SECTION 00890

PERMITS

PART 1 – GENERAL

1.01 DESCRIPTION:

This Section provides specific information and defines specific requirements of the Contractor regarding the preparation and acquisition of permits required to perform the work of this project.

1.02 RELATED WORK:

A. Section 01110, CONTROL OF WORK AND MATERIALS

B. Section 01550, SIGNAGE (TRAFFIC CONTROL)

C. Section 01570, ENVIRONMENTAL PROTECTION

D. Section 02240, DEWATERING

E. Section 02222, UTILITY ABANDONMENT

F. Section 02300, EARTHWORK

1.03 GENERAL REQUIREMENTS:

A. The Owner has obtained or will obtain and pay for the permits listed below, which are required for this project. The Contractor shall assist in obtaining certain permits, as indicated. The Contractor shall obtain and pay for all other permits required, as defined under the Permits subsection of Section 00700, GENERAL CONDITIONS.

Permits by Owner	Status
City of Newton – Street Opening Permit	(Attachment A)
City of Newton - Trench Permit (520 CMR 14.00) (eff. date 3/1/09)	(Attachment B)
*Contractor shall prepare permit application and obtain the permit after contract is awarded, bearing all expenses. Owner will pay for and/or waive the permit application fee, if applicable.	

PART 2 - PRODUCTS

Not Used.

PART 3 – EXECUTION

3.01 PERFORM WORK IN ACCORDANCE WITH REQUIREMENTS:

A. The Contractor shall perform the work in accordance with the Contract Documents, including the attached permits, and any applicable municipal requirements.

B. Prior to commencing any construction activities, the Contractor shall demonstrate to the Owner and the Engineer, through on-site inspection and submitting copies of permits or approvals, that it is in full compliance with the terms and conditions of all permits specified herein. The Contractor shall maintain full compliance with all permits throughout the performance of the work, and upon request, grant access to permitting authorities to inspect the site for the purpose of verifying such compliance.

END OF SECTION

ATTACHMENT A
STREET OPENING PERMIT

PERMIT NO._____

LOCATION OF WORK_____

TYPE OF WORK_____

PROPERTY OWNER_____ TEL:_____

APPLICANTS ADDRESS_____ SBL:_____

I am making this application under the terms and conditions as set forth on the reverse side of this form.

APPLICANT SIGNATURE_____ DATE:_____

CONTRACTOR/FIRM_____ TEL:_____

BUSINESS ADDRESS_____

Note: Nothing is to be buried until it has been inspected by the City Engineer. I will give at least 48 hour notice prior to any installation (617-796-1020) and that any actual installation work is to be made under the direct supervision of the City Engineer/Designee. For Marking Water and Sewer Line Locations please call 617-796-1640

Please call for MWRA-Massachusetts Water Resources Water/Sewer Locations.

SIGNATURE_____ DATE:_____

Signature of Contractor's Authorized Representative

***1. IF APPLYING FOR MORE THEN ONE PERMIT ON SAME PROPERTY BONDS MAY BE COMBINED.**

***2. STREET OPENING PERMITS MUST BE OBTAINED WHEN WORK IS BEING PERFORMED IN THE PUBLIC WAY.**

***3. IF APPLYING FOR ONE OR MORE PERMITS, A MAXIMUM OF 5 SETS OF PLANS NEEDED.**

***4. A DIG SAFE NUMBER IS REQUIRED WITH ALL PERMITS. (1-888-344-7233).**

***5. APPLICATION FEES MAY BE PAID WITH ONE CHECK/CHECKS PAYABLE TO THE CITY OF NEWTON.**

CITY OF NEWTON

MASSACHUSETTS

DEPARTMENT OF PUBLIC WORKS/ENGINEERING DIVISION

PERMITS APPLICATION

617-796-1020

ENGINEERING DIVISION CONDITION REPORT [OFFICIAL USE ONLY]

CERTIFICATE OF INSURANCE EXPIRATION DATE of. _____

All work will be completed by the BOND EXPIRATION DATE of: _____

Prior to start of work: DATE

Completion of work: DATE

ENGINEERS APPROVAL DATE

PUBLIC WORKS APPROVAL RECORD [OFFICIAL USE ONLY]

☐ Permission denied (see Engineers remarks)

☐ Permission to proceed will be granted once this office receives the required articles

_____

Commissioner of Public Works or Designee Date

Permission is granted for the work to commence subject to the TERMS & CONDITIONS of this agreement

ENGINEER'S REMARKS [OFFICIAL USE ONLY]

Please check permit applying for:

PERMIT TYPE	PERMIT REQUIREMENTS BONDS*1		PERMIT REQUIREMENTS CERTIFICATE INSURANCE	PERMIT REQUIREMENTS # PLANS*3	DIG SAFE CONFIRMATION NO.	APPLICATION FEES*5	
☐ SEWER	$5,000(MIN.)	Drain Layers	$1,000,000	Approved Plan		$100	VB
☐ DRAIN	$5,000(MIN.)	Drain Layers	$1,000,000	Approved Plan		$100	VB
☐ STREET OPENING *2	$5,000(MIN.)	Street Opening	$1,000,000		DIG SAFE CONFIRMATION NO.	$100 + $150 INSP./MTCE	VB
☐ INSTALL CURB SIDEWALK	$5,000(MIN.)	Street Opening	$1,000,000			$0	VB
☐ SIDEWALK CROSSING	$1,000(MIN.)	SideWalk				$50	VB
☐ OCCUPY	$1,000(MIN.)	Crossing			DIG SAFE CONFIRMATION NO.	$50	VB
Totals _____			$1,000,000(max.)		Unless otherwise required by City Engineer	_____ +	_____ = _____
					Payment of Sewer Assessment $_____	TOTAL APP. FEE	TOTAL FEE INSP/MTCE / TOTAL FEES

Note: Fees are not refundable

Acct: ☐ 27 422019 Water/Sewer

Acct: ☐ 27 422-18 Drain

Acct: ☐ 13 131005 Utilities

Acct: ☐ 13E4011A 442082 Insp/Mtce Fee

Acct: ☐ 01401 442115 Application Fee

White: DPW/Engineering Pink: Applicant Canary: Water/Sewer

ATTACHMENT B
TRENCH PERMIT

City of Newton
Massachusetts 02459
Engineering Division
Phone (617) 796-1020
FAX (617) 796-1051

Permit Number _____

Date Issued _____

Expiration Date _____

Fee: $50 x _____ = _____
Trenches Total

TRENCH PERMIT
Pursuant to G.L. c. 82A §1 and 520 CMR 7.00 et seq.(as amended)

THIS PERMIT MUST BE FULLY COMPLETED PRIOR TO CONSIDERATION

Name of Applicant **Street Address**			**Phone** **Cell**
City/Town	**MA**	**ZIP**	
Name of Excavator (if different from applicant) **Street Address**			**Phone** **Cell**
City/Town	**MA**	**ZIP**	
Name of Owner(s) of Property **Street Address**			**Phone** **Cell**
City/Town	**MA**	**ZIP**	
Other Contact			**Permit Fee Received No ( ) Yes ( )**
Description, location and purpose of proposed trench: **Please describe the exact location of the proposed trench and its purpose (include a description of what is (or is intended) to be laid in proposed trench (eg; pipes/cable lines etc..) Please use reverse side if additional space is needed.**			
Insurance Certificate #:			
Name and Contact Information of Insurer:			
Policy Expiration Date:			
Dig Safe #:			
Name of Competent Person (as defined by 520 CMR 7.02):			
Massachusetts Hoisting License # **License Grade:**			**Expiration Date:**

BY SIGNING THIS FORM, THE APPLICANT, OWNER, AND EXCAVATOR ALL ACKNOWLEDGE AND CERTIFY THAT THEY ARE FAMILIAR WITH, OR, BEFORE COMMENCEMENT OF THE WORK, WILL BECOME

FAMILIAR WITH, ALL LAWS AND REGULATIONS APPLICABLE TO WORK PROPOSED, INCLUDING OSHA REGULATIONS, G.L. c. 82A, 520 CMR 7.00 et seq., AND ANY APPLICABLE MUNICIPAL ORDINANCES, BY-LAWS AND REGULATIONS AND THEY COVENANT AND AGREE THAT ALL WORK DONE UNDER THE PERMIT ISSUED FOR SUCH WORK WILL COMPLY THEREWITH IN ALL RESPECTS AND WITH THE CONDITIONS SET FORTH BELOW.

THE UNDERSIGNED OWNER AUTHORIZES THE APPLICANT TO APPLY FOR THE PERMIT AND THE EXCAVATOR TO UNDERTAKE SUCH WORK ON THE PROPERTY OF THE OWNER, AND ALSO, FOR THE DURATION OF CONSTRUCTION, AUTHORIZES PERSONS DULY APPOINTED BY THE MUNICIPALITY TO ENTER UPON THE PROPERTY TO MONITOR AND INSPECT THE WORK FOR CONFORMITY WITH THE CONDITIONS ATTACHED HERETO AND THE LAWS AND REGULATIONS GOVERING SUCH WORK.

THE UNDERSIGNED APPLICANT, OWNER AND EXCAVATOR AGREE JOINTLY AND SEVERALLY TO REIMBURSE THE MUNICIPALITY FOR ANY AND ALL COSTS AND EXPENSES INCURRED BY THE MUNICIPALITY IN CONNECTION WITH THIS PERMIT AND THE WORK CONDUCTED THEREUNDER, INCLUDING BUT NOT LIMITED TO ENFORCING THE REQUIREMENTS OF STATE LAW AND CONDITIONS OF THIS PERMIT, INSPECTIONS MADE TO ASSURE COMPLIANCE THEREWITH, AND MEASURES TAKEN BY THE MUNICIPALITY TO PROTECT THE PUBLIC WHERE THE APPLICANT OWNER OR EXCAVATOR HAS FAILED TO COMPLY THEREWITH INCLUDING POLICE DETAILS AND OTHER REMEDIAL MEASURES DEEMED NECESSARY BY THE MUNICIPALITY.

THE UNDERSIGNED APPLICANT, OWNER AND EXCAVATOR AGREE JOINTLY AND SEVERALLY TO DEFEND, INDEMNIFY, AND HOLD HARMLESS THE MUNICIPALITY AND ALL OF ITS AGENTS AND EMPLOYEES FROM ANY AND ALL LIABILITY, CAUSES OR ACTION, COSTS, AND EXPENSES RESULTING FROM OR ARISING OUT OF ANY INJURY, DEATH, LOSS, OR DAMAGE TO ANY PERSON OR PROPERTY DURING THE WORK CONDUCTED UNDER THIS PERMIT.

APPLICANT SIGNATURE

_____ DATE _____

EXCAVATOR SIGNATURE (IF DIFFERENT)

_____ DATE _____

OWNER'S SIGNATURE (IF DIFFERENT)

_____ DATE:_____

For City/Town use -- Do not write in this section	
PERMIT APPROVED BY	**$_____ Application Fee**
PERMITTING AUTHORITY **Date**	
CONDITIONS OF APPROVAL	

CONDITIONS AND REQUIREMENTS PURSUANT TO G.L.C.82A AND 520 CMR 7.00 et seq. (as amended)

By signing the application, the applicant understands and agrees to comply with the following:

i. No trench may be excavated unless the requirements of sections 40 through 40D of chapter 82, and any accompanying regulations, have been met and this permit is invalid unless and until said requirements have been complied with by the excavator applying for the permit including, but not limited to, the establishment of a valid excavation number with the underground plant damage prevention system as said system is defined in section 76D of chapter 164 (DIG SAFE);

ii. Trenches may pose a significant health and safety hazard. Pursuant to Section 1 of Chapter 82 of the General Laws, an excavator shall not leave any open trench unattended without first making every reasonable effort to eliminate any recognized safety hazard that may exist as a result of leaving said open trench unattended. Excavators should consult regulations promulgated by the Department of Public Safety in order to familiarize themselves with the recognized safety hazards associated with excavations and open trenches and the procedures required or recommended by said department in order to make every reasonable effort to eliminate said safety hazards which may include covering, barricading or otherwise protecting open trenches from accidental entry.

iii. Persons engaging in any in any trenching operation shall familiarize themselves with the federal safety standards promulgated by the Occupational Safety and Health Administration on excavations: 29 CFR 1926.650 et.seq., entitled Subpart P "Excavations".

iv. Excavators engaging in any trenching operation who utilize hoisting or other mechanical equipment subject to chapter 146 shall only employ individuals licensed to operate said equipment by the Department of Public Safety pursuant to said chapter and this permit must be presented to said licensed operator before any excavation is commenced;

v. By applying for, accepting and signing this permit, the applicant hereby attests to the following: (1) that they have read and understands the regulations promulgated by the Department of Public Safety with regard to construction related excavations and trench safety; (2) that he has read and understands the federal safety standards promulgated by the Occupational Safety and Health Administration on excavations: 29 CMR 1926.650 et.seq., entitled Subpart P "Excavations" as well as any other excavation requirements established by this municipality; and (3) that he is aware of and has, with regard to the proposed trench excavation on private property or proposed excavation of a city or town public way that forms the basis of the permit application, complied with the requirements of sections 40-40D of chapter 82A.

vi. This permit shall be posted in plain view on the site of the trench.

Summary of Excavation and Trench Safety Regulation (520 CMR 14.00 et seq.)

This summary was prepared by the Massachusetts Department of Public Safety pursuant to G.L.c.82A and does not include all requirements of the 520 CMR 14.00. To view the full regulation and G.L.c.82A, go to www/mass.gov/dps. Pursuant to M.G.L. c. 82, § 1, the Department of Public Safety, jointly with the Division of Occupational Safety, drafted regulations relative to trench safety. The regulation is codified in section 14.00 of title 520 of the Code of Massachusetts Regulations. The regulation requires all excavators to obtain a permit prior to the excavation of a trench made for a construction-related purpose on public or private land or rights-of-way. All municipalities must establish a local permitting authority for the purpose of issuing permits for trenches within their municipality. Trenches on land owned or controlled by a public (state) agency requires a permit to be issued by that public agency unless otherwise designated.

In addition to the permitting requirements mandated by statute, the trench safety regulations require that all excavators, whether public or private, take specific precautions to protect the general public and prevent unauthorized access to unattended trenches. Accordingly, unattended trenches must be covered, barricaded or backfilled. Covers must be road plates at least ¾" thick or equivalent; barricades must be fences at least 6' high with no openings greater than 4" between vertical supports; backfilling must be sufficient to eliminate the trench. Alternatively, excavators may choose to attend trenches at all times, for instance by hiring a police detail, security guard or other attendant who will be present during times when the trench will be unattended by the excavator.

The regulations further provide that local permitting authorities, the Department of Public Safety, or the Division of Occupational Safety may order an immediate shutdown of a trench in the event of a death or serious injury; the failure to obtain a permit; or the failure to implement or effectively use adequate protections for the general public. The trench shall remain shutdown until re-inspected and authorized to re-open provided, however, that excavators shall have the right to appeal an immediate shutdown. Permitting authorities are further authorized to suspend or revoke a permit following a hearing. Excavators may also be subject to administrative fines issued by the Department of Public Safety for identified violations.

For additional information please visit the Department of Public Safety's website at www.mass.gov/dps

Summary of 1926 CFR Subpart P -OSHA Excavation Standard

This is a worker protection standard, and is designed to protect employees who are working inside a trench. This summary was prepared by the Massachusetts Division of Occupational Safety and not OSHA for informational purposes only and does not constitute an official interpretation by OSHA of their regulations, and may not include all aspects of the standard.
For further information or a full copy of the standard go to www.osha.gov.

Trench Definition per the OSHA standard:

- An excavation made below the surface of the ground, narrow in relation to its length.
- In general, the depth is greater than the width, but the width of the trench is not greater than fifteen feet.

Protective Systems to prevent soil wall collapse are always required in trenches deeper than 5', and are also required in trenches less than 5' deep when the competent person determines that a hazard exists. Protection options include:

- Shoring. Shoring must be used in accordance with the OSHA Excavation standard appendices, the equipment manufacturer's tabulated data, or designed by a registered professional engineer.
- Shielding (Trench Boxes). Trench boxes must be used in accordance with the equipment manufacturer's tabulated data, or a registered professional engineer.
- Sloping or Benching. In Type C soils (what is most typically encountered) the excavation must extend horizontally 1 ½ feet for every foot of trench depth on both sides, 1 foot for Type B soils, and ¾ foot for Type A soils.
- A registered professional engineer must design protective systems for all excavations greater than 20' in depth.
- **Ladders** must be used in trenches deeper than 4'.
- Ladders must be inside the trench with workers at all times, and located within 25' of unobstructed lateral travel for every worker in the trench.
- Ladders must extend 3' above the top of the trench so workers can safely get onto and off of the ladder.

Inspections of every trench worksite are required:

- Prior to the start of each shift, and again when there is a change in conditions such as a rainstorm.
- Inspections must be conducted by the competent person (see below).

Competent Person(s) is:

- Capable (i.e., trained and knowledgeable) in identifying existing and predictable hazards in the trench, and other working conditions which may pose a hazard to workers, and
- Authorized by management to take necessary corrective action to eliminate the hazards. Employees must be removed from hazardous areas until the hazard has been corrected.

Underground Utilities must be:

- Identified prior to opening the excavation (e.g., contact Digsafe).
- Located by safe and acceptable means while excavating.
- Protected, supported, or removed once exposed.

Spoils must be kept back a minimum of 2' from the edge of the trench.

Surface Encumbrances creating a hazard must be removed or supported to safeguard employees. Keep heavy equipment and heavy material as far back from the edge of the trench as possible.

