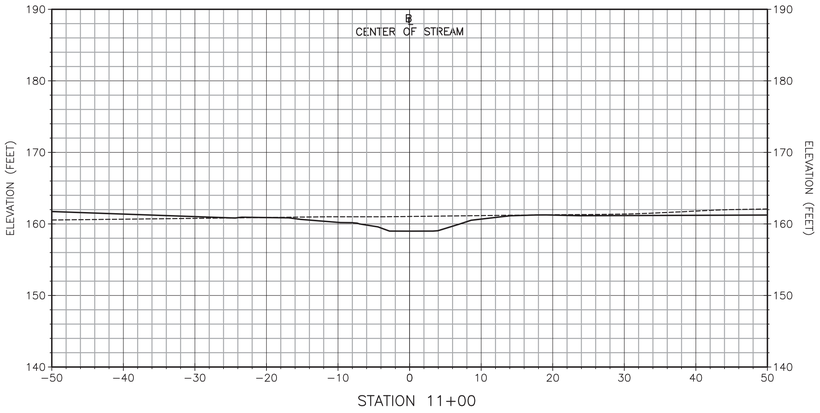
Proj. No.

Dwg. No.

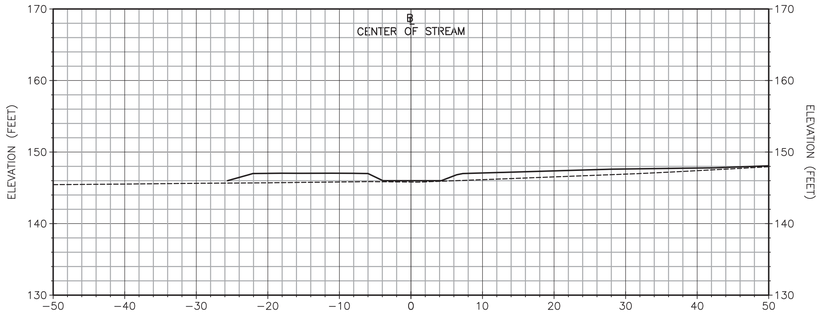
S-1

LEGEND

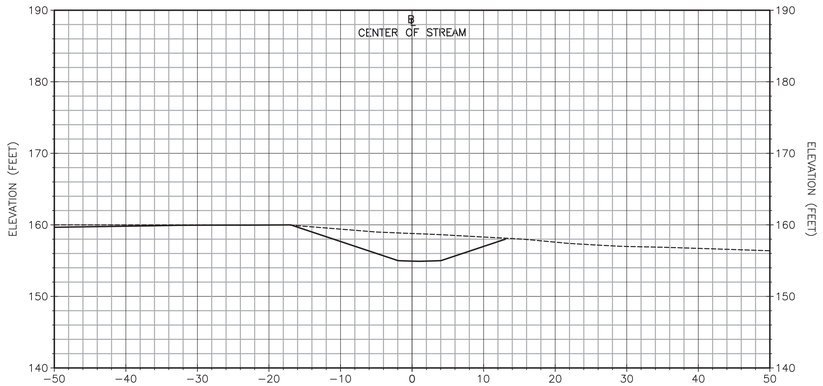
- EXISTING GROUND SURFACE
- PROPOSED STREAM CHANNEL



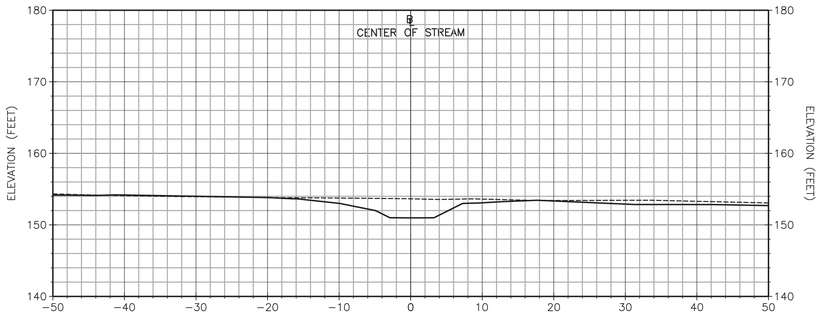
STATION 11+00



STATION 17+00



STATION 13+00



STATION 15+00

1" = 10'
5 0 10

PROGRESS PRINT–NOT FOR CONSTRUCTION

REVISIONS

SSV ENGINEERING INC.