Stability of Adjacent Structures:

- Where the stability of adjacent structures is endangered by creation of the trench, they must be underpinned, braced, or otherwise supported.
- Sidewalks, pavements, etc. shall not be undermined unless a support system or other method of protection is provided.

Protection from water accumulation hazards:

- It is not allowable for employees to work in trenches with accumulated water. If water control such as pumping is used to prevent water accumulation, this must be monitored by the competent person.
- If the trench interrupts natural drainage of surface water, ditches, dikes or other means must be used to prevent this water from entering the excavation.

Additional Requirements:

- For mobile equipment operated near the edge of the trench, a warning system such as barricades or stop logs must be used.
- Employees are not permitted to work underneath loads. Operators may not remain in vehicles being loaded unless vehicles are equipped with adequate protection as per 1926.601(b)(6).
- Employees must wear high-visibility clothing in traffic work zones.
- Air monitoring must be conducted in trenches deeper than 4' if the potential for a hazardous atmosphere exists. If a hazardous atmosphere is found to exist (e.g., O2 <19.5% or >23.5%, 20% LEL, specific chemical hazard), adequate protections shall be taken such as ventilation of the space.
- Walkways are required where employees must cross over the trench. Walkways with guardrails must be provided for crossing over trenches > 6' deep.
- Employees must be protected from loose rock or soil through protections such as scaling or protective barricades.

SECTION 01014

SCOPE AND SEQUENCE OF WORK

PART 1 – GENERAL

1.01 WORK INCLUDED:

A. This Section of the specifications covers the scope and sequence of work for "Union Street Drain Extension" in Newton, Massachusetts, including:

B. Installation of approximately 700 linear feet of PVC gravity drains, 150 linear feet of HDPE gravity drains by pipe bursting, five (5) PVC building connections, four (4) precast concrete drain manholes, eight (8) precast concrete catch basins, and other related tasks in the City of Newton, Massachusetts.

C. The Contractor shall furnish all labor, materials, equipment, and incidentals required to complete the work as shown on the drawings and as specified herein.

1.02 RELATED WORK:

A. SECTION 01110 – CONTROL OF WORK AND MATERIALS

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.01 GENERAL:

A. The Contractor shall be responsible for scheduling its activities and the activities of any subcontractors involved, to meet the completion date, or milestones, established for the contract. Scheduling of the work shall be coordinated with the Owner and Engineer.

B. The Construction Sequence Requirements shall be used by the Contractor to form a complete schedule for the project, which shall be coordinated with the Owner and Engineer. Prior to performing any work at the site, the Contractor shall submit a detailed plan to the Engineer for review. The plan shall describe the proposed sequence, methods, and timing of the work.

3.02 CONSTRUCTION SEQUENCING REQUIREMENTS:

A. All work may be scheduled at the Contractor's discretion within the time of the contract and all plans and specifications. The schedule is also subject to approval by the ENGINEER.

SECTION 01110

CONTROL OF WORK AND MATERIALS

PART 1 – GENERAL

Not Used.

PART 2 – PRODUCTS

Not Used

PART 3 - EXECUTION

3.01 HAULING, HANDLING AND STORAGE OF MATERIALS:

A. The Contractor shall, at its own expense, handle and haul all materials furnished by it and shall remove any of its surplus materials at the completion of the work.

B. The Contractor shall provide suitable and adequate storage for equipment and materials furnished by it that are liable to injury and shall be responsible for any loss of or damage to any equipment or materials by theft, breakage, or otherwise.

C. All excavated materials and equipment to be incorporated in the Work shall be placed so as not to injure any part of the Work or existing facilities and so that free access can be had at all times to all parts of the Work and to all public utility installations in the vicinity of the work. Materials and equipment shall be kept neatly piled and compactly stored in such location as will cause a minimum of inconvenience to public travel and adjoining owners, tenants and occupants.

D. The Contractor shall be responsible for all damages to the work under construction during its progress and until final completion and acceptance even though partial payments have been made under the Contract.

3.02 EASEMENTS:

A. As indicated on the drawings, the work is located in easements obtained by the Owner. The Contractor has no rights outside of the easements unless they are obtained from the property owner.

B. Contractor shall schedule work so that it will cause minimum inconvenience and nuisance to abutting property owners, over the shortest possible time.

C. Easements shall be kept clean; no rubbish or discarded construction materials shall be allowed to accumulate. Storage of excess construction materials, including soil, ledge, equipment, or machinery on easements will not be allowed.

D. Restoration of fences, shrubs, trees and grass shall be completed promptly following completion of the work in an easement, to minimize disruption and inconvenience to property owners.

E. Unless approved by the Engineer, the use of easements for ease of access to and egress from other areas of the project will not be permitted.

3.03 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 its own expense, provide suitable and safe means for completely covering all open excavations and for accommodating travel when work is not in progress.

B. Bridges provided for access to private property during construction shall be removed when no longer required.

C. The length of open trench will be controlled by the particular surrounding conditions but shall always be confined to the limits prescribed by the Engineer.

D. If the excavation becomes a hazard, or if it excessively restricts traffic at any point, then special construction procedures shall be taken, such as limiting the length of trench and prohibiting stocking excavated material in the street.

E. All street excavations shall be completely closed at the end of each work day. Backfilling or use of steel plates of adequate strength to carry traffic shall be used.

3.04 MAINTENANCE OF TRAFFIC:

A. Unless permission to close the street is received in writing from the proper authority, all excavated materials and equipment shall be placed so that vehicular and pedestrian traffic may be safely maintained at all times.

B. Should the Chief of Police deem it necessary, uniformed officers will be assigned to direct traffic. The Contractor shall make all arrangements in obtaining uniformed officers required.

C. The Contractor shall at its own expense, as directed by the Police Traffic Control/Safety Officer, provide and erect acceptable barricades, barrier fences, traffic signs, and all other traffic devices not specifically covered in a bid item, to protect the work from traffic, pedestrians, and animals. The Contractor shall provide sufficient temporary lighting such as lanterns/flashers (electric battery operated) or other approved illuminated traffic signs and devices to afford adequate protection to the traveling public, at no additional cost to the Owner. See Section 01552 CONSTRUCTION ZONE SAFETY PLAN.

D. The Contractor shall furnish all construction signs that are deemed necessary by and in

accordance with Part VI of the Manual on Uniform Traffic Control Devices as published by the U.S. Department of Transportation. In addition, the Contractor may be required to furnish up to 128 square feet of additional special construction warning signs. Size and exact wording of signs shall be determined by the Engineer during construction.

E. The intent of policing is to ensure public safety by direction of traffic. Police officers are not to serve as watchmen to protect the Contractor's equipment and materials.

F. Nothing contained herein shall be construed as relieving the Contractor of any of its responsibilities for protection of persons and property under the terms of the Contract.

3.05 CARE AND PROTECTION OF PROPERTY:

The Contractor shall be responsible for the preservation of all public and private property, and shall use every precaution necessary to prevent damage thereto. If any direct or indirect damage is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work on the part of the Contractor, such property shall be promptly restored by the Contractor, at its expense, to a condition similar or equal to that existing before the damage was done, to the satisfaction of the Engineer.

3.06 PROTECTION AND RELOCATION OF EXISTING STRUCTURES AND UTILITIES:

A. All existing buildings, utilities, pipes, poles, wires fences, curbings, property line markers and other structures which the Engineer decides must be preserved in place without being temporarily or permanently relocated, shall be carefully supported and protected from damage by the contractor. Should such property be damaged, it shall be restored by the Contractor, at no additional cost to the Owner.

B. The Contractor shall determine the location of all underground structures and utilities (including existing water services, drain lines, electrical lines, and sewers). Services to buildings shall be maintained, and all costs or charges resulting from damage thereto shall be paid by Contractor.

C. When fences interfere with the Contractor's operations, it shall remove and (unless otherwise specified) promptly restore them in accordance with Section 01564 EXISTING FENCES.

D. On paved surfaces the Contractor shall not use or operate tractors, bulldozers, or other power-operated equipment with treads or wheels which are shaped so as to cut or otherwise damage such surfaces.

E. All property damaged by the Contractor's operations shall be restored to a condition at least equal to that in which it was found immediately before work was begun. Suitable materials and methods shall be used for such restoration.

F. Restoration of existing property and structures shall be carried out as promptly as practicable and shall not be left until the end of the construction period.

3.07 MAINTENANCE OF FLOW:

A. The Contractor shall at its own cost, provide for the flow of sewers and drains interrupted during the progress of the work, and shall immediately cart away and dispose of all offensive matter. The entire procedure of maintaining existing flow shall be fully discussed with the Engineer well in advance of the interruption of any flow.

B. All existing drainage facilities including, but not limited to; brooks, streams, canals, channels, ditches, culverts, catch basins and drainage piping shall be adequately safeguarded so as not to impede drainage or to cause siltation of downstream areas in any manner whatsoever. If the Contractor damages or impairs any of the aforesaid drainage facilities, it shall repair the same within the same day.

C. At the conclusion of the work, the Contractor shall remove all silt in drainage structures caused by its operations as described in Section 01740, CLEANING UP.

3.08 REJECTED MATERIALS AND DEFECTIVE WORK:

A. Materials furnished by the Contractor and condemned by the Engineer as unsuitable or not in conformity with the specifications shall forthwith be removed from the work by the Contractor, and shall not be made use of elsewhere in the work.

B. Any errors, defects or omissions in the execution of the work or in the materials furnished by the Contractor, even though they may have been passed or overlooked or have appeared after the completion of the work, discovered at any time before the final payment is made hereunder, shall be forthwith rectified and made good by and at the expense of the Contractor and in a manner satisfactory to the Engineer.

C. The Contractor shall reimburse the Owner for any expense, losses or damages incurred in consequence of any defect, error, omission or act of the Contractor or its employees, as determined by the Engineer, occurring previous to the final payment.

3.09 SANITARY REGULATIONS:

Sanitary conveniences for the use of all persons employed on the work, properly screened from public observation, shall be provided in sufficient numbers in such manner and at such locations as may be approved. The contents shall be removed and disposed of in a satisfactory manner as the occasion requires. The Contractor shall rigorously prohibit the committing of nuisances within, on or about the work. Any employees found violating these provisions shall be discharged and not again employed on the work without the written consent of the Engineer. The sanitary conveniences specified above shall be the obligation and responsibility of the Contractor.

3.10 SAFETY AND HEALTH REGULATIONS:

This project is subject to the Safety and Health regulations of the U.S. Department of Labor set forth in 29 CFR, Part 1926, and to the Massachusetts Department of Labor and Industries, Division of Industrial Safety "Rules and Regulations for the Prevention of Accidents in Construction Operations (454 CMR 10.0 et. seq.)." The Contractor shall be familiar with the requirements of these regulations.

3.11 SITE INVESTIGATION:

The Contractor acknowledges that it has satisfied itself as to the conditions existing at the site of the work, the type of equipment required to perform this work, the quality and quantity of the materials furnished insofar as this information is reasonably ascertainable from an inspection of the site, as well as from information presented by the drawings and specifications made a part of this contract. Any failure of the Contractor to acquaint itself with available information will not relieve it from the responsibility for estimating properly the difficulty or cost of successfully performing the work. The Owner assumes no responsibility for any conclusion or interpretation made by the Contractor on the basis of the information made available by the Owner.

3.12 ELECTRIC SERVICE:

A. The Contractor shall make all necessary applications and arrangements and pay for all fees and charges for electrical energy for power and light necessary for the proper completion of this contract during its entire progress. The Contractor shall provide and pay for all temporary wiring, switches, connections, and meters.

B. There shall be sufficient electric lighting so that all work may be done in a workmanlike manner where there is not sufficient daylight.

3.13 HAZARDOUS WASTE:

Should the Contractor, while performing work under this contract, uncover hazardous materials, as defined in Massachusetts Hazardous Waste Regulations 310 CMR 30.00, he shall immediately notify the Engineer. The Contractor is not, and has no authority to act as, a handler, generator, operator or disposer of hazardous or toxic substances found or identified at the site, and the Owner shall undertake all such functions.

END OF SECTION

SECTION 01250

PRICE ADJUSTMENTS

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. Price adjustments, as required by MGL Chapter 30, Section 38A, shall be implemented for this Project. Price adjustments, as enumerated in Part 3 of this specification, shall be made for the following items:

Water and Sewer Projects

- Diesel fuel and gasoline
- Liquid asphalt
- Portland cement contained in cast-in-place concrete

Road and Bridge Projects

- Diesel fuel and gasoline
- Asphalt
- Concrete
- Steel

B. Price adjustments shall be made in accordance with the methodology adopted by the Massachusetts Department of Transportation in the following SPECIAL PROVISIONS documents, which are attached, but modified as contained herein:

1. Document 00811 Monthly Price Adjustment for Hot Mix Asphalt Mixtures, revised July 8, 2016
2. Document 00812 Monthly Price Adjustment for Diesel fuel and Gasoline, revised January 26, 2009
3. Document 00813 Price Adjustments for Structural Steel and Reinforcing Steel, dated October 11, 2018
4. Document 00814 Price Adjustments for Portland Cement concrete Mixes, dated January 12, 2009

C. Base and Period Prices used to calculate price adjustments shall be as published by the Massachusetts Department of Transportation as presented in Documents 00811 through 00814.

1.02 CONTRACTOR CREDIT TO OWNER SHOULD PRICES DECREASE:

A. Price adjustments will only be made if the variance between the base price and the period price is Five Percent (5%) or more.

B. In the instance where the period price is below the base price by 5% or more, then the Contractor shall credit the Owner the adjustment.

PART 2 - PRODUCTS

Not used

PART 3 - EXECUTION

3.01 DIESEL FUEL AND GASOLINE:

A. Price adjustments shall be determined based on documented quantities of diesel fuel and gasoline usage for site dedicated equipment. This methodology shall replace the price adjustment basis on fuel usage factors, as described within the Massachusetts Department of Transportation Document 00812.

B. All site dedicated equipment shall be approved by the Engineer for the calculation of any qualifying price adjustment. Prior to the start of work the Contractor shall submit to the Engineer a list of all dedicated equipment for the project. The Contractor shall forward updated submittals, as necessary, throughout the duration of the contract. Only that equipment included within the current approved list shall be considered eligible for calculating a price adjustment under this Section 01250.

C. The Contractor shall submit fuel delivery slips to the Engineer as a basis for calculating total diesel fuel and gasoline usage for site dedicated equipment. At a minimum, the delivery slips will include the name of the fuel delivery company, the date and location of fueling, the type of fuel, description of the fueled equipment and the quantity for each type of fuel delivered in gallons. Any slips not providing the minimum information shall not be included in the calculation of total diesel fuel and gasoline usage for price adjustment purposes.

3.02 LIQUID ASPHALT:

A. The “Period Price Method” shall be used to determine price adjustments. For projects utilizing reclaimed asphalt include Reclaimed Asphalt Pavement (RAP) Factor (0.0 to <1.0) in calculation of the total price adjustment. Otherwise, use RAP Factor = 1.0.

B. For bid items involving asphalt paving that are measured and paid on a linear foot basis, or some other basis besides tonnage, the number of tons shall be determined by the Engineer using compacted measure of thickness within the established payment limits.

C. Asphalt paving not separately measured for payment but rather included as an incidental component of work under a related bid item shall not be considered for price adjustment.

3.03 STRUCTURAL AND REINFORCING STEEL:

A. Steel price adjustments shall not be made for water and sewer projects.

B. Period prices for steel are subject to change up to four (4) months after the date of original publication. Therefore, no price adjustment will be made until the index for the period is finalized.

3.04 PORTLAND CEMENT AND CONCRETE:

A. The price adjustment applies to all projects contained herein in Section 1.01A.

B. Field Concrete used in water and sewer projects, typically used for thrust blocks and concrete encasement, shall not be considered for price adjustment. Cast-in-place concrete used on these projects will be included in the price adjustment determination.

END OF SECTION

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ATTACHMENT FOR SECTION 01250 PRICE ADJUSTMENTS

MASSDOT DOCUMENTS 00811-00814

DOCUMENT 00811
SPECIAL PROVISIONS
MONTHLY PRICE ADJUSTMENT FOR HOT MIX ASPHALT (HMA) MIXTURES
ENGLISH AND METRIC UNITS
Revised: 07/08/2016

This provision applies to all projects using greater than 100 tons (91 megagrams) of hot mix asphalt (HMA) mixtures containing liquid asphalt cement as stipulated in the Notice to Contractors section of the bid documents.

Price Adjustments will be based on the variance in price, for the liquid asphalt component only, between the Base Price and the Period Price. They shall not include transportation or other charges. Price Adjustments will occur on a monthly basis.

Base Price
The Base Price of liquid asphalt on a project as listed in the Notice to Contractors section of the bid documents is a fixed price determined by the Department at the time of the bid using the same method as the determination of the Period Price detailed below. The Base Price shall be used in all bids.

Period Price
The Period Price is the price of liquid asphalt for each monthly period as determined by the Department using the average selling price per standard ton of PG64-28 paving grade (primary binder classification) asphalt, FOB manufacturer's terminal, as listed under the "East Coast Market - New England, Boston, Massachusetts area" section of the Poten & Partners, Inc. "Asphalt Weekly Monitor". This average selling price is listed in the issue having a publication date of the second Friday of the month and will be posted as the Period Price for that month. The Department will post this Period Price on its website at http://www.mhd.state.ma.us/ within two (2) business days following its receipt of the relevant issue of the "Asphalt Weekly Monitor". Poten and Partners has granted the Department the right to publish this specific asphalt price information sourced from the Asphalt Weekly Monitor. This method of period price determination was formerly called the New Asphalt Period Price Method. Separate website postings using both the New Asphalt Period Price Method and the Old Asphalt Period Price Method were discontinued after June 2013.