JCLA
JOSEPH CLEARY LANDSCAPE ARCHITECTURE
STURBRIDGE MA (413) 668-4553

Proj. Mgr: SB
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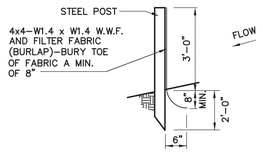
CROSS SECTIONS II

FERNALD SCHOOL
WALTHAM MA

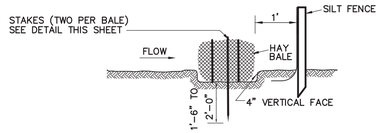
Proj. No.

Dwg. No.

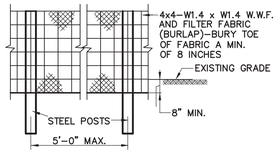
S-2



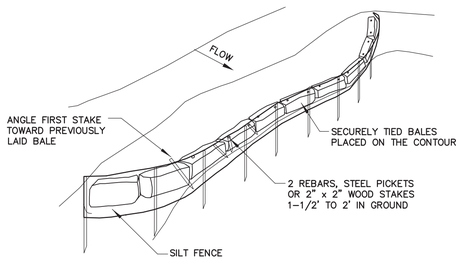
SILT FENCE
EMBEDDING DETAIL



HAYBALE
EMBEDDING DETAIL

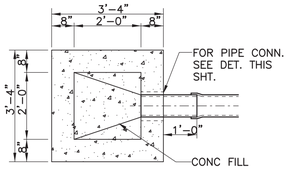


SILT FENCE
DETAIL

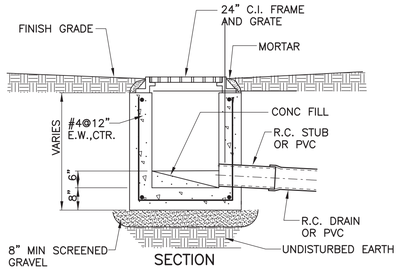


PLACEMENT AND ANCHORING DETAIL
HAYBALE SEDIMENT BARRIERS AND SILT FENCE

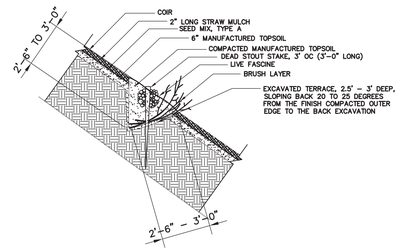
ANCHORING FOR HAYBALES AND SILT FENCE
DETAIL
N.T.S.