Price Adjustment Determination, Calculation and Payment
The Contract Price of the HMA mixture will be paid under the respective item in the Contract. Price Adjustments, as herein provided, either upwards or downwards, will be made after the work has been performed using the monthly period price for the month during which the work was performed.

Price Adjustments will be paid only if the variance from the Base Price is 5% or more for a monthly period. The complete adjustment will be paid in all cases with no deduction of the 5% from either upward or downward adjustments.

The Price Adjustment applies only to the actual virgin liquid asphalt content in the mixture placed on the job in accordance with the Standard Specifications for Highways and Bridges, Division III, Section M3.11.03.

Price Adjustments will be separate payment items. The pay item numbers are 999.401 for a positive price adjustment (a payment) and 999.402 for a negative price adjustment (a deduction). Price Adjustments will be calculated using the following equation:

Price Adjustment = Tons of HMA Placed X Liquid Asphalt Content % X RAP Factor X (Period Price - Base Price)

No Price Adjustment will be allowed beyond the Completion Date of this Contract, unless there is a Department-approved extension of time.

******** END OF DOCUMENT ********

DOCUMENT 00812

SPECIAL PROVISIONS
MONTHLY PRICE ADJUSTMENT FOR DIESEL FUEL AND GASOLINE –
ENGLISH UNITS

Revised: 01/26/2009

This monthly fuel price adjustment is inserted in this contract because the national and worldwide energy situation has made the future cost of fuel unpredictable. This adjustment will provide for either additional compensation to the Contractor or repayment to the Commonwealth, depending on an increase or decrease in the average price of diesel fuel or gasoline.

This adjustment will be based on fuel usage factors for various items of work developed by the Highway Research Board in Circular 158, dated July 1974. These factors will be multiplied by the quantities of work done in each item during each monthly period and further multiplied by the variance in price from the Base Price to the Period Price.

The Base Price of Diesel Fuel and Gasoline will be the price as indicated in the Department's web site (www.mhd.state.ma.us) for the month in which the contract was bid, which includes State Tax.

The Period Price will be the average of prices charged to the State, including State Tax for the bulk purchases made during each month.

This adjustment will be effected only if the variance from the Base Price is 5% or more for a monthly period. The complete adjustment will be paid in all cases with no deduction of the 5% from either upward or downward adjustments.

No adjustment will be paid for work done beyond the extended completion date of any contract.

Any adjustment (increase or decrease) to estimated quantities made to each item at the time of final payment will have the fuel price adjustment figured at the average period price for the entire term of the project for the difference of quantity.

The fuel price adjustment will apply only to the following items of work at the fuel factors shown:

ITEMS COVERED	**FUEL FACTORS**	
	Diesel	**Gasoline**
Excavation: and Borrow Work: Items 120, 120.1, 121, 123, 124, 125, 127, 129.3, 140, 140.1, 141, 142, 143, 144., 150, 150.1, 151 and 151.1 (Both Factors used)	0.29 Gallons / CY.	0.15 Gallons / CY
Surfacing Work: All Items containing Hot Mix Asphalt	2.90 Gallons / Ton	Does Not Apply

******** END OF DOCUMENT ********

DOCUMENT 00813

SPECIAL PROVISIONS

PRICE ADJUSTMENTS FOR STRUCTURAL STEEL AND REINFORCING STEEL

October 11, 2018

This special provision applies to all projects containing the use of structural steel and/or reinforcing steel as specified elsewhere in the Contract work. It applies to all structural steel and all reinforcing steel, as defined below, on the project. Compliance with this provision is mandatory, i.e., there are no "opt-in" or "opt-out" clauses. Price adjustments will be handled as described below and shall only apply to unfabricated reinforcing steel bars and unfabricated structural steel material, consisting of rolled shapes, plate steel, sheet piling, pipe piles, steel castings and steel forgings, and.

Price adjustments will be variances between Base Prices and Period Prices. Base Prices and Period Prices are defined below.

Price adjustments will only be made if the variances between Base Prices and Period Prices are 5% or more. A variance can result in the Period Price being either higher or lower than the Base Price. Once the 5% threshold has been achieved, the adjustment will apply to the full variance between the Base Price and the Period Price.

Price adjustments will be calculated by multiplying the number of pounds of unfabricated structural steel material or unfabricated reinforcing steel bars on a project by the index factor calculated as shown below under Example of a Period Price Calculation.

Price adjustments will *not* include guardrail panels or the costs of shop drawing preparation, handling, fabrication, coatings, transportation, storage, installation, profit, overhead, fuel costs, fuel surcharges, or other such charges not related to the cost of the unfabricated structural steel and unfabricated reinforcing steel.

The weight of steel subject to a price adjustment shall not exceed the final shipping weight of the fabricated part by more than 10%.

Base Prices and Period Prices are defined as follows:

Base Prices of unfabricated structural steel and unfabricated reinforcing steel on a project are fixed prices determined by the Department and found in the table below. While it is the intention of the Department to make this table comprehensive, some of a project's unfabricated structural steel and/or unfabricated reinforcing steel may be inadvertently omitted. Should this occur, the Contractor shall bring the omission to the Department's attention so that a contract alteration may be processed that adds the missing steel to the table and its price adjustments to the Contract.

The Base Price Date is the month and year in which MassDOT opened bids for the project. This date is used to select the Base Price Index.

Period Prices of unfabricated structural steel and unfabricated reinforcing steel on a project are variable prices that have been calculated using the Period Price Date and an index of steel prices to adjust the Base Price.

The Period Price Date is the date the steel was delivered to the fabricator as evidenced by an official bill of lading submitted to the Department containing a description of the shipped materials, weights of the shipped materials and the date of shipment. This date is used to select the Period Price Index.

The index used for the calculation of Period Prices is the U.S. Department of Labor Bureau of Labor Statistics Producer Price Index (PPI) Series ID WPU101702 (Not Seasonally Adjusted, Group: Metals and Metal Products, Item: Semi-finished Steel Mill Products.) As this index is subject to revision for a period of up to four (4) months after its original publication, no price adjustments will be made until the index for the period is finalized, i.e., the index is no longer suffixed with a "(P)".

Period Prices are determined as follows:

Period Price = Base Price X Index Factor
Index Factor = Period Price Index / Base Price Index

Example of a Period Price Calculation:

Calculate the Period Price for December 2009 using a Base Price from March 2009 of $0.82/Pound for 1,000 Pounds of ASTM A709 (AASHTO M270) Grade A36 Structural Steel Plate.

The Period Price Date is December 2009. From the PPI website*, the Period Price Index = 218.0.

The Base Price Date is March 2009. From the PPI website*, the Base Price Index = 229.4.

Index Factor = Period Price Index / Base Price Index = 218.0 / 229.4 = 0.950
Period Price = Base Price X Index Factor = $0.82/Pound X 0.950 = $0.78/Pound

Since $0.82 - $0.78 = $0.04 is less than 5% of $0.82, no price adjustment is required.

If the $0.04 difference shown above was greater than 5% of the Base Price, then the price adjustment would be 1,000 Pounds X $0.04/Pound = $40.00. Since the Period Price of $0.78/Pound is less than the Base Price of $0.82/Pound, indicating a drop in the price of steel between the bid and the delivery of material, a credit of $40.00 would be owed to MassDOT. When the Period Price is higher than the Base Price, the price adjustment is owed to the Contractor.

* To access the PPI website and obtain a Base Price Index or a Period Price Index, go to http://data.bls.gov/cgi-bin/srgate

End of example.

The Contractor will be paid for unfabricated structural steel and unfabricated reinforcing steel under the respective contract pay items for all components constructed of either structural steel or reinforced Portland cement concrete under their respective Contract Pay Items.

Price adjustments, as herein provided for, will be paid separately as follows:

Structural Steel
Pay Item Number 999.449 for positive (+) pay adjustments (payments to the Contractor)

Pay Item Number 999.457 for negative (-) pay adjustments (credits to MassDOT Highway Division)

Reinforcing Steel
Pay Item Number 999.466 for positive (+) pay adjustments (payments to the Contractor)

Pay Item Number 999.467 for negative (-) pay adjustments (credits to MassDOT Highway Division)

No price adjustment will be made for price changes after the Contract Completion Date, unless the MassDOT Highway Division has approved an extension of Contract Time for the Contract.

BASE PRICES

The Department's table of Base Prices specified above is updated monthly. The current table is attached to this Document 00813 and included in each new contract.

DOCUMENT 00814

SPECIAL PROVISIONS
PRICE ADJUSTMENT FOR PORTLAND CEMENT CONCRETE MIXES

January 12, 2009

This provision applies to all projects using greater than 100 Cubic Yards (76 Cubic Meters) of Portland cement concrete containing Portland cement as stipulated in the Notice to Contractors section of the Bid Documents. This Price Adjustment will occur on a monthly basis.

The Price Adjustment will be based on the variance in price for the Portland cement component only from the Base Price to the Period Price. It shall not include transportation or other charges.

The Base Price of Portland cement on a project is a fixed price determined at the time of bid by the Department by using the same method as for the determination of the Period Price (see below) and found in the Notice to Contractors.

The Period Price of Portland cement will be determined by using the latest published price, in dollars per ton (U.S.), for Portland cement (Type I) quoted for Boston, U.S.A. in the **Construction Economics** section of *ENR Engineering News-Record* magazine or at the ENR website http://www.enr.com under **Construction Economics**. The Period Price will be posted on the MassHighway website the Wednesday immediately following the publishing of the monthly price in ENR, which is normally the first week of the month.

The Contract Price of the Portland cement concrete mix will be paid under the respective item in the Contract. The price adjustment, as herein provided, upwards or downwards, will be made after the work has been performed, using the monthly period price for the month during which the work was performed.

The price adjustment applies only to the actual Portland cement content in the mix placed on the job in accordance with the Standard Specifications for Highways and Bridges, Division III, Section M4.02.01. No adjustments will be made for any cement replacement materials such as fly ash or ground granulated blast furnace slag.

The Price Adjustment will be a separate payment item. It will be determined by multiplying the number of cubic yards of Portland cement concrete placed during each monthly period times the Portland cement content percentage times the variance in price between the Base Price and Period Price of Portland cement.

This Price Adjustment will be paid only if the variance from the Base Price is 5% or more for a monthly period. The complete adjustment will be paid in all cases with no deduction of the 5% from either upward or downward adjustments.

No Price Adjustment will be allowed beyond the Completion Date of this Contract, unless there is a Department-approved extension of time.

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END OF DOCUMENT

SECTION 01270

MEASUREMENT AND PAYMENT

PART 1 - DESCRIPTION

1.01 GENERAL:

A. The following subsections describe the measurement of and payment for the work to be done under the items listed in the Bid Form.

B. All work performed as described in these contract documents will be paid for under one or more of the items listed in the Bid Form. All other activities required in connection with performance of the work, including all work required under Division 1, GENERAL REQUIREMENTS, whether described in the contract documents or mandated by applicable codes, permits and laws, will not be separately paid for unless specifically provided for in the form of general bid, but will be considered incidental to performance of the overall project.

C. Each unit or lump-sum price stated in the Bid Form shall constitute full compensation as herein specified for each item of work completed in accordance with the drawings and specifications, including cleanup.

D. The payment items listed herein and in the Bid Form are intended to provide full payment for the work shown on the drawings and specified herein. Any work called for or implied in the documents but not listed as a payment item shall be considered incidental to the overall project.

E. Unless otherwise noted, each item shall be furnished and installed in accordance with the technical section whether a specific applicable payment item exists or not.

F. Unless otherwise noted, all earthwork shall be included under any item requiring excavation. The prices for those items that involve excavation shall include installation of all necessary sheeting and bracing.

G. In all items involving excavation, the price shall be based on doing the entire excavation in earth. Where rock is excavated, the price therefor shall be in addition to the cost of excavating earth and no deduction shall be made in the amount for earth excavation.

H. The price for all pipe items for drains shall constitute full compensation for furnishing, laying, jointing, and testing pipe; earth excavation and backfill; crushed stone bedding; and cleaning up.

1.02 DRAINS COMPLETE IN PLACE:

A. PVC AND HDPE DRAINS:

1. The length of drains to be paid for under the appropriate subdivisions of this item shall be measured by the linear foot along the completed drains, including wyes and tees, from centerline of manhole or catch basin to centerline of manhole or catch basin**.**

2. The unit prices under the appropriate subdivisions of this item shall constitute full compensation for constructing the drains and catch basin leaders, complete in place, as indicated on the drawings and as specified, including removal and disposal of existing drains where necessary, furnishing and installing pipe and fittings, 12”x12” wyes, making connections to the existing drain, excavation, backfill, bedding, select material, tree protection, testing, removal and replacement of sidewalks and curbing, pipe bursting access pits, solid sleeve to connect HDPE pipe to new DMH 0077-079, enlarging opening in DMH 0077-0924 to accept bursting head and new HDPE pipe, sealing around new HDPE pipe in DMH 0077-079, and all work incidental thereto and not specifically included for payment under other items, as described in Section 02085, POLYVINYL CHLORIDE GRAVITY PIPE AND FITTINGS and SECTION 02225, PIPE BURSTING CONSTRUCTION.

3. Payment for 12-inch PVC gravity drains shall be paid at the contract unit price under Item 1a.

4. Payment for 12-inch (IPS) HDPE gravity drains by pipe bursting shall be paid at the contract unit price under Item 1b.

1.03 BUILDING CONNECTIONS SYSTEMS:

A. TEES:

1. The unit price to be paid for under the appropriate subdivisions of this item shall be measured for payment per tee installed within the main drain.

2. The contract unit price under the appropriate sub-divisions of this item shall constitute full compensation for furnishing and installing tees in the main drain, complete, as indicated on the drawings and/or specified, including pavement replacement, and all work incidental thereto and not specifically included for payment under other items.

3. The work under this item shall be paid at the contract unit price under Items 2a.

B. BUILDING CONNECTIONS:

1. The length of building connections to be paid for under the appropriate subdivisions of this item shall be measured per linear foot along the horizontal projection of the

centerline of the completed building connection, from the centerline of the main drain to the end of the building connection.

2. Building connections shall be paid at the contract unit price under the Item "6-inch PVC Building Connections." The unit price under this Item shall include excavation, backfill, crushed stone and select backfill; furnishing and installing pipe, fittings, detectable tracer tape, end plug, restoration of the ground surface, surface restoration, sidewalk and curb replacement, pavement replacement, and incidentals necessary to construct the building connections as shown on the drawings and/or as specified.

3. The work under this item shall be paid at the contract unit price under Items 2b.

1.04 PRECAST CONCRETE MANHOLES AND CATCH BASINS:

A. Unless otherwise provided for, the work shall be measured per unit of completed work under the appropriate subdivisions of the item "Precast Concrete Manholes and Catch Basins."

B. PRECAST CONCRETE MANHOLE BASES, FRAMES and COVERS:

1. Bases, frames and covers shall be measured per set installed in place.

2. The unit price for this item shall include excavation, removal and disposal of existing manhole if necessary, crushed stone bedding, and backfill; furnishing and installing base, invert channels, steps, gaskets, sealants, connections and couplings; pavement replacement; and all incidental work necessary to complete the precast concrete base as shown on the drawings and as specified herein.

3. The unit price for this item shall also include furnishing and installing the frame and cover, and grouting the frame to the brick courses.

4. The work of this item shall be paid at the contract unit price under Item 3a.

C. PRECAST CONCRETE MANHOLE WALLS AND CONES:

1. Walls and cones shall be measured per vertical foot installed in place. Measurement shall be based on the vertical distance from the invert of the pipeline to the top of the completed frame at finished grade.

2. Walls and cones shall be paid at the contract unit prices under the item "Precast Concrete Manhole Walls and Cones." The unit price for this item shall include excavation and backfill; furnishing and installing walls, cones, gaskets, seals, steps, and bricks and grout to grade; pavement replacement; and all incidentals necessary to complete the precast concrete walls and cones as shown on the drawings and specified herein.

3. The work of this item shall be paid at the contract unit price under Item 3b.

D. PRECAST CONCRETE CATCH BASIN (TYPE A):

1. Precast concrete catch basins (Type A) shall be measured per catch basin installed.

2. The unit price for this item shall include removal and disposal of existing catch basin if necessary, excavation and backfill, crushed stone bedding, furnishing and installing base, walls, top slab, gaskets, sealants, hood, connections and couplings; frame and grate; resetting or replacing of granite curbing; removal and replacement of sidewalks; pavement replacement; and all incidental work necessary to complete the precast concrete catch basin (Type A) as shown on the drawings and as specified herein.

3. The work of this item shall be paid at the contract unit price under Item 3c.

E. PRECAST CONCRETE CATCH BASIN (TYPE B):

1. Precast concrete catch basins (Type B) shall be measured per catch basin installed.

2. The unit price for this item shall include removal and disposal of existing catch basin if necessary, excavation and backfill, crushed stone bedding, furnishing and installing base, walls, top slab, granite gutter inlet, gaskets, sealants, hood, connections and couplings; frame and grates; resetting or replacing of granite curbing; removal and replacement of sidewalks; pavement replacement; and all incidental work necessary to complete the precast concrete catch basin (Type A) as shown on the drawings and as specified herein.

3. The work of this item shall be paid at the contract unit price under Item 3d.

F. CONNECTIONS TO EXISTING STRUCTURES:

1. Connections to existing structures shall be considered incidental to the work and shall not be measured separately for payment.

1.05 ROCK EXCAVATION AND DISPOSAL:

A. The cost of pre-blast surveys, vibration air blast monitoring, blasting records and post-blast inspection shall be considered incidental to the cost of rock excavation and disposal and will not be separately paid.

B. Rock excavated and disposed of off-site by the Contractor shall be measured by the cubic yard, within the limits of excavation as defined in Paragraph C below. The unit price established by the Engineer under Item Number 4a is the minimum unit price to be used for rock excavation. The unit price to be inserted by the Contractor in his bid under Item Number 4b is intended to reflect the Contractor's additional costs for performing the rock excavation, should he decide that the minimum unit price in Item Number 4a is insufficient compensation.

C. Where rock is encountered, it shall be uncovered but not excavated until measurements have been made by the Engineer, unless in the opinion of the Engineer, satisfactory measurements can be made in some other manner.

D. Payment for this item includes rock excavation and disposal, furnishing and installing gravel borrow in its place, and providing all required documentation.

E. The bidder should include in his bid for items involving excavation, the cost of doing the entire excavation as earth, the price for the Item "Rock Excavation and Disposal" being intended to cover the difference between the cost of rock excavation and the cost of earth excavation. The price for this item shall be paid in addition to any payment made for earth excavation.

F. For all manholes and structures, measurement will be to one foot outside the widest dimension of the structure or shall be the maximum connecting trench width, whichever is greater. No allowance will be made for overbreakage.

1.06 MISCELLANEOUS EARTHWORK:

A. CHANGES IN EARTHWORK:

1. Should it be necessary to lower the pipeline below the grade indicated on the drawings for any reason, the additional excavation and backfill shall be measured per cubic yard within payment limits under the item "Changes in Earthwork."

2. Changes in earthwork shall be measured per cubic yard for work completed as ordered, under the "Changes in Earthwork" item.

3. The work of this item shall be paid at the contract unit price under Item 5a.

B. EXCAVATION AND BACKFILL OF UNSUITABLE MATERIAL ABOVE NORMAL GRADE:

1. If, in the opinion of the Engineer, the material at or above normal grade is unsuitable for use as backfill, it shall be removed and disposed of to such depths and widths within the limits of payment as he may order. Normal grade is defined as the elevation of the trench bottom, as shown on the drawings.

2. The quantity of earth excavation and backfill above normal grade to be included for payment shall be the number of cubic yards of material ordered to be removed and measured by the Engineer within the normal trench limits shown on the contract drawings.

3. Removal of topsoil, paving materials, frozen material or rock excavation above the normal grade of the trench excavation will not be considered for payment.

4. The unit price for this item shall constitute full compensation for excavation of unsuitable material above normal grade and furnishing, installing and compacting approved backfill materials excluding materials noted in Item 1.06-B-.3 above as specified in Section 02300 of the Contract Documents.

5. The Contractor will not be reimbursed for excavation of unsuitable material above normal grade, which has not been ordered by the Engineer.

6. The work of this item shall be paid at the contract unit price under Item 5b.

C. EARTH EXCAVATION AND BACKFILL BELOW NORMAL GRADE:

1. If, in the opinion of the Engineer, the material at or below normal grade for the bottom of trench excavation is unsuitable for foundation, it shall be removed to such depths and widths within the limits of payment as he may order. Normal grade is defined as the elevation of the proposed sewer trench bottom, as shown on the drawings.

2. The quantity of earth excavation below normal grade (limit of normal excavation) to be included for payment under this item shall be the number of cubic yards of unsuitable material excavated, measured to the depths and lengths ordered, and to the width between payment limits for normal excavation as indicated on the drawings.

3. The unit price for this item shall constitute full compensation for excavation below normal grade and furnishing, installing and compacting gravel borrow as indicated on the drawings.

4. The Contractor will not be reimbursed for over-excavation that has not been ordered by the Engineer. The Contractor shall backfill any such overexcavated areas in accordance with the specifications, at no additional cost to the Owner.

4. The Contractor will not be reimbursed under this pay item for rock excavation that qualifies for payment under the pay item for “rock excavation and disposal.”

5. The work of this item shall be paid at the contract unit price under Item 5c.

D. TEST PITS:

1. Test pits as ordered by the Engineer and not incidental to construction shall be measured per cubic yard excavated and backfilled under the Item "Test Pits."

2. Test pits shall be paid at the contract unit price under the item "Test Pits." The unit price under this item shall constitute full compensation for all excavation, backfill, pavement repair, surface restoration, or other work incidental to excavation or restoration of test pits.

3. The work of this item shall be paid at the contract unit price under Item 5c.

E. ADDITIONAL CRUSHED STONE:

1. Additional crushed stone ordered by the Engineer shall be measured in place per cubic yard installed.

2. Additional crushed stone shall be paid at the contract price for work completed and shall constitute full compensation for furnishing and placing crushed stone.

3. The work of this item shall be paid at the contract unit price under Item 5e.

F. SHEETING LEFT IN PLACE:

1. Unless designated otherwise, the work as specified in Section 02252 - SUPPORT OF EXCAVATION shall not be separately measured for payment, but shall be considered incidental to the pipeline or structure for which it is required.

2. No payment will be made for trench boxes, sheeting, sheeting left in place, or steel plates used at the Contractor's option in the course of the work.

1.07 PEDESTRIAN CURB RAMPS:

The contract unit price per pedestrian curb ramp to be paid shall constitute full compensation for supplying all material, labor, tools, and equipment required to install pedestrian curb ramps as indicated on the drawings, including removal and disposal of existing sidewalks and curb ramps and all work incidental thereto and not specifically included for payment under other items, as described in Section 02775, SIDEWALK CONSTRUCTION AND REPLACEMENT.

1.08 HANDLING AND DISPOSAL OF EXCAVATED MATERIALS:

A. REMOVAL AND DISPOSAL OF GROUP A MATERIAL:

1. The Unit price to be paid under the item "Removal and disposal of Group A excavated material," shall be measured for payment per ton for removal and offsite reuse/recycle or offsite disposal of Group A excavated material, as defined in Section 02282, based on certified weight slips from the facility where the Group A materials are received.

2. The Unit price under this item shall constitute full compensation for furnishing all labor, material, tools, and equipment required to handle, stockpile, segregate, sample, conduct laboratory analysis, load and legally haul, by a licensed common carrier, and reuse, recycle or dispose of Group A excavated material off-site, as specified in Section 02282. Contract price shall include full compensation for all local, state, and federal taxes associated with the transportation, reuse, recycling, or disposal of the Group A excavated material.

3. Removal of topsoil, paving materials, construction and demolition debris, frozen material or ledge excavation above the normal grade of the trench excavation will not be considered for payment.

4. The Contractor will not be reimbursed for excavation of unsuitable material that has not been ordered by the Engineer.

5. The work of this item shall be paid at the contract unit price under Item 7a.

B. REMOVAL AND DISPOSAL OF GROUP B-1 MATERIAL

1. The Unit price to be paid under the item "Removal and disposal of Group B-1 excavated material" shall be measured for payment per ton for removal and offsite reuse/recycle or offsite disposal of Group B-1 excavated material, as defined in Section 02282, based on certified weight slips from the applicable shipping documentation.

2. The Unit price under this item shall constitute full compensation for furnishing all labor, material, tools, and equipment required to handle, stockpile, segregate, sample, conduct laboratory analysis, load and legally haul, by a licensed common carrier, and reuse, recycle or disposal of Group B-1 excavated material off-site, as specified in Section 02282. Contract price shall include full compensation for all local, state, and federal taxes associated with transportation, reuse, recycle, or disposal of Group B-1 excavated material.

3. Removal of topsoil, paving materials, construction and demolition debris, frozen material or ledge excavation above the normal grade of the trench excavation will not be considered for payment.

4. The Contractor will not be reimbursed for excavation of unsuitable material which has not been ordered by the Engineer.

5. The work of this item shall be paid at the contract unit price under Item 7b.

C. REMOVAL AND DISPOSAL OF GROUP B-2 MATERIAL

1. The Unit price to be paid under the item "Removal and disposal of Group B-2 excavated material" shall be measured for payment per ton for removal and offsite reuse/recycle or offsite disposal of Group B-2 excavated material, as defined in Section 02282, based on certified weight slips from the applicable shipping documentation.

2. The Unit price under this item shall constitute full compensation for furnishing all labor, material, tools, and equipment required to handle, stockpile, segregate, sample, conduct laboratory analysis, load and legally haul, by a licensed common carrier, and reuse, recycle or dispose of Group B-2 excavated material off-site, as

specified in Section 02282. Contract price shall include full compensation for all local, state, and federal taxes associated with transportation, reuse, recycle, or disposal of Group B-2 excavated material.

3. Removal of topsoil, paving materials, construction and demolition debris, frozen material or ledge excavation above the normal grade of the trench excavation will not be considered for payment.

4. The Contractor will not be reimbursed for excavation of unsuitable material which has not been ordered by the Engineer.

5. The work of this item shall be paid at the contract unit price under Item 7c.

1.09 DEWATERING:

The work of this section shall not be measured separately for payment, but shall be considered incidental to the project.

1.10 PAVEMENT REPLACEMENT:

A. BITUMINOUS PAVEMENT:

1. Bituminous pavement shall be measured per linear foot, square yard, or ton of work completed and shall be paid at the contract unit prices under the subdivisions of the item "Pavement Replacement" as further described below.

2. Pavement disturbed by the Contractor's operations outside of payment limits shall not be paid for under these items, but shall be repaired to its original condition by the Contractor at no additional cost to the Owner.

3. Pavement replacement for manholes and catch basins shall be considered incidental to the work and shall not be measured separately for payment.

4. Pavement replacement for tees/wyes and building connections shall be considered incidental to the work and shall not be measured separately for payment.

5. Items measured per linear foot shall be measured along the centerline of the completed pipeline trench.

6. Permanent Trench Width Binder Course Pavement (6-inches thick):

Permanent trench width binder course pavement (6-inches thick) shall be measured per linear foot where mainline sewer is replaced and shall include, furnishing, preparation and installation of 12-inch depth of compacted gravel borrow subbase, tack coat, and permanent trench width binder course pavement (4-inches thick) as shown on the drawings and as specified. The work for this item shall be paid at the contract unit price under Item 6a.

7. Permanent Trench Width Top Course Pavement with Cold Planing:

   Permanent trench width top course pavement (2-inches thick) and cold planing shall be measured per linear foot and shall include cold planing, tack coat, asphalt joint sealant, furnishing, preparation and installation of top course pavement, and pavement markings as shown on the drawings and as specified. The work for this item shall be paid at the contract unit price under Item 6b.

8. Additional Pavement:

   a. Additional pavement beyond the payment limits of the trench shall be measured per ton for payment at the unit price, where ordered by the Engineer and not included for payment under other items.

   b. Payment for additional pavement shall include furnishing, preparation and installation of the additional pavement ordered by the Engineer, outside of the normal trench limits.

   c. The work for this item shall be paid at the contract unit price under Item 6d.

9. Raising and adjusting of new and existing castings shall be incidental to pavement replacement and not included separately for payment. Castings belonging to private utilities shall be raised by their own forces at their expense.

10. Except as otherwise indicated, repainting of traffic markings shall be included in the payment for this item. Provision of stop bars, crosswalks, traffic arrows, printed words and lane striping dividers shall also be included in the payment for this item.

1.11 ENVIRONMENTAL PROTECTION:

The work of this section shall not be separately measured for payment but shall be considered incidental to the project.

1.12 TRAFFIC CONTROL:

1. The lump sum for this item shall constitute full compensation to the Contractor to develop, implement, and maintain traffic control for the duration of the work.

2. The work for traffic control shall include, but not be limited to; meeting with Newton Police Department and commercial property representatives; providing all warning signs, portable changeable message signs, barricades, barrier fences, traffic signs, no parking signs, and other traffic control devices as required by the City of Newton Police Department and the MUTCD, as described in Section 01550, SIGNAGE.

3. The work of this item shall be paid at the contract unit price under Item 9a.

1.13 MOBILIZATION:

The lump sum for this item shall constitute full compensation to the Contractor for the general mobilization necessary to make the contract operational, exclusive of the cost of materials. The total for mobilization shall not exceed 5 percent of the total of all bid items excluding this item and Uniformed Officers for Traffic Control. Mobilization shall be paid at the contract unit price under Item 10a.

1.14 ALLOWANCES FOR SERVICES OF UNIFORMED OFFICERS:

A. The services of uniformed officers shall be measured per hour worked.

B. The services of uniformed officers shall be paid at the contract unit prices under the subdivisions of the item "Allowances for Services of Uniformed Officers." The unit prices under this item include administration charges required by the police.

C. The set prices in the Bid Form for Uniformed Officers are based on the prevailing hourly wage rates. Payment will be made based on invoices submitted by the traffic authority to the Contractor. The Contractor shall forward copies of these invoices to the Engineer and include the cost in his Application for Payment. Actual payment to the traffic authority shall be made by the Contractor and the Contractor shall be reimbursed by the Owner through the payment estimate. If police wages change during the course of the Contract, the unit prices under this item will be changed accordingly.

1.15 SUPPORT OF EXCAVATION:

Unless otherwise indicated, the work of this section shall not be separately measured for payment but shall be considered incidental to the project.

1.16 CURBING REPLACEMENT:

Unless otherwise indicated, the work of this section shall not be separately measured for payment but shall be considered incidental to the project.

1.17 SIDEWALK REPLACEMENT:

Unless otherwise indicated, sidewalk replacement, including concrete sidewalks, stamped brick sidewalks, and laid brick sidewalks shall not be separately measured for payment, but shall be considered incidental to the project.

1.18 TRACER TAPE:

Unless otherwise indicated, the work of this section shall not be separately measured for payment but shall be considered incidental to the project.

1.19 LANDSCAPING:

Unless otherwise indicated, the work of this section shall not be separately measured for payment but shall be considered incidental to the project.

1.20 LOAMING AND SEEDING:

Unless otherwise indicated, the work of this section shall not be separately measured for payment but shall be considered incidental to the project.

1.21 FIELD CONCRETE:

Unless otherwise indicated, the work of this section shall not be separately measured for payment but shall be considered incidental to the project.

1.22 ELECTRICAL:

Unless otherwise indicated, the work of this division shall not be separately measured for payment but shall be considered incidental to the project.

1.23 PROTECTION AND RELOCATION OF EXISTING STRUCTURES AND UTILITIES:

Unless otherwise indicated, protection or temporary removal and replacement of existing utilities and structures as described in Section 01110 shall not be separately measured for payment but shall be considered incidental to the project.

1.24 PRICE ADJUSTMENTS MANDATED BY MGL CHAPTER 30, SECTION 38A:

Price adjustments for certain payment items shall be as described in Specification Section 01250 PRICE ADJUSTMENTS. Payment shall be made at the unit prices included in Section 00410 or, if no such items are contained in Section 00410, by change order.

1.25 CONSTRUCTION ZONE SAFETY PLAN:

Unless otherwise indicated, the work of this section shall not be separately measured for payment but shall be considered incidental to the project.

1.26 NOTIFICATION

Unless otherwise indicated, the work of this section shall not be separately measured for payment but shall be considered incidental to the project.

1.27 HANDLING EXISTING FLOWS

Unless otherwise indicated, the work of this section shall not be separately measured for

payment but shall be considered incidental to the project.

1.28 RESTORATION

Unless otherwise indicated, the work of this section shall not be separately measured for payment but shall be considered incidental to the project.

1.29 TREE PROTECTION

Unless otherwise indicated, the work of this section shall not be separately measured for payment but shall be considered incidental to the project.

1.30 REMOVING AND RESETTING PARKING METERS

Unless otherwise indicated, the work of this section shall not be separately measured for payment but shall be considered incidental to the project.

1.31 PROTECTION AND RELOCATION OF EXISTING STRUCTURES AND UTILITIES: Unless otherwise indicated, protection or temporary removal and replacement of existing utilities and structures as described in Section 01110 shall not be separately measured for payment, but shall be considered incidental to the project.

1.32 NOISE ORDINANCE WAIVERS:

Unless otherwise indicated, the work of this section shall not be separately measured for payment but shall be considered incidental to the project.

END OF SECTION

SECTION 01330

SUBMITTALS

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. The Contractor shall provide the Engineer with submittals as required by the contract documents.

1.02 RELATED WORK:

A. Divisions 1 – 3 of these specifications that require submittals.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 GENERAL:

A. As required by the General Conditions, Contractor shall submit a schedule of shop and working drawing submittals.

B. The Contractor shall submit the shop and working drawing submittals electronically.

3.02 ELECTRONIC SUBMITTALS:

A. In accordance with the accepted schedule, the Contractor shall submit promptly to the Engineer by email (Mahoney.Carolyn@wseinc.com) or on Compact Disc (mail to Weston & Sampson Engineers, attention: CSD), one electronic copy in Portable Document Format (PDF) of shop or working drawings required as noted in the specifications, of equipment, structural details and materials fabricated especially for this Contract.

B. Each electronic copy of the shop or working drawing shall be accompanied by the Engineer's standard shop drawing transmittal form, included as Exhibit 1 of this section (use only for electronic submittals), on which is a list of the drawings, descriptions and

numbers and the names of the Owner, Project, Contractor and building, equipment or structure.

C. The Contractor shall receive a shop drawing memorandum with the Engineer's approval or comments via email.

3.03 SHOP AND WORKING DRAWINGS:

A. Shop and working drawings shall show the principal dimensions, weight, structural and operating features, space required, clearances, type and/or brand of finish of shop coat, grease fittings, etc., depending on the subject of the drawings. When it is customary to do so, when the dimensions are of particular importance, or when so specified, the drawings shall be certified by the manufacturer or fabricator as correct for this Contract.