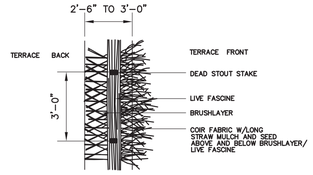
SECTIONAL PLAN



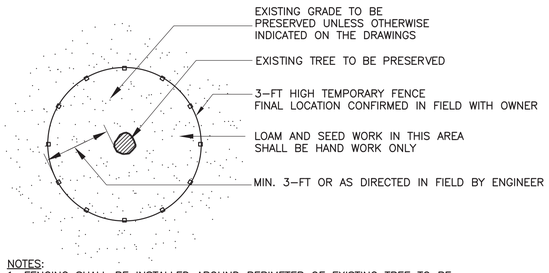
SECTION
DROP INLET
DETAIL
NOT TO SCALE



SECTION

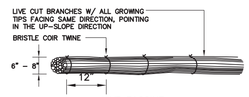


PLAN
BRUSHLAYER/LIVE FASCINE
DETAIL
NOT TO SCALE

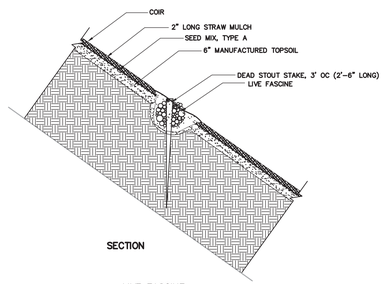


NOTES:
1. FENCING SHALL BE INSTALLED AROUND PERIMETER OF EXISTING TREE TO BE PROTECTED AS APPROVED BY OWNER.
2. FENCING MAY BE REMOVED TEMPORARILY, ONLY AS REQUIRED TO PERFORM THE WORK SHOWN ON THE DRAWINGS.
3. FENCING SHALL REMAIN IN PLACE & BE MAINTAINED THROUGHOUT CONSTRUCTION AND THEN REMOVED COMPLETELY AS DIRECTED BY OWNER TO COMPLETE LOAMING AND SEEDING ACTIVITIES.

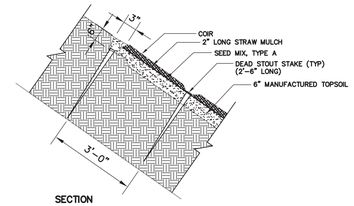
TREE PROTECTION
DETAIL
NOT TO SCALE



LIVE FASCINE



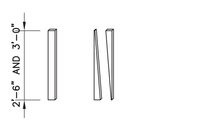
SECTION
LIVE FASCINE
DETAIL
NOT TO SCALE



SECTION

NOTE: STAKE COIR TO THE FINISH SURFACE 3'–0" OC OVER THE ENTIRE AREA.

COIR MAT WITH LONG STRAW MULCH AND SEED
DETAIL
NOT TO SCALE



DEAD STOUT STAKE
DETAIL
NOT TO SCALE

PROGRESS PRINT–NOT FOR CONSTRUCTION

REVISIONS

SSV ENGINEERING INC.

JCLA
JOSEPH CUOMO LANDSCAPE ARCHITECTURE
STURBRIDGE MA | 413.668.4555

Proj. Mgr: SB
Designed : JC
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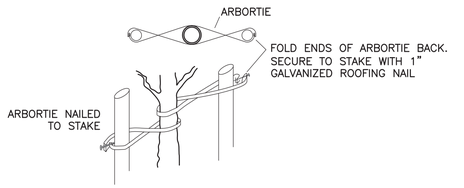
DETAILS I

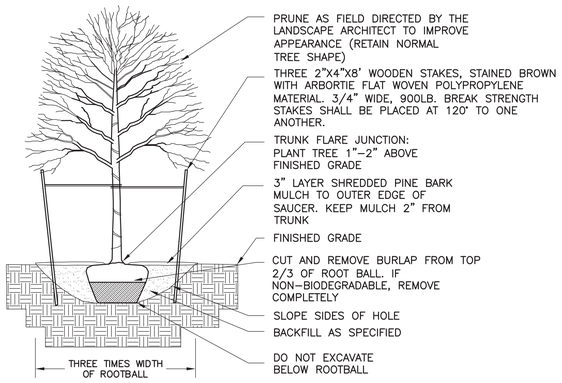
FERNALD SCHOOL
WALTHAM MA

Proj. No.

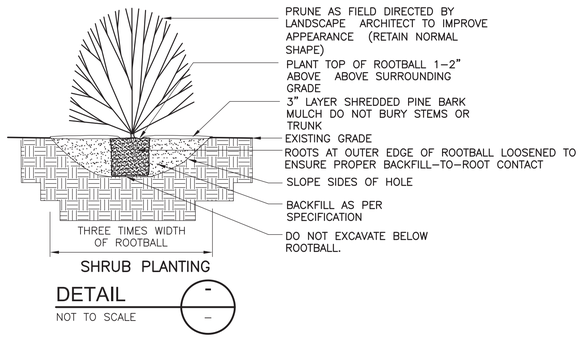
Dwg. No.

D-1

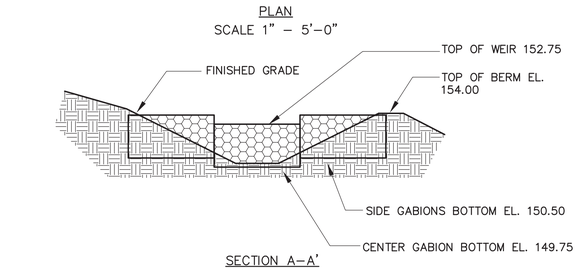




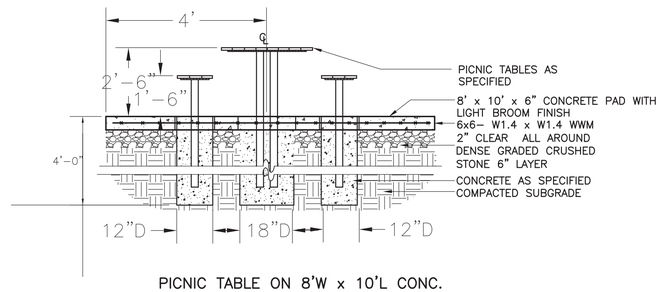
DECIDUOUS TREE PLANTING
DETAIL
NOT TO SCALE



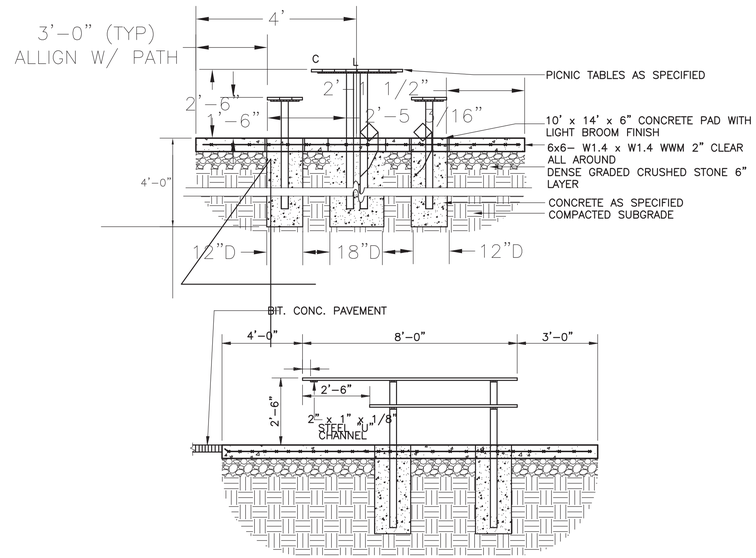
SHRUB PLANTING
DETAIL
NOT TO SCALE



GABION CHECK DAM
DETAIL
NOT TO SCALE



PICNIC TABLE ON 8'W x 10'L CONC. PAD W/ TYPE S–1 EMBEDMENT
DETAIL
NOT TO SCALE



ACCESSIBLE PICNIC TABLE ON 10'W x 15'L CONC. PAD
DETAIL
NOT TO SCALE

REVISIONS

SSV ENGINEERING INC.

JCLA
JOSEPH CLAM LANDSCAPE ARCHITECTURE
STURBRIDGE MA (413) 668-4555

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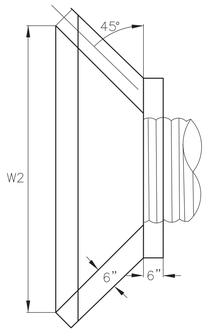
DETAILS II

FERNALD SCHOOL
WALTHAM MA

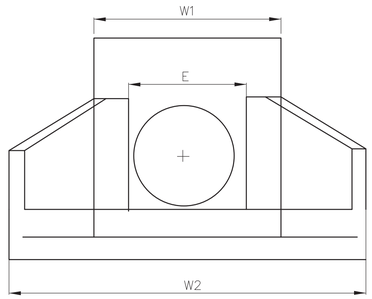
Proj. No.