B. All shop and working drawings shall be submitted to the Engineer by and/or through the Contractor, who shall be responsible for obtaining shop and working drawings from its subcontractors and returning reviewed drawings to them. All shop and working drawings shall be prepared on standard size, 24-inch by 36-inch sheets, except those, which are made by changing existing standard shop or working drawings. All drawings shall be clearly marked with the names of the Owner, Project, Contractor and building, equipment or structure to which the drawing applies, and shall be suitably numbered. Each shipment of drawings shall be accompanied by the Engineer's (if applicable) standard shop drawing transmittal form on which is a list of the drawings, descriptions and numbers and the names mentioned above.

C. Only drawings that have been prepared, checked and corrected by the fabricator should be submitted to the Contractor by its subcontractors and vendors. Prior to submitting drawings to the Engineer, the Contractor shall check thoroughly all such drawings to satisfy himself that the subject matter thereof conforms to the Contract Documents in all respects. Shop drawings shall be reviewed and marked with the date, checker's name and indication of the Contractor's approval, and only then shall be submitted to the Engineer. Shop drawings unsatisfactory to the Contractor shall be returned directly to their source for correction, without submittal to the Engineer. Shop drawings submitted to the Engineer without the Contractor's approval stamp and signature will be rejected. Any deviation from the Contract Documents indicated on the shop drawings must be identified on the drawings and in a separate submittal to the Engineer, as required in this section of the specifications and General Conditions.

D. The Contractor shall be responsible for the prompt submittal and resubmittal, as necessary, of all shop and working drawings so that there will be no delay in the work due to the absence of such drawings.

E. The Engineer will review the shop and working drawings as to their general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Corrections of comments made on the drawings during the review do not relieve the Contractor from compliance with requirements of the Contract Documents. The Contractor is responsible for:

confirming and correlating all quantities and dimensions; selecting fabrication processes and techniques of construction; coordinating its work with that of all other trades; and performing its work in a safe and satisfactory manner. The review of the shop drawings is general and shall not relieve the Contractor of the responsibility for details of design, dimensions, code compliance, etc., necessary for interfacing with other components, proper fitting and construction of the work required by the Contract and for achieving the specified performance. The Engineer will review submittals two times: once upon original submission and a second time if the Engineer requires a revision or corrections. The Contractor shall reimburse the Owner amounts charged to the Owner by the Engineer for performing any review of a submittal for the third time or greater.

F. With few exceptions, shop drawings will be reviewed and returned to the Contractor within 30 days of submittal.

G. No material or equipment shall be purchased or fabricated especially for this Contract nor shall the Contractor proceed with any portion of the work, the design and details of which are dependent upon the design and details of equipment or other features for which review is required, until the required shop and working drawings have been submitted and reviewed by the Engineer as to their general conformance and compliance with the project and its Contract Documents. All materials and work involved in the construction shall then be as represented by said drawings.

H. Two copies of the shop and working drawings and/or catalog cuts will be returned to the Contractor. The Contractor shall furnish additional copies of such drawings or catalog cuts when it needs more than two copies or when so requested.

END OF SECTION

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EXHIBIT 1 TO SECTION 01330 SUBMITTALS

SHOP DRAWING TRANSMITTAL FORM

Shop Drawing Transmittal

Weston & Sampson SM

Instruction for Preparing Transmittal

No action will be taken on any item unless accompanied by this form.
TRANSMITTAL NOS. to be consecutive (1, 2, 3, etc.).
Each resubmittal of same item shall use same number with suffix letter (A, B, etc.).
SPEC. SECT. NO: Only one spec. section no. to each transmittal.
DESCRIPTION: Complete identification of document or group of documents.
SOURCE: Originator of document(s) being submitted.

DRAWING NO: Identification of document(s).
CONTRACT DRAWING REFERENCE: Contract drawing number(s) showing details of document(s).
SPECIAL INSTRUCTIONS: Special cases and emergencies, changes in distribution and special handling requests, etc. should be entered here.
SIGNATURE OF CONTRACTOR: Signature of individual who reviews and approves material prior to submittal to engineer.

THIS SECTION TO BE COMPLETED BY CONTRACTOR

TRANSM. NO.	SPEC. SECT. NO.	DATE	CONTRACTORS JOB NO.	W&S JOB NO.

PROJECT NAME & CONTRACT NO.	LOCATION

TO	Attention: CSD (Mahoney.Carolyn@wseinc.com) Weston & Sampson Engineers, Inc. 55 Walkers Brook Drive Reading, MA 01867	FROM	

						BY W&S	
ITEM NO.	DESCRIPTION	SOURCE	DRAWING NO. CATALOG NO. BROUCHURE, ETC	NO. OF COPIES	CONTRACT DRAWING REF.	ACTION CODE	REVIEWED BY
1							
2							
3							
4							

THIS CERTIFIES THAT ALL ITEMS SUBMITTED HEREWITH HAVE BEEN CHECKED BY THE CONTRACTOR, ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE CONTRACT DOCUMENTS, EXCEPT AS NOTED, AND ARE APPROVED BY THE CONTRACTOR FOR THIS PROJECT.	SIGNATURE & TITLE	

THIS SECTION TO BE COMPLETED BY W&S

ACTION CODE:
1. FURNISH AS SUBMITTED
2. FURNISH AS NOTED
3. REVISE AND RESUBMIT
4. REJECTED- SEE REMARKS
5. ACKNOWLEDGEMENT
6. SUBMITTAL NOT REQUIRED, RETURNED WITHOUT REVIEW

a. INSTALLATION SHALL PROCEED ONLY WHEN ACTION CODE IS 1 OR 2
b. ACTION CODED 3 SHALL BE RESUBMITTED WITHIN TIME LIMIT SET IN CONTRACT
c. REVIEW DOES NOT RELIEVE CONTRACTOR FROM RESPONSIBILITY OF COMPLIANCE WITH ALL REQUIREMENTS OF THE CONTRACT DOCUMENTS

Weston & Sampson

SECTION 01380

HEALTH AND SAFETY PLAN

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. Prior to the start of work on the site, Contractor shall prepare and submit a site-specific health and safety plan that includes consideration of all known and potential hazards at the site. Work may not proceed at the project site until the Contractor's health and safety plan has been received and reviewed by the Engineer.

1.02 REFERENCES:

A. OSHA 29 CFR 1910.120

PART 2 – PRODUCTS

2.01 HEALTH AND SAFETY PLAN:

A. The health and safety plan shall include, but not necessarily be limited to the following:

1. Identification of Contractor's Site Safety Officer.
2. Identification of Hazards and Risks Associated with Project.
3. Contractor's Standard Operating Procedures, Including Personnel Training and Field Orientation.
4. Respiratory Protection Training Requirements.
5. Levels of Protection and Selection of Equipment Procedures.
6. Type of Medical Surveillance Program.
7. Personal Hygiene Requirements and Guidelines.
8. Zone Delineation of the Project Site.
9. Site Security and Entry Control Procedures.
10. Field Monitoring of Site Contaminants.
11. Contingency and Emergency Procedures.
12. Listing of Emergency Contacts.

PART 3 - EXECUTION

3.01 PERSONAL PROTECTIVE EQUIPMENT:

A. The personal protective equipment required to provide the appropriate level of dermal and respiratory protection shall be determined based on the results of continuous air monitoring performed by the Contractor and the standards set forth in the Contractor's health and safety plan. The Engineer may conduct duplicate air monitoring for quality control purposes. Modified Level D protection shall be the minimum requirement for all on-site personnel.

END OF SECTION

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SECTION 01550

SIGNAGE (TRAFFIC CONTROL)

PART 1 - GENERAL

1.01 WORK INCLUDED:

This Section covers furnishing and installing traffic control signs and other devices.

1.02 SYSTEM DESCRIPTION:

The Contractor shall furnish and install all construction signs deemed necessary by and in accordance with the latest edition of Part VI of the Manual on Uniform Traffic Control Devices(MUTCD) as published by the U.S. Department of Transportation.

PART 2 - PRODUCTS

2.01 TRAFFIC WARNING AND REGULATING DEVICES:

Contractor shall provide warning signs, barricades and other devices in accordance with the specifications provided in the MUTCD. Size of signs, lettering, colors, method of support and other factors prescribed in the MUTCD shall be adhered to.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Contractor shall erect barricades, barrier fences, traffic signs, and other traffic control devices as required by the MUTCD, or as required by the Engineer, to protect the work area from traffic, pedestrians, and animals.

B. Contractor shall relocate barricades, signs and other devices as necessary as the work progresses.

C. Unless extended protection is required for specific areas, when the work has been completed, all temporary warning and regulatory devices used by the Contractor shall be removed so that traffic can move unimpeded through the area.

END OF SECTION

SECTION 01551

PORTABLE CHANGEABLE MESSAGE SIGN

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. The work covered under this section shall consist of furnishing, maintaining, transporting and using a Trailer-Mounted Changeable Message Sign.

B. All messages displayed shall be approved by the Engineer and the Newton Police Department.

1.02 REFERENCES

A. The following standard forms part of these specifications and indicates a minimum required standard:

Massachusetts Department of Transportation Standard Specifications for Highways and Bridges

Manual on Uniform Traffic Control Devices (MUTCD)

PART 2 - PRODUCTS

2.01 GENERAL:

A. Materials required under this Section need not be new but must be in first class condition and acceptable to the Engineer. Any materials that in the judgement of the Engineer are unsatisfactory in appearance and/or performance shall be immediately replaced by acceptable units.

2.02 SPECIFIC REQUIREMENTS:

Refer to Sections 01330 – SUBMITTALS and Section 01140 – SPECIAL PROVISIONS for information regarding required certification that all materials, products, equipment and/or services.

A. The Trailer-Mounted Changeable Message Sign shall meet the requirements of this specification and shall consist of the following major components;

1. Message Board
2. Operator Interface (CPU and Keyboard)
3. Power Supply
4. Towable Trailer

B. Message Board

1. Type - The display can be Flip Disk, LED or a combination of both Flip Disk and LED (Hybrid).

2. Size – The message board shall have a minimum height of 48-inches, maximum height of 55-inches and minimum width of 88-inches, maximum width of 96-inches.

3. Colors - The display shall be either fluorescent yellow or ITE amber.

4. Lines - The sign board shall have the capability of displaying at least three lines of 18- inch high characters with 1 to 8 characters per line.

5. Visibility and Viewing Angle - The sign shall be visible for one-half mile and legible from a minimum distance of 650 feet with a viewing angle of no less than 30 degrees, during both daytime and nighttime operation.

2.03 OPERATOR INTERFACE:

A. A means of creating/controlling the on-site display message(s) shall be provided with each sign. The operator interface shall contain as a minimum the following:

1. Operator's Display terminal with keyboard will provide a full screen display to allow the operator to preview the message content and format before it is sent to the sign panel. The keyboard shall be of a standard design.

2. Controller (CPU)

3. Lockable weatherproof enclosure for interface components.

2.04 CONTROLLER:

A. The controller shall possess, as a minimum, the following features:

1. Full 32K user memory with the option for an additional 32K archive memory.

2. Capacity to store a minimum of 199 pre-defined messages and a minimum of 50 user-created messages (not to exceed 32K).

3. Changeable message flash rate capability.

4. A minimum of 24-hour battery back-up.

5. Password activation shall be software available.

2.05 POWER-SUPPLY

A. The sign shall be capable of operation from the following sources:

1. A diesel powered generator with a battery backup.

2. A battery with diesel generator charging or solar charging.

3. The power supply shall have a cover for weather protection and shall be lockable for security.

2.06 TOWABLE TRAILER

A. The trailer shall be of rugged construction suitable for towing at highway speeds and at low speed over rugged construction site terrain. The trailer shall have at least the following features:

1. Complete lighting to standard highway specifications.

2. A single axle with two (2) – 15-inch wheels (3500 GVW rated).

3. Two (2) inch ball coupler with heavy duty safety chains.

4. Four (4) corner-located leveling swivel jacks capable of leveling the trailer on one (1) in six (6) grade and capable of stabilizing the trailer in high winds of up to 80 MPH. in addition, a tongue leveling swivel jack shall be provided.

5. Surge breaks with lockable parking in conformance with Federal weight regulations.

6. The sign shall be capable of being locked in a stowed position while being towed.

7. A hydraulic lift mechanism shall be provided to elevate the sign to its operating position.

8. It shall be possible to lock the sign panel in several off-angle positions with respect to the trailer axis for enhanced visibility.

2.07 ENVIRONMENTAL:

A. The Trailer-Mounted Changeable Message Sign shall be capable of performing all functions at ambient temperatures ranging from -30 degrees F to +165 degrees F. There shall be no degradation of operation due to fog, rain or snow.

2.08 MAINTENANCE:

A. All components of the Trailer-Mounted Changeable Message Sign shall be readily accessible for ease of maintenance. Standard commercially available parts shall be used where possible.

B. The sign shall require no special scheduled maintenance. Maintenance shall include periodic cleaning. When not being used, at the discretion of the Engineer, the sign shall be stored in an approved secure area.

2.09 DOCUMENTATION:

A. As a minimum, the following documentation shall be supplied with each Trailer-Mounted Changeable Message Sign:

1. Operating Manual

2. Parts Manual

3. Wiring Diagrams

4. Troubleshooting Guide

PART 3 - EXECUTION

3.01 INSTALLATION:

A. All warning devices shall be subject to removal, replacement and/or repositioning as often as necessary. The changeable message unit shall be available for immediate use on the project and be positioned as required by the Engineer and the City of Newton Police Department. The Contractor shall be responsible for the maintenance of such device and appurtenances, throughout its use on the project, with no additional compensation thereof, other than as provided under the contract unit price. Should the unit be found defective in any way it shall be replaced immediately at the Contractor's expense.

END OF SECTION

SECTION 01552

CONSTRUCTION ZONE SAFETY PLAN

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. This Section covers the provisions for complying with Commonwealth of Massachusetts requirements for construction zone safety plans on public works projects.

1.02 DESCRIPTION:

A. The Contractor shall implement traffic safety and control measures through the construction zone through road closures and detours and mitigate impacts on traffic outside of the construction zone in accordance with these contract documents.

1.03 RELATED WORK:

A. SECTION 01110, CONTROL OF WORK AND MATERIALS (MAINTENANCE OF TRAFFIC)

B. SECTION 01550, SIGNAGE (TRAFFIC CONTROL)

C. SECTION 01553, UNIFORMED OFFICERS FOR TEMPORARY TRAFFIC CONTROL

1.04 REFERENCES:

701 CMR 7.00 Use of Road Flaggers and Police Details on Public Works Projects

Massachusetts Department of Transportation Standard Specifications for Highways and Bridges – latest edition

PART 2 - PRODUCTS

2.01 Traffic control devices utilized by the Contractor shall meet the requirements of these contract documents and the latest Massachusetts Department of Transportation (MassDOT) Standard Specifications and Manual On Uniform Traffic Control Devices (MUTCD).

PART 3 - EXECUTION

3.01 OPERATION:

A. Contractor shall be responsible for providing all temporary traffic control devices including barricades, barrier fences, signs, drums, cones, impact attenuators and other traffic control devices in accordance with typical traffic management plans and details shown on the drawings or as required by the Engineer.

B. The Contractor shall prepare temporary traffic management plans and details that deviates significantly from the typical plans shown on the drawings and submit to the Engineer for review and approval prior to start of the work.

C. Contractor shall relocate barricades, signs and other devices as necessary as the work progresses as required by the Owner's Traffic Control Officer or the Engineer.

D. Police details shall be required for a safe work site on this project as determined by the Newton police department.

E. If police details fail to show up for work at the construction zone at the usual time for start of work, or otherwise leave the jobsite before work is completed for the day, the provisions of the Alternative Plan will be followed by the Contractor.

3.02 ALTERNATIVE PLAN:

A. In accordance with 701 CMR 7.06(6), whenever required police details do not arrive on time or fail to show up for work, the Alternative Plan will be implemented by the Contractor.

B. The Alternative Plan for this project is as follows:

1. Redeploy crew to work in areas not requiring temporary traffic control (if available).

END OF SECTION

\\wse03.local\WSE\Projects\MA\Newton\2191018 - UNION STREET AND HERRICK ROAD DRAIN EXTENSION\Specifications\DIVISION 1 GENERAL REQUIREMENTS\In Progress\01552 Construction Zone Safety Plan.docx

SECTION 01553

UNIFORMED OFFICERS FOR TEMPORARY TRAFFIC CONTROL

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. This Section covers the provisions for furnishing Uniformed Officers for Traffic Control and Maintenance of Traffic as described in Section 01110 CONTROL OF WORK AND MATERIALS.

1.02 DESCRIPTION:

A. The Contractor shall coordinate with the Newton Traffic Control Officer to determine the number of Officers deemed necessary to provide for public safety and to maintain a smooth flow of traffic through the construction area(s) affected.

1.03 RELATED WORK:

A. SECTION 01110, CONTROL OF WORK AND MATERIALS (MAINTENANCE OF TRAFFIC)

B. SECTION 01550, SIGNAGE (TRAFFIC CONTROL)

C. SECTION 01552, CONSTRUCTION ZONE SAFETY PLAN

PART 2 - PRODUCTS

2.01 UNIFORMED OFFICERS:

A. Contractor shall provide the Traffic Control Officer with a minimum of 24 hours notice indicating the time of day, street location and confirm number of officers required for traffic control.