Dwg. No.
D-2

PROGRESS PRINT–NOT FOR CONSTRUCTION

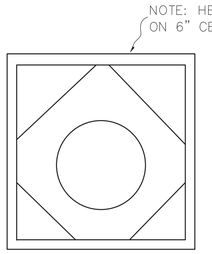


PLAN VIEW

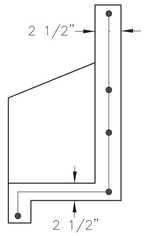


FRONT ELEVATION

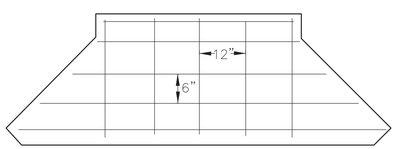
INLET HEADWALL



WALL SECTION



BASE & WALL SECTION



BASE SECTION
N.T.S.

TABLE I								
HEADWALL DIMENSION FOR METAL PIPE*								
INSIDE DIA. OF PIPE	W1	W2	H1	H2	D	E	WT.	SQ. FT. IN BASE AREA
18"	3' – 2"	4' – 3"	1' – 3"	3' – 2"	1' – 3"	1' – 9"	1,550	7.34
21", 24"	3" – 8"	5' – 3"	1' – 9"	3' – 8"	1' – 6"	2' – 7"	2,100	9.9
30"	4' – 2"	6' – 5"	2' – 0"	4' – 2"	1' – 10"	2' – 9"	2,850	13.5
36"	4' – 8"	7' – 7"	2' – 4"	4' – 8"	2' – 2"	3' – 3"	3,700	17.65
42", 48"	5' – 8"	10' – 1"	3' – 3"	5' – 8"	2' – 11"	4' – 3"	5,600	28.6
54"	6' – 8"	11' – 11"		6' – 8"	3' – 4"	5' – 3"	7,500	35.6

CONCRETE HEADWALL
DETAIL
NOT TO SCALE

PROGRESS PRINT–NOT FOR CONSTRUCTION

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SSV ENGINEERING INC.

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JOSEPH COAN LANDSCAPE ARCHITECTURE
STURBRIDGE MA | 413.668.4553

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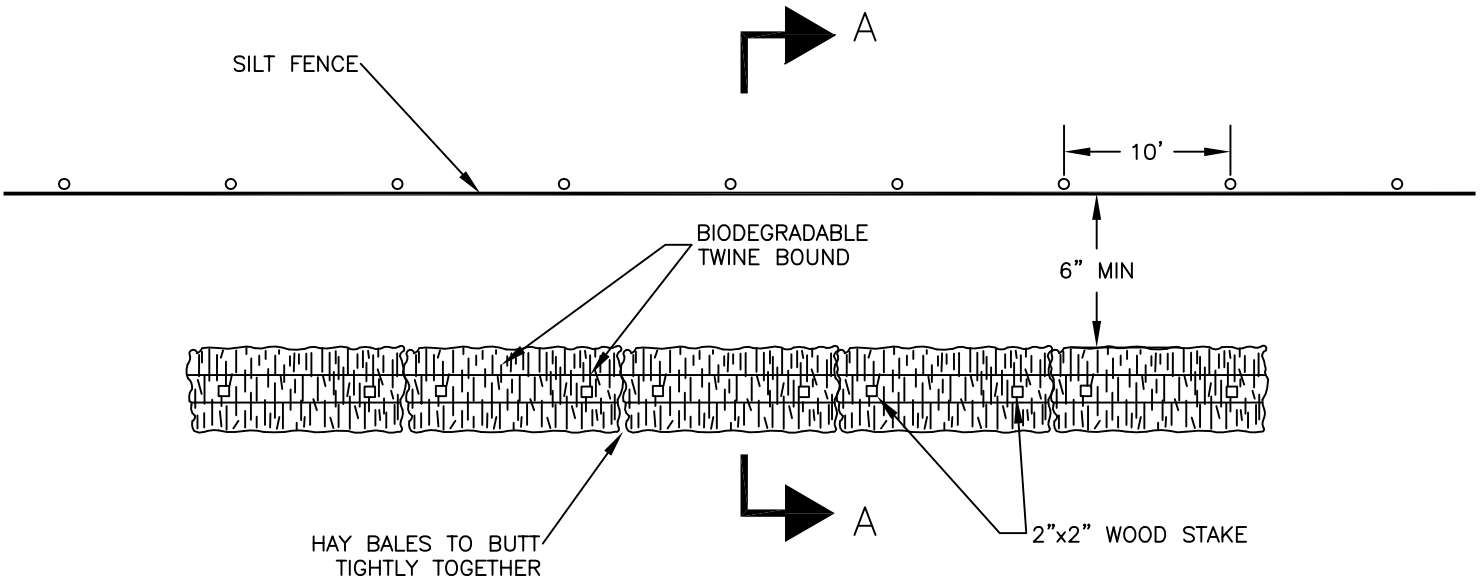
DETAILS III

FERNALD SCHOOL
WALTHAM MA

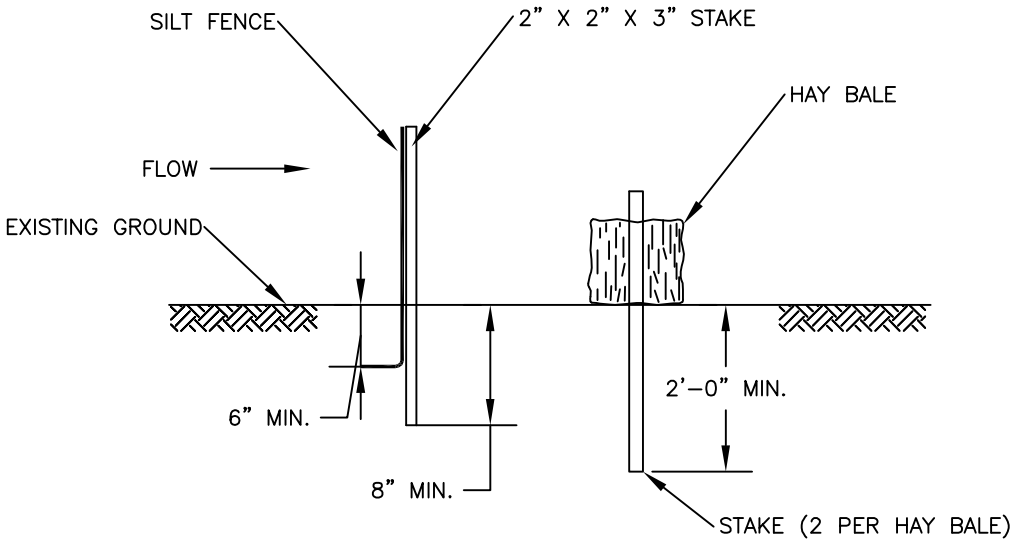
Proj. No.

Dwg. No.