B. Contractor shall give the Traffic Control Officer a minimum of 2 hours prior cancellation notice should Contractor determine that due to weather or conditions beyond his control he would not need the scheduled officers.

C. Contractor shall pay for officer(s) at the prevailing rate established by the local police department should officers not be needed and the Contractor fails to cancel the officers as noted in 2.01.B above.

D. Where the Owner is paying directly for Traffic Officers and the Contractor cancels scheduled officers, the Contractor shall be responsible for payment of the wages for cancellations if not cancelled in accordance with 2.01.B and 2.01.C above.

PART 3 - EXECUTION

3.01 OPERATION:

A. Contractor shall provide barricades, barrier fences, traffic signs, and other traffic control devices as required by the Owners Traffic Control Officer, or as required by the Engineer, to protect the work area from traffic, pedestrians, and animals.

B. Contractor shall relocate barricades, signs and other devices as necessary as the work progresses as required by the Owners Traffic Control Officer or the Engineer.

END OF SECTION

\\wse03.local\WSE\Projects\MA\Newton\2191018 - UNION STREET AND HERRICK ROAD DRAIN EXTENSION\Specifications\DIVISION 1 GENERAL REQUIREMENTS\In Progress\01553 Uniformed Officers for Temporary Traffic Control.docx

SECTION 01570

ENVIRONMENTAL PROTECTION

PART 1 – GENERAL

1.01 DESCRIPTION:

A. The work covered by this section of the specifications consists of furnishing all labor, materials, tools and equipment and performing all work required for the prevention of environmental pollution during and as a result of construction operations under this contract.

B. All work under this Contract shall be in accordance with any conditional requirements applied, all of which are attached to Section 00890, PERMITS.

C. Prior to commencement of work, the Contractor shall meet with representatives of the Engineer to develop mutual understandings relative to compliance of the environmental protection program.

1.02 RELATED WORK:

A. Section 00890, PERMITS

B. Section 01330, SUBMITTALS

C. Section 02240, DEWATERING

D. Section 02252, SUPPORT OF EXCAVATION

E. Section 02300, EARTHWORK

1.03 SUBMITTALS:

A. The Contractor shall submit details and literature fully describing environmental protection methods to be employed.

PART 2 - PRODUCTS

2.05 CATCH BASIN PROTECTION:

A. To trap sediment and to prevent sediment from clogging drainage systems, catch basin protection in the form of a siltation sack (Siltsack as manufactured by ACF Environmental, Inc. or approved equal) shall be provided as approved by the Engineer.

PART 3- EXECUTION

3.01 AREA OF CONSTRUCTION ACTIVITY:

A. Insofar as possible, the Contractor shall confine his construction activities to those areas defined by the plans and specifications. All land resources within the project boundaries and outside the limits of permanent work performed under this contract shall be preserved in their present condition or be restored to a condition after completion of construction at least equal to that which existed prior to work under this contract.

3.02 PROTECTION OF WATER RESOURCES:

A. The Contractor shall not pollute streams, lakes or reservoirs with fuels, oils, bitumens, calcium chloride, acids or other harmful materials. It is the Contractor's responsibility to comply with all applicable Federal, State, County and Municipal laws regarding pollution of rivers and streams.

B. Special measures should be taken to insure against spillage of any pollutants into public waters.

3.03 PROTECTION OF LANDSCAPE:

A. The Contractor shall not deface, injure, or destroy trees or shrubs nor remove or cut them without written authority from the Owner. No ropes, cables, or guys shall be fastened to or attached to any existing nearby trees for anchorages unless specifically authorized by the Engineer. Excavating machinery and cranes shall be of suitable type and be operated with care to prevent injury to trees which are not to be removed, particularly overhanging branches and limbs. The Contractor shall, in any event, be responsible for any damage resulting from such use.

B. Branches, limbs, and roots shall not be cut except by permission of the Engineer. All cutting shall be smoothly and neatly done without splitting or crushing. When there is unavoidable injury to branches, limbs and trunks of trees, the injured portions shall be neatly trimmed and covered with an application of grafting wax or tree healing paint as directed.

C. Where, in the opinion of the Engineer, trees may possibly be defaced, bruised, injured, or otherwise damaged by the Contractor's equipment or by his blasting or other operations, the Engineer may require the Contractor to adequately protect such trees by placing boards, planks, poles or fencing around them. Any trees or landscape feature scarred or damaged by the Contractor's equipment or operations shall be restored as nearly as possible to its original condition at the expense of the Contractor. The Engineer will decide what method of restoration shall be used, and whether damaged trees shall be treated and healed or removed and disposed of.

D. Cultivated hedges, shrubs, and plants which could be injured by the Contractor's

operations shall be protected by suitable means or shall be dug up, balled and temporarily replanted and maintained. After construction operations have been substantially completed, they shall be replanted in their original positions and cared for until growth is re-established. If cultivated hedges, shrubs, and plants are injured to such a degree as to affect their growth or diminish their beauty or usefulness, they shall be replaced by items of a kind and quality at least equal to that existing at the start of the work.

3.04 DISCHARGE OF DEWATERING OPERATIONS:

A. Any water that is pumped and discharged from the trench and/or excavation as part of the Contractor's water handling shall be filtered by an approved method prior to its discharge into a receiving water or drainage system.

B. Under no circumstances shall the Contractor discharge water to the areas designated as wetlands. When constructing in a wetlands area, the Contractor shall discharge water from dewatering operations directly to the nearest drainage system, stream, or waterway after filtering by an approved method.

3.05 BALED STRAW:

A. To trap sediment and to prevent sediment from clogging drainage systems, baled straw shall be used where shown on the drawings. Care shall be taken to keep the bales from breaking apart. The bales should be securely staked to prevent overturning, flotation, or displacement. All deposited sediment shall be removed periodically.

3.06 CATCH BASIN PROTECTION:

A. Catch basin protection shall be used for every catch basin, shown on the plans or as required by the Engineer, to trap sediment and prevent it from clogging drainage systems and entering wetlands. Siltation sacks shall be securely installed under the catch basin grate. Care shall be taken to keep the siltation sacks from breaking apart or clogging. All deposited sediment shall be removed periodically and at times prior to predicted precipitation to allow free drainage flow. Prior to working in areas where catch basins are to be protected, each catch basin sump shall be cleaned of all debris and protected. The Contractor shall properly dispose of all debris at no additional cost to the Owner.

B. All catch basin protection shall be removed by the Contractor after construction is complete.

END OF SECTION

SECTION 01575

HANDLING EXISTING FLOWS

PART 1 - GENERAL

1.01 WORK INCLUDED:

This Section covers all materials, equipment, and labor required to handle existing drain flows and installation and maintenance of all temporary connections, plugs, and by-pass pumping. Upon completion of the drain, all temporary plugs and connections shall be removed and flows returned to the drain or flows transferred to the new pipes.

1.02 RELATED WORK:

Section 01330, SUBMITTALS

1.03 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

Submit complete, checked shop drawings, showing equipment, method of by-passing, and the method of transferring flows from the existing system to the new system. Prior to starting work, the Contractor shall submit flow calculations for each pipeline to be bypassed that show pump capacity to be provided. Comply with requirements of Section 01330.

PART 2 - PRODUCTS - NOT APPLICABLE

PART 3 - EXECUTION

3.01 MAINTAINING EXISTING FLOWS:

A. The Contractor shall maintain all flows in the existing system until construction of the drainage system is complete and ready for safe operation.

B. The Contractor shall protect against surcharging of the existing system upstream of the work area by installing adequate temporary by-pass pumping to handle dry weather and wet weather flows.

C. The Contractor shall repair any damage that occurs to existing pipes and structures to the satisfaction of the Engineer. Work performed under this section shall be considered incidental and shall not be measured separately for payment.

END OF SECTION

SECTION 01740

CLEANING UP

PART 1 - GENERAL

1.01 DESCRIPTION:

The Contractor must employ at all times during the progress of its work adequate cleanup measures and safety precautions to prevent injuries to persons or damage to property. The Contractor shall immediately, upon request by the Engineer provide adequate material, equipment and labor to cleanup and make safe any and all areas deemed necessary by the Engineer.

1.02 RELATED WORK:

A. Section 00700 GENERAL CONDITIONS

B. Section 01110 CONTROL OF WORK AND MATERIALS

C. Section 01140 SPECIAL PROVISIONS

D. Section 01570 ENVIRONMENTAL PROTECTION

PART 2 - PRODUCTS

Not applicable

PART 3 - EXECUTION

3.01 DAILY CLEANUP:

A. The Contractor shall clean up, at least daily, all refuse, rubbish, scrap and surplus material, debris and unneeded construction equipment resulting from the construction operations and sweep the area. The site of the work and the adjacent areas affected thereby shall at all times present a neat, orderly and workmanlike appearance.

B. Upon written notification by the Engineer, the Contractor shall within 24 hours clean up those areas, which in the Engineer's opinion are in violation of this section and the above referenced sections of the specifications.

C. If in the opinion of the Engineer, the referenced areas are not satisfactorily cleaned up, all other work on the project shall stop until the cleanup is satisfactory.

3.02 MATERIAL OR DEBRIS IN DRAINAGE FACILITIES:

A. Where material or debris has washed or flowed into or has been placed in existing watercourses, ditches, gutters, drains, pipes, structures, such material or debris shall be entirely removed and satisfactorily disposed of during progress of the work, and the ditches, channels, drains, pipes, structures, and work shall, upon completion of the work, be left in a clean and neat condition.

3.03 REMOVAL OF TEMPORARY BUILDINGS, STRUCTURES AND EQUIPMENT:

A. On or before completion of the work, the Contractor shall, unless otherwise specifically required or permitted in writing, tear down and remove all temporary buildings and structures it built; shall remove all temporary works, tools and machinery or other construction equipment it furnished; shall remove all rubbish from any grounds which it has occupied; shall remove silt fences and hay bales used for trapping sediment; and shall leave the roads and all parts of the property and adjacent property affected by its operations in a neat and satisfactory condition.

3.04 RESTORATION OF DAMAGED PROPERTY:

A. The Contractor shall restore or replace, when and as required, any property damaged by its work, equipment or employees, to a condition at least equal to that existing immediately prior to the beginning of operations. To this end the Contractor shall do as required all necessary highway or driveway, walk and landscaping work. Materials, equipment, and methods for such restoration shall be as approved by the Engineer.

3.05 FINAL CLEANUP:

A. Before acceptance by the Owner, the Contractor shall perform a final cleanup to bring the construction site to its original or specified condition. This cleanup shall include removing all trash and debris off of the premises. Before acceptance, the Engineer shall approve the condition of the site.

END OF SECTION

SECTION 02071

GEOTEXTILE FABRICS

PART 1 - GENERAL

1.01 WORK INCLUDED:

This Section covers furnishing of all labor, materials, and equipment necessary to install specified geotextile fabrics in locations shown on the drawings and as required by the Engineer.

1.02 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF SECTION 01330 SUBMITTALS, SUBMIT THE FOLLOWING:

Shop drawings or working drawings and material specifications shall be submitted to the Engineer for review for each type of geotextile fabric furnished. General installation practices and installation schedule shall be included.

PART 2 - PRODUCTS

2.05 FILTER/DRAINAGE FABRIC:

A. The filter/drainage fabric shall be composed of continuous-filament fibers bonded together to form a sheet. The fabric shall be an average of 20 mils thick and possess the characteristics of Tencate Mirafi 140N.

B. The filter/drainage fabric shall be Tencate Mirafi 140N as manufactured by Tencate Geosynthetics, Pendergrass, GA; Foss-65 by Foss Manufacturing Co., Hampton, NH; US 120NW, as manufactured by US Fabrics, Cincinnati, OH, or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. GENERAL:

Installation of geotextile fabrics shall be strictly in accordance with manufacturer's instructions and specific layout plans and details reviewed by the Engineer.

B. FILTER/DRAINAGE FABRIC:

1. The filter/drainage fabric shall be installed in the final graded trench bottom prior to placement of the crushed stone bedding and at other locations shown on the drawings or designated by the Engineer. The drainage fabric in place shall cover the entire trench bottom and trench sides as shown on the drawings. Each width of

drainage fabric shall be overlapped in accordance with manufacturer's recommendations, but not less than 2 feet, to prevent intrusion of soil fines into the bedding.

2. On landfill projects, the filter/drainage fabric shall be installed over the drainage layer prior to loaming and seeding, per manufacturer's installation recommendations.

END OF SECTION

\\Wse03.local\WSE\Projects\MA\Newton\2191018 - UNION STREET AND HERRICK ROAD DRAIN EXTENSION\Specifications\DIVISION 2 SITE CONSTRUCTION\In progress\02071 Geotextile Fabrics.docx

SECTION 02085

POLYVINYL CHLORIDE GRAVITY PIPE AND FITTINGS(SDR-35)

PART 1 - GENERAL

1.01 WORK INCLUDED:

This section covers the furnishing and installation of Polyvinyl Chloride (PVC) pipe and fittings, as indicated on the drawings and as specified herein.

1.02 RELATED WORK:

A. Section 02252, SUPPORT OF EXCAVATION

B. Section 02300, EARTHWORK

C. Section 02518, TRACER TAPE

D. Section 02631, PRECAST MANHOLES AND CATCH BASINS

1.03 REFERENCES:

A. The following standards form a part of these specifications as referenced:

ASTM International (ASTM)

ASTM	D2321	Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe
ASTM	D3034	Specification for Type PSM Polyvinyl Chloride (PVC) Sewer Pipe and Fittings
ASTM	D3212	Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
ASTM	F679	Specification for Polyvinyl Chloride (PVC) Large Diameter Plastic Gravity Sewer Pipe and Fittings

1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF SECTION 01330 SUBMITTALS, SUBMIT THE FOLLOWING:

Manufacturer's literature of the materials of this section.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. PVC nonpressure pipe 4-inches through 15-inches diameter shall conform to ASTM D3034, 18-inches through 60-inches diameter to ASTM F679, all with SDR of 35 unless noted, and shall meet the specific requirements and exceptions to the aforementioned specifications that follow.

B. PVC nonpressure pipe shall be furnished in standard lengths.

C. One pipe bell consisting of an integral wall section with a solid cross section rubber ring, factory assembled, shall be furnished with each standard, random and short length of pipe. Rubber rings shall be provided to the requirements of ASTM D3212.

D. The rubber ring shall be retained within the bell of the pipe by a precision formed groove or recess designed to resist fishmouthing or creeping during assembly of joints.

E. Spigot pipe ends shall be supplied with bevels from the manufacturer to ensure proper insertion. Each spigot end shall have an "assembly stripe" imprinted thereon to which the bell end of the mated pipe will extend upon proper jointing of the two pipes.

F. PVC fittings shall be provided with bell and/or spigot configurations with rubber gasketed joints compatible with that of the pipe. Bend fittings with spigot ends shorter than the pipe recess bells will not be allowed. The shorter spigot end would not allow proper seating of the spigot in the mating bell and would permit undesired contact between the mating bell and the outside of the fitting bell.

G. All pipe delivered to the job site shall be accompanied by independent testing laboratory reports certifying that the pipe and fittings conform to the above-mentioned specifications. In addition, the pipe shall be subject to thorough inspection and tests, the right being reserved for the Engineer to apply such of the tests specified as it may from time to time deem necessary.

H. All cutting of pipe shall be done with a machine suitable for cutting PVC pipe. Cut ends shall be beveled when recommended by the pipe manufacturer.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Except as modified herein, installation of the PVC pipe shall be in accordance with ASTM D2321.

B. Each pipe length shall be inspected before being laid to verify that it is not cracked. Pipe shall be laid to conform to the lines and grades indicated on the drawings or given by the Engineer. Each pipe shall be so laid as to form a close joint with the next adjoining pipe and bring the inverts continuously to the required grade.

C. The pipe shall be supported by compacted crushed stone. Crushed stone shall be as specified under Section 02300, EARTHWORK.

D. The pipe shall not be driven down to grade by striking it with a shovel handle, timber, rammer, or other unyielding object. When each pipe has been properly bedded, enough of the backfill material shall be placed and compacted between the pipe and the sides of the trench to hold the pipe in correct alignment.

E. Before a joint is made, the pipe shall be checked to assure that a close joint with the next adjoining pipe has been maintained and that inverts are matched and conform to the required line and grade.

F. For pipe placed on crushed stone, immediately after the joint is made, the jointing area shall be filled with suitable materials so placed and compacted that the ends of either pipe will not settle under backfill load.

G. No pipe or fitting shall be permanently supported on saddles, blocking, or stones.

H. Branches and fittings shall be laid by the Contractor as indicated on the drawings, and/or as required by the Engineer. Open ends of pipe and branches shall be closed with PVC caps secured in place with premolded gasket joints or as required by the Engineer.

I. All pipe joints shall be made as nearly watertight as practicable. There shall be no visible leakage at the joints and there shall be no sand, silt, clay, or soil of any description entering the pipeline at the joints. Where there is evidence of water or soil entering the pipeline, connecting pipes, or structures, the defects shall be repaired to the satisfaction of the Engineer.

J. The Contractor shall build a tight bulkhead in the pipeline where new work enters an existing drain. This bulkhead shall remain in place until the Engineer authorizes its removal.

K. Care shall be taken to prevent earth, water, and other materials from entering the pipe, and when pipe laying operations are suspended, the Contractor shall maintain a suitable stopper in the end of the pipe and also at openings for manholes.

L. As soon as possible after the pipe and manholes are completed on any street, the Contractor shall flush out the new pipeline using a rubber ball ahead of the water, and none of the flushing water or debris shall be permitted to enter any existing drain.

3.02 QUALITY ASSURANCE

A. LEAKAGE TESTING:

1. On completion of a section of drain, including building connections installed to the curb, the Contractor shall install suitable bulkheads as required, dewater and test the drain for leakage.

2. Unless otherwise approved, the section shall be tested using low pressure air test procedures. If circumstances permit, the Engineer may allow testing by infiltration or exfiltration in lieu of air testing.

3. The air test procedures shall conform to the Uni-Bell Recommended Practice for Low Pressure Air Testing of Installed Sewer Pipe, UNI-B-6. The starting air pressure for the test shall be 4 psig (greater than the average groundwater back pressure of any groundwater above the pipe, but not greater than 9.0 psig). The minimum duration permitted for the prescribed low pressure air exfiltration pressure drop between two consecutive manholes shall not be less than provided in Table I or Table II of UNI-B-6. The two tables are reproduced on the following pages.

4. Using the air pressure test, if there has been no leakage (zero psig drop) after one hour of testing, the section undergoing test shall have passed.

5. If either infiltration or exfiltration testing is permitted by the Engineer, the test shall be conducted for at least 24 hours. The amount of infiltration or exfiltration shall not exceed 100 gallons per inch-diameter per mile of drain per 24 hours.

6. The infiltration test measures leakage into a section of drain and may be used only where the groundwater level is one foot or more above the crown of the section of drain pipe at its upper end and at least one foot above the top of building connections and chimneys. For making the infiltration tests, underdrains, if used, shall be plugged and other groundwater drainage shall be stopped to permit the groundwater to return to its normal level insofar as practicable. Allowances shall be made for water that may enter the drain through pipe connections and inlets during the infiltration test.

7. Where the groundwater level is less than 1 foot above the top of the pipe at its upper end, the exfiltration test may be used. The drains shall be subjected to an internal pressure by plugging the pipe at the lower end and then filling the pipelines and manholes with clean water to a height of 2 feet above the highest point in the system to be tested, including main pipeline, service connections and chimneys. When slopes between manholes are steep, the Contractor shall insure that this test can be accomplished without danger of forcing stoppers from wye or tee branches.

8. The rate of exfiltration from the drains shall be determined by measuring the amount of water required to maintain the water level at the elevation established at the beginning of the test.

9. The Contractor shall construct such weirs or other means of measurements as may be required, shall furnish water and shall do all necessary pumping to enable the test to be properly made.

10. The Contractor shall be responsible for the satisfactory watertightness of the entire section of drain. Should the sections under test fail to meet the requirements, the Contractor shall do all work of locating and repairing leaks and retesting as the Engineer may require without additional compensation. A plan of the method of repairing any leaks that are found shall be submitted to the Engineer for review.

B. PIPE DEFLECTION MEASUREMENT:

1. In accordance with ASTM D3034, no less than 30 days after completion of the PVC drain pipe installation, the Contractor shall test the pipeline for deflection using a "go/no-go" deflection mandrel having a minimum of nine evenly spaced arms or prongs. The "go/no-go" gauge shall be hand pulled through all sections of the pipeline by the Contractor. The Contractor shall submit drawings of the "go/no-go" gauge to the Engineer for approval prior to testing. Complete dimensions of the gauge for each diameter of pipe to be tested shall be in accordance with ASTM D3034.

2. Any section of pipe found to exceed 7.5 percent deflection shall be deemed a failed pipe and shall be excavated and replaced by the Contractor at its own expense.

TABLE I

MINIMUM SPECIFIED TIME REQUIRED FOR A 1.0 PSIG PRESSURE DROP
FOR SIZE AND LENGTH OF PIPE INDICATED FOR Q=0.0015

Pipe Diameter (in)	Minimum Time (min:sec)	Length for Min. Time (ft)	Time for Longer Length (sec)	Specification Time for Length (L) shown (min:sec)							
				100 ft	150 ft	200 ft	250 ft	300 ft	350 ft	400 ft	450 ft
4	3:46	597	0.380 L	3:46	3:46	3:46	3:46	3:46	3:46	3:46	3:46
6	5:40	398	0.854 L	5:40	5:40	5:40	5:40	5:40	5:40	5:42	6:24
8	7:34	298	1.52 L	7:34	7:34	7:34	7:34	7:36	8:52	10:08	11:24
10	9:26	239	2.374 L	9:26	9:26	9:26	9:53	11:52	13:51	15:49	17:48
12	11:20	199	3.418 L	11:20	11:20	11:24	14:15	17:05	19:56	22:47	25:38
15	14:10	159	5.342 L	14:10	14:10	17:48	22:15	26:42	31:09	35:36	40:04
18	17:00	133	7.692 L	17:00	19:13	25:38	32:03	38:27	44:52	51:16	57:41
21	19:50	114	10.470 L	19:50	26:10	34:54	43:37	52:21	61:00	69:48	78:31
24	22:40	99	13.674 L	22:47	34:11	45:34	56:58	68:22	79:46	91:10	102:33
27	25:30	88	17.306 L	28:51	43:16	57:41	72:07	86:32	100:57	115:22	129:48
30	28:20	80	21.366 L	35:37	53:25	71:13	89:02	106:50	124:38	142:26	160:15
33	31:10	72	25.852 L	43:05	64:38	86:10	107:43	129:16	150:43	172:21	193:53
36	34:00	66	30.768 L	51:17	76:55	102:34	128:12	153:50	179:29	205:07	230:46
42	39:48	57	41.883 L	69:48	104:42	139:37	174:30	209:24	244:19	279:13	314:07
48	45:34	50	54.705 L	91:10	136:45	182:21	227:55	273:31	319:06	364:42	410:17
54	51:02	44	69.236 L	115:24	173:05	230:47	288:29	346:11	403:53	461:34	519:16
60	56:40	40	85.476 L	142:28	213:41	284:55	356:09	427.23	498:37	569:50	641:04

TABLE II

MINIMUM SPECIFIED TIME REQUIRED FOR A 0.5 PSIG PRESSURE DROP
FOR SIZE AND LENGTH OF PIPE INDICATED FOR Q=0.0015

Pipe Diameter (in)	Minimum Time (min:sec)	Length for Min. Time (ft)	Time for Longer Length (sec)	Specification Time for Length (L) shown (min:sec)							
				100 ft	150 ft	200 ft	250 ft	300 ft	350 ft	400 ft	450 ft
4	1:53	597	0.190 L	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53
6	2:50	398	0.427 L	2:50	2:50	2:50	2:50	2:50	2:50	2:51	3:12
8	3:47	298	0.760 L	3:47	3:47	3:47	3:47	3:48	4:26	5:04	5:42
10	4:43	239	1.187 L	4:43	4:43	4:43	4:57	5:56	6:55	7:54	8:54
12	5:40	199	1.709 L	5:40	5:40	5:42	7:08	8:33	9:58	11:24	12:50
15	7:05	159	2.671 L	7:05	7:05	8:54	11:08	13:21	15:35	17:48	20:02
18	8:30	133	3.846 L	8:30	9:37	12:49	16:01	19:14	22:26	25:38	28:51
21	9:55	114	5.235 L	9:55	13:05	17:27	21:49	26:11	30:32	34:54	39:16
24	11:20	99	6.837 L	11:24	17:57	22:48	28:30	34:11	39:53	45:35	51:17
27	12:45	88	8.653 L	14:25	21:38	28:51	36:04	43:16	50:30	57:42	64:54
30	14:10	80	10:683 L	17:48	26:43	35:37	44:31	53:25	62:19	71:13	80:07
33	15:35	72	12:926 L	21:33	32:19	43:56	53:52	64:38	75:24	86:10	96:57
36	17:00	66	15:384 L	25:39	38:28	51:17	64:06	76:55	89:44	102:34	115:23
42	19:54	57	20.942 L	34:54	52:21	69:49	87:15	104:42	122:10	139:37	157:04
48	22:47	50	27.352 L	45:35	68:23	91:11	113:58	136:46	159:33	182:21	205:09
54	25:31	44	34.618 L	57:42	86:33	115:24	144:15	173:05	201:56	230:47	259:38
60	28:20	40	42.738 L	71:14	106:51	142:28	178:05	213:41	249:18	284:55	320:32

END OF SECTION

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SECTION 02225

PIPE BURSTING CONSTRUCTION

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. This Section includes furnishing all labor, materials, transportation and equipment necessary for the replacement of existing drains by means of the installation of a new pipe in place of an existing host conduit utilizing the Pipe Bursting System. Pipe bursting is a system by which pneumatic burster unit splits the existing pipe, while simultaneously installing a new polyethylene pipe where the old pipe existed.

1.02 RELATED WORK

A. Section 01575 – HANDLING EXISTING FLOWS

B. Section 01740 – CLEANING UP

C. Section 02240 – DEWATERING

D. Section 02252 - SUPPORT OF EXCAVATION

E. Section 02300 – EARTHWORK

F. Section 02440 - CLEANING AND INSPECTION OF PIPELINES

G. Section 02624 – HIGH DENSITY POLYETHYLENE PIPE

1.03 SYSTEM DESCRIPTION

A. This section covers the rehabilitation of existing drains using the pipe bursting system as called for herein and on the drawings. Pneumatically or hydraulically operated equipment shall be used to burst the existing host conduit and install the replacement pipe as described in NASSCO Specification Guidelines.

1.04 QUALITY ASSURANCE:

A. The work described herein shall be performed by a company with not less than five (5) years of experience in pipe bursting services, employing experienced workers and experienced supervisory personnel. Supervisory personnel shall have not less than three (3) years of experience in providing the required services and shall be present at the jobsite during all work related to the required services.

B. The Contractor shall be certified by the Pipe Bursting System Manufacturer that the Contractor is a trained user and/or licensed installer of their system.

C. The Contractor shall "Hold Harmless" the Owner and the Engineer, in any legal action resulting from patent infringements**.**

1.05 REFERENCES:

A. The following standards form a part of this specification as referenced:

ASTM International (ASTM)

ASTM F714 - Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter,

ASTM D1248 – Specification for Polyethylene Plastics Molding and Extrusion Materials

The National Association of Sewer Service Companies (NASSCO)

Recommended Specifications for Sewer Collection System Rehabilitation (Current Edition).

Uni-Bell PVC Pipe Association

UNI-B-6 -Recommended Practice for Low Pressure Air Testing of Installed Sewer Pipe

1.06 SUBMITTALS:

IN ACCORDANCE WITH REQUIREMENTS OF SECTION 01330 SUBMITTALS, SUBMIT THE FOLLOWING:

A. Prior to beginning the work, submit the following:

1. Qualifications of the firm/personnel who will perform the Work.

2. Descriptions of system proposed for handling existing flows, if necessary, during the procedures to be carried out.

3. Submit a written description of the system, equipment, and materials proposed for the pipe bursting operation, including pit dimensions, support of excavations, and locations required for equipment and material access.

4. A statement containing the pipe bursting Contractor's name, address, the years of experience in pipe bursting of the type being proposed in accordance with Paragraph 1.04.A, and at least three references relating to the same type of work being proposed, with telephone numbers, and contact person shall be submitted.

5. The contractor shall submit Design Calculations as described in Paragraph 1.07 for the HDPE pipe proposed. A licensed Professional Engineer registered in the state where the project is to be constructed shall prepare the calculations.

6. Submit Certificate of Compliance for HDPE Pipe from the manufacturer.

7. Submit the Certificate by the Pipe Bursting System Manufacturer that the Contractor is a trained user and/or licensed installer of their system**.**

1.07 DESIGN CALCULATIONS:

A. The HDPE shall be designed to withstand the maximum load that the Contractor anticipates will be exerted on the pipe during the pipe bursting operations with the appropriate factors of safety. The design calculations shall also include all loadings from hydrostatic, earth and live loads that may be applied to the HDPE pipe.

B. For the purpose of designing the HDPE for horizontal and vertical loads the Contractor shall use the conditions indicated below:

Surface Elevation	refer to drawings
Groundwater Elevation	refer to drawings
Invert of the Host Pipe	refer to drawings
Soil Unit Weight	125/pcf
Design Life	50 Years
Factor of Safety	2.5
Live Load	HS-20-44

C. The Contractor shall submit test results with respect to the physical characteristics of the HDPE pipe. These tests shall be at no additional cost to the Owner. These tests shall include the following:

1. Test for Tensile Strength of HDPE material in accordance with ASTM D638, minimum tensile strength shall be 3,100 psi.

2. Tests for the determination of Environmental Stress Crack Resistance [ESCR] shall be in accordance with ASTM F1248 with a ESCR test equal to 2,000 hours.

1.08 DELIVERY, STORAGE, AND HANDLING:

A. Transport, handle, and store pipe and fittings as recommended by the manufacturer.

B. If new pipe and fittings become damaged before or during installation, it shall be repaired as recommended by the manufacturer or replaced at the Contractor's expense as required by the Engineer.

C. Deliver, store and handle other materials as required to prevent damage.

1.09 WARRANTY:

A. Newly installed pipe shall be warranted against infiltration and faulty workmanship and materials for one [1] year from the date the project is accepted by the Owner.

PART 2 - PRODUCTS:

2.01 MATERIALS:

A. Polyethylene Plastic Pipe shall be high-density polyethylene pipe and meet the applicable requirements of ASTM F714 Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter, and ASTM D1248 Specification for Polyethylene Plastics Molding and Extrusion Materials.

1. The nominal diameter of the HDPE pipe to be installed shall be as indicated on the contract drawings.

2. The thickness of the HDPE pipe to be installed shall be as determined by the manufacturer for the minimum thickness to meet the design structural requirements in accordance with Paragraph 1.07, A through D. The minimum SDR rating shall be SDR 17.

3. The finished HDPE pipe shall be continuous over the entire length of pipe bursting/insertion. The HDPE shall be impervious and free from any leakage from the rehabilitated host conduit to the surrounding ground or from the surrounding ground to the inside of the HDPE.

4. The HDPE materials, when cured, shall be chemically resistant to withstand internal exposure to sewage gases containing hydrogen sulfide, carbon monoxide, carbon dioxide and methane.

B. Tests for compliance with this specification shall be made as specific herein and in accordance with the applicable ASTM Standards. A certificate shall be furnished by the manufacturer for all material furnished under this specification. Polyethylene plastic pipe and fittings shall meet the requirements of this specification.

C. The method approved for rehabilitation of existing drains by means of the installation of a new polyethylene pipe is T.T. Technologies Grundocrack Pipe Bursting System, (800-533-2078) or approved equal.

D. Solid sleeve couplings shall have ductile iron sleeve and flanges (ASTM A536) and corrosion resistant, high strength alloy bolts and nuts (AWWA C-111, ANSI A21.11). Transition couplings shall be utilized, where necessary, to join pipes of the same nominal size that have different outside diameters. Gaskets shall be suitable for use with wastewater. Couplings shall be Type 210-212 by JCM Industries, Nash, Texas; Style 501 by Romac Industries, Inc., Bothell, Washington; or approved equal.

E. All HDPE plain end pipe connections utilizing mechanical fittings shall have circumferential inside supports (“stiffeners”), with a minimum 18 – 8 Type 304 stainless steel (ASTM 240) and a minimum width of 6-inches. Stiffeners shall have a permanent outside diameter that fits into the pipe’s inside diameter and maintains concentricity of the pipe. Stiffeners shall be appropriate for the SDR rating of the pipe and couplings. Circumferential inside supports shall be Type 206 Stiffening Inserts by Romac Industries, Inc., Bothell, Washington; Type

230/231 Stiffening Inserts by JCM Industries, Nash, Texas; HDPE Stiffening Inserts by Romac Industries, Inc., Bothell, Washington; or approved equal.

2.02 EQUIPMENT:

A. The equipment and the pipe bursting method selected by the Contractor shall be submitted as detailed in Paragraph 1.06-A.3 of this section and be operated in accordance with the manufacturers recommendation, unless modified herein. The pipe bursting tool shall be designed and manufactured to force its way through the existing pipe materials by fragmenting the pipe and compressing the old pipe sections into the surrounding soil as it progresses.

B. The Contractor shall use pneumatically operated equipment with either front or rear expanders to prevent collapse of the hole ahead of the polyethylene pipe insertion. The pneumatic tool must be used in conjunction with a constant tension hydraulic twin capstan winch of either 20, 10, or 5 tons. In no case is the constant tension on the winch to exceed 20 tons. The winch shall have twin capstan with twin hydraulic drive motors and twin gear boxes for independent operation to control the pipe's stress and stretch during bursting.

C. The pipe bursting tool shall be pneumatic. The bursting action of the tool shall increase the external dimensions sufficiently, causing breakage of the pipe at the same time expanding the surrounding ground. This action shall not only break the pipe but also create the void into which the burster can be winched and enables forward progress to be made. At the same time the polyethylene pipe, directly attached to the sleeve on the rear of the burster, shall also move forward. To form a complete operating system, the burster must be matched to a constant tension hydraulic winching system.

PART 3 - EXECUTION

3.01 CONSTRUCTION METHOD:

A. It is the Contractor's responsibility to assure that the host pipeline is sufficiently clean so as not to prohibit pipe bursting operations. The Engineer may require televising the line prior to commencing the pipe bursting operation. Cleaning required shall be conducted in accordance with Section 02440, CLEANING AND INSPECTION OF PIPELINES.

B. Equipment used to perform the work shall be located away from buildings so as not to create noise impact. Provide a silent engine compartment with the winch to reduce machine noise as required to meet the Community Sound Level Criteria as established by the Commonwealth of Massachusetts' Department of Environmental Protection (DEP). Noise levels shall also comply with local Code of Ordinances.

C. Contractor shall install pulleys, rollers, bumpers, alignment control devices and other equipment required to protect existing manholes, and to protect the pipe from damage during installation. Lubrication may be used as recommended by the manufacturer. Under no circumstances shall the replacement pipe be stressed beyond its elastic limit.

D. A winch shall be attached to the front of the bursting unit, connecting to or through the schnooze. The winch shall provide a constant tension to the burster in order that it may operate

in an efficient manner. The winch shall ensure directional stability in keeping the unit on line and control the pipe's stress and stretch during bursting.

E. The footage of the new pipeline shall be installed in a single pull.

F. The supports to the trench shoring in the insertion pit shall remain completely separate from the winch boom support system and shall be so designed that neither the pipe nor the winch cable shall be in contact with them.

G. All buried utilities adjacent to the pipe bursting operation shall be reviewed, and where necessary be excavated to relieve transient loading during the insertion operation. If any utilities are within 24-inches of the pipe to be burst, the Contractor shall excavate a pit at the location to check clearance.

H. The new polyethylene pipe shall be inserted immediately behind the bursting head in accordance with the manufacturer's recommended procedures.

I. The installed pipe shall be allowed the manufacturer's recommended amount of time, but not less than four (4) hours, for cooling and relaxation due to tensile stressing prior to any sealing of the annular space or backfilling of the insertion pit(s).

J. Following the relaxation period, the new HDPE pipe shall be connected to the manhole with a watertight seal utilizing one of two methods:

1. The Contractor shall allow sufficient excess length of new HDPE pipe, but not less than four (4) inches, nor more than six (6) inches shall be allowed to protrude into the manhole.
2. The Contractor shall connect the new HDPE pipe to the manhole by use of an appropriate length of pipe, of the same tensile strength equivalent to that being connected, and a solid sleeve coupling. The solid sleeve coupling shall be as specified herein or as recommended by the pipe manufacturer. Circumferential inside supports for the HDPE pipe ends, specified herein, shall be installed as recommended by the manufacturer and to prevent disturbance of the flow characteristics in the pipe.

K. Manhole seals, as shown on the Drawings, shall be installed around the pipe at DMH 0077-079 to form a watertight seal between the pipe exterior and the manhole wall. The Contractor shall not complete the watertight seal to the manhole until the solid sleeve coupling has been fully installed.

3.02 BY-PASS PUMPING:

A. At all pipe replacement locations; the flow shall be re-routed by by-pass pumping. By-pass pumping shall be as specified in Section 01575, Handling of Existing Flows.

3.03 ACCESS PITS/LOCATIONS

A. The location and number of pits for access to the pipeline shall be as indicated on the contract drawings.

B. The Contractor shall carry out operations relative to the access pit excavation in strict accordance with all applicable OSHA, local and state safety regulations.

C. Any damage to adjacent properties that are not part of this work shall be repaired and restored to its original condition at no additional cost to the Owner.

3.04 PIPE JOINING:

A. Polyethylene pipe shall be assembled and joined at the site using butt-fusion methods to provide a leak proof joint. Threaded or solvent-cement joints and connections are not permitted. All equipment and procedures used shall be in strict compliance with the manufacturer's recommendations. Fusing shall be accomplished by personnel certified as fusion technicians by a manufacturer of polyethylene pipe and/or fusing equipment.

B. The butt-fused joint shall be true alignment and shall have uniform roll-back beads resulting from the use of proper temperature and pressure. Joints shall be allowed adequate cooling time before removal of pressure. Fused joints shall be watertight and shall have tensile strength equal to that of the pipe. All joints shall be subject to acceptance by the Engineer and/or his representative prior to insertion. All defective joints shall be cut out and replaced at no cost to the Owner. Any section of the pipe with a gash, blister, abrasion, nick, scar, or other deleterious fault greater in depth than ten percent (10%) of the wall thickness, shall not be used and must be removed from the site. However, a defective area of the pipe may be cut out and the joint fused in accordance with the procedures stated above. In addition, any section of the pipe having other defects such as concentrated ridges, discoloration, excessive spot roughness, pitting, variable wall thickness or any other defect of manufacturing or handling as determined by the Engineer and/or his representative shall be discarded and not used.

C. Terminal sections of pipe that are joined within the insertion pit shall be connected with connectors with tensile strength equivalent to that of the pipe being joined.

3.05 VIDEO INSPECTION:

A. After the existing pipe section is completely replaced, internally inspect with television camera and videotape as required in Section 02440. The finished tape shall be continuous over the entire length of the replaced pipe section and to be free from visual defects. The Contractors shall provide the Engineer with an electronic copy of the inspection video.

B. Defects, which may affect the integrity or strength of the pipe, shall be repaired or the pipe replaced at the Contractor's expense.

3.06 CLEANUP

A. Refer to Section 01740 – CLEANING UP

END OF SECTION

SECTION 02240

DEWATERING

PART 1 - GENERAL

1.01 WORK INCLUDED:

This section specifies designing, furnishing, installing, maintaining, operating and removing temporary dewatering systems as required to lower and control water levels and hydrostatic pressures during construction; disposing of pumped water; constructing, maintaining, observing and, except where indicated or required to remain in place, removing of equipment and instrumentation for control of the system.

1.02 RELATED WORK:

A. Section 00890, PERMITS

B. Section 01570, ENVIRONMENTAL PROTECTION

C. Section 02252, SUPPORT OF EXCAVATION

D. Section 02300, EARTHWORK

1.03 SYSTEM DESCRIPTION:

A. Dewatering includes lowering the water table and intercepting seepage which would otherwise emerge from the slopes or bottom of the excavation; increasing the stability of excavated slopes; preventing loss of material from beneath the slopes or bottom of the excavation; reducing lateral loads on sheeting and bracing; improving the excavation and hauling characteristics of sandy soil; preventing rupture or heaving of the bottom of any excavation; and disposing of pumped water.

1.04 QUALITY ASSURANCE:

A. The Contractor is responsible for the adequacy of the dewatering systems.

B. The dewatering systems shall be capable of effectively reducing the hydrostatic pressure and lowering the groundwater levels to a minimum of 2 feet below excavation bottom, unless otherwise required by the Engineer, so that all excavation bottoms are firm and dry.

C. The dewatering system shall be capable of maintaining a dry and stable subgrade until the structures, pipes and appurtenances to be built therein have been completed to the extent that they will not be floated or otherwise damaged.

D. The dewatering system and excavation support (see Section 02252, SUPPORT OF EXCAVATION) shall be designed so that lowering of the groundwater level outside the excavation does not adversely affect adjacent structures, utilities or wells.

1.05 SUBMITTALS:

A. In accordance with Section 01330, Contractor shall submit a plan indicating how it intends to control the discharge from any dewatering operations on the project, whether it is discharge of groundwater from excavations or stormwater runoff during the life of the project.

PART 2 - PRODUCTS: NOT APPLICABLE

PART 3 - EXECUTION

3.01 DEWATERING OPERATIONS:

A. All water pumped or drained from the work shall be disposed of in a manner that will not result in undue interference with other work or damage to adjacent properties, pavements and other surfaces, buildings, structures and utilities. Suitable temporary pipes, flumes or channels shall be provided for water that may flow along or across the site of the work. All disposal of pumped water shall conform to the provisions of Section 01570 ENVIRONMENTAL PROTECTION and Section 00890 PERMITS.

B. Dewatering facilities shall be located where they will not interfere with utilities and construction work to be done by others.

C. Dewatering procedures to be used shall be as described below:

1. Crushed stone shall encapsulate the suction end of the pump to aid in minimizing the amount of silt discharged.

2. For dewatering operations with relatively minor flows, pump discharges shall be directed into straw bale sedimentation traps lined with filter fabric. Water is to be filtered through the straw bales and filter fabric prior to being allowed to seep out into its natural watercourse.

3. For dewatering operations with larger flows, pump discharges shall be into a steel dewatering basin. Steel baffle plates shall be used to slow water velocities to increase the contact time and allow adequate settlement of sediment prior to discharge into waterways.

4. Where indicated on the contract drawings or in conditions of excess silt suspended in the discharge water, silt control bags shall be utilized in catch basins.

D. The Contractor shall be responsible for repair of any damage caused by his dewatering operations, at no cost to the Owner.

SECTION 02252

SUPPORT OF EXCAVATION

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. This section of the specification covers wood sheeting and bracing for support of excavations. The requirements of this section shall also apply, as appropriate, to other methods of excavation support and underpinning which the Contractor elects to use to complete the work.

B. The Contractor shall furnish and place timber sheeting of the kinds and dimensions required, complying with these specifications, where indicated on the drawings or required by the Engineer.

1.02 RELATED WORK:

A. Section 02240, DEWATERING.

B. Section 02300, EARTHWORK.

1.03 QUALITY ASSURANCE:

A. This project is subject to the Safety and Health regulations of the U.S. Department of Labor set forth in 29 CFR, Part 1926, and to the Massachusetts Department of Safety and Department of Labor, Division of Occupational Safety "Excavation & Trench Safety Regulation (520 CMR 14.00)" and "Rules and Regulations for the Prevention of Accidents in Construction Operations (454 CMR 10.0 et seq.)." Contractors shall be familiar with the requirements of these regulations.

B. The excavation support system shall be of sufficient strength and be provided with adequate bracing to support all loads to which it will be subjected. The excavation support system shall be designed to prevent any movement of earth that would diminish the width of the excavation or damage or endanger adjacent structures.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Timber sheeting shall be sound spruce, pine, or hemlock, planed on one side and either tongue and grooved or splined. Timber sheeting shall not be less than nominal 2-inches thick.

B. Timber and steel used for bracing shall be of such size and strength as required in the excavation support design. Timber or steel used for bracing shall be new or undamaged

used material which does not contain splices, cutouts, patches, or other alterations which would impair its integrity or strength.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Work shall not be started until all materials and equipment necessary for their construction are either on the site of the work or satisfactorily available for immediate use as required.

B. The sheeting shall be securely and satisfactorily braced to withstand all pressures to which it may be subjected and be sufficiently tight to minimize lowering of the groundwater level outside the excavation, as required in Section 02240, DEWATERING.

C. The sheeting shall be driven by approved means to the design elevation. No sheeting may be left so as to create a possible hazard to safety of the public or a hindrance to traffic of any kind.

D. If boulders or very dense soils are encountered, making it impractical to drive a section to the desired depth, the section shall, as required, be cut off.

E. The sheeting shall be left in place where indicated on the drawings or required by the Engineer in writing. At all other locations, the sheeting may be left in place or salvaged at the option of the Contractor. Steel or wood sheeting permanently left in place shall be cut off at a depth of not less than two feet below finish grade unless otherwise required.

F. All cut-off will become the property of the Contractor and shall be removed by him from the site.

G. Responsibility for the satisfactory construction and maintenance of the excavation support system, complete in place, shall rest with the Contractor. Any work done, including incidental construction, which is not acceptable for the intended purpose shall be either repaired or removed and reconstructed by the Contractor at his expense.

H. The Contractor shall be solely responsible for repairing all damage associated with installation, performance, and removal of the excavation support system.

END OF SECTION

SECTION 02282

HANDLING AND DISPOSAL OF EXCAVATED MATERIALS

PART 1 – GENERAL

1.01 DESCRIPTION OF WORK:

A. In general, the Contractor shall maximize the reuse of excavated material to minimize the generation of surplus material as required by the Engineer and specified herein. Excavated material shall be reused in the same general area it was excavated.

B. The Work of this Section consists of all labor, equipment, materials, and services for excavating, characterizing/sampling, handling, segregating, reusing, tracking, transporting, and off-site recycling and/or disposing of excavated material to be generated during the course of the Work.

C. The Contractor shall also be responsible for the management of miscellaneous material accumulated from dewatering (see Section 02240, DEWATERING) and catch basin protection (see Section 01570, ENVIRONMENTAL PROTECTION).

1.02 RELATED WORK:

A. Section 01380, HEALTH AND SAFETY PLAN

B. Section 01570, ENVIRONMENTAL PROTECTION

C. Section 02240, DEWATERING

D. Section 02300, EARTHWORK

1.03 SUBMITTALS:

A. The Contractor shall submit to the Engineer for review, an Excavated Materials Management Plan (EMMP), which includes at a minimum the information required by Paragraph 1.03.B of this Section, no more than 14 days after issuance of the Notice to Proceed.

B. The Contractor's EMMP shall include the following:

1. Plans outlining the proposed procedures and sequence for the excavation of materials to be reused on-site and disposed/recycled off-site, procedures used to track excavated materials to be transported off-site and a proposed implementation schedule.

2. The name and contact information of a Environmental Consultant employed by the Contractor to oversee the implementation of the EMMP and related services to help ensure compliance with all references listed in Paragraph 1.04 of this

Section.

3. All pertinent information relating to the transport of excavated material, at a minimum, shall include:

   a. Name and address of all transporters.

   b. Transporter identification number (USEPA or Massachusetts Department of Transportation Transporter) and expiration date.

   c. Proof of permit, license, or authorization to transport excavated material, when applicable, in all affected states.

4. The Contractor shall identify appropriate reuse sites and/or disposal/recycling facilities that will accept each category of material identified in Paragraph 3.04 of this Section. The Contractor shall submit names of a primary and secondary facility for each category. Disposal/recycling facilities listed in the EPA Superfund Program will not be accepted as disposal/recycling facilities for this Work. For each facility, the Contractor shall submit the following information:

   a. General Information:

      1) Facility Name
      2) Facility Address
      3) Name of Contact Person
      4) Title of Contact Person
      5) Telephone Number of Contact Person
      6) Permit Number

   b. The facility shall specify the volume of material that can be accepted from the site on a weekly and a total basis.

   c. The facility shall provide written confirmation that they are permitted to accept and will accept the excavated material and/or accumulated sediment of the general quality and quantity described by these Specifications.

   d. The facility shall provide a listing of all current and valid permits, licenses, letters of approval, and other authorizations to operate that they hold, pertaining to the receipt and management of the soils or materials specified in this Contract.

   e. The Contractor shall submit a complete list of the reuse sites and disposal/recycling facility's permitted allowable contaminant levels and physical characteristic requirements for contaminated material, and list any required regulatory approvals for individual waste streams.

   f. After the Contractor obtains approval for off-site reuse and/or disposal/recycling of surplus excavated materials, the Contractor shall submit

to the Engineer, approvals or letters of intent and facility information for each facility proposed, prior to transporting material off-site.

5. The Contractor shall include procedures for decontamination of vehicles and equipment in the EMMP.

1.04 REFERENCES:

A. Massachusetts Department of Environmental Protection (DEP) Policy Number(s):

1. WSC-94-400, Interim Remediation Waste Management Policy for Petroleum Contaminated Soils.
2. WSC-94-320, Construction Activities in Contaminated Areas.
3. COMM-97-001, Reuse and Disposal of Contaminated Soils at Massachusetts Landfills.
4. WSC-13-500, Similar Soils Provision Guidance

B. Massachusetts Contingency Plan (MCP), 310 CMR 40.0000.

C. Toxic Substances Control Act (TSCA), 40 CFR 761.00.

D. Massachusetts Hazardous Waste Regulations, 310 CMR 30.000 and the Resource Conservation Recovery Act (RCRA), 40 CFR 148 and 268.

E. All other applicable Federal, State, and local regulations. It is Contractor's responsibility to know, understand, and abide by all such regulations and common practices. In the event of a conflict, the most stringent regulations shall govern.

1.05 DEFINITIONS:

A. Excavated Material: All soil, sediment, sewer grit, and miscellaneous materials and/or debris excavated from within the limit of work.

B. Contaminated Material: Soil containing Oil or Hazardous Material (OHM) at concentrations equal to or greater than MCP Reportable Concentrations, category S-1 (RCS-1).

C. LSP: Licensed Site Professional, a hazardous waste site cleanup professional, as defined in M.G.L. c. 21A § 19, holding a valid license issued by the Board of Registration of Hazardous Waste Site Cleanup Professionals, pursuant to M.G.L. c. 21A, §§ 19 through 19J.

D. Suspected Contaminated Material: Excavated material with any of the following characteristics: significant petroleum and/or chemical odor; an oily sheen; and/or material with staining or significant change of color.

E. Refer to Paragraph 3.05 of this Section for the definitions of the excavated material categories.

1.06 PERMIT REQUIREMENTS:

A. The Contractor shall obtain all Federal, State, and local permits required for the transport and disposal of excavated material and accumulated sediment. The Contractor shall adhere to all permit requirements.

B. The Contractor shall document that the disposal/recycling/reuse facilities proposed have all current certifications and permits as required by Federal, State, and local regulatory agencies to receive and dispose/recycle/reuse of the excavated material, dewatering residuals, and/or accumulated sediment.

1.07 EXISTING CONDITIONS:

A. The Contractor shall note that the work in this Section includes handling of soil containing metals, petroleum hydrocarbons, volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs).

B. A subsurface investigation in the Project Area was performed in October 2022. The investigation included soil and groundwater sampling and analysis. Based on the results, soil contains metals, petroleum hydrocarbons, VOCs and SVOCs that were less than their respective Reportable Concentrations for soil (RCS-1). Groundwater contains one polycyclic aromatic hydrocarbon (PAH) and one metal, that were less than their respective Reportable Concentrations for groundwater (RCGW-2). Tables summarizing the results along with the laboratory data reports are appended to these specifications. Pre-characterization sample locations are shown on the Contract Drawings.

C. The contractor shall note that a portion of the work will occur adjacent to the limits of a Massachusetts