D-3

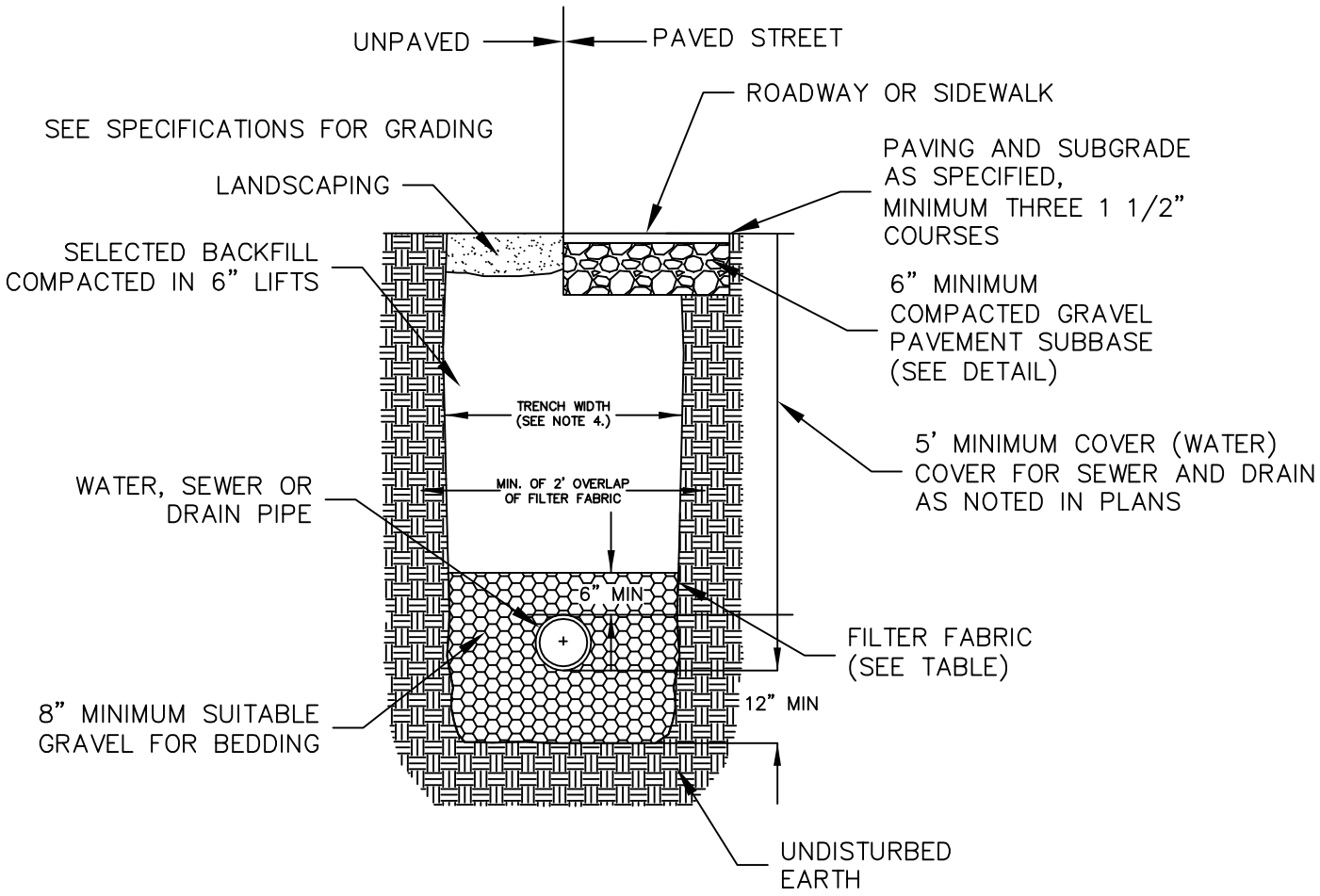


EROSION BARRIER
HAY BALES AND SILT FENCE PLAN



SECTION A-A

	FIGURE NAME: 199.000.A – HAY BALE FOR EROSION CONTROL	SCALE: NOT TO SCALE
	CITY OF WALTHAM, MA. – ENGINEERING DEPARTMENT STANDARD DETAILS	REV. DATE: 12/8/2010



NOTES:
1. ALL TRENCHES MUST BE JETTED OR PUDDLED AS REQUIRED BY THE ENGINEER.
2. PRIOR TO FINISHING PAVING, CUT SQUARE EDGES AT EXISTING PAVEMENT, AT LEAST 6 INCHES BEYOND OUTERMOST DISTURBED PAVEMENT.
3. NO LEDGE TO BE WITHIN 6" OF PIPE.
4. TRENCH WIDTH:

   LEDGE: OUTSIDE DIAMETER OF PIPE PLUS 2 FEET

   EARTH: GREATER OF LEDGE VALUE OR 3 FEET (OR AS DETERMINED BY THE ENGINEER)

FILTER FABRIC USE

	SOIL TYPE	
	SILT OR CLAY	GRANULAR SOIL
ABOVE GROUND WATER	FILTER FABRIC NOT REQUIRED	FILTER FABRIC NOT REQUIRED
BELOW GROUND WATER	FILTER FABRIC REQUIRED	FILTER FABRIC NOT REQUIRED

WATER, SEWER, AND DRAIN TRENCH DETAIL

	FIGURE NAME: 141.000.A – TRENCH DETAIL	SCALE: NOT TO SCALE
	CITY OF WALTHAM, MA. – ENGINEERING DEPARTMENT STANDARD DETAILS	REV. DATE: 3/30/2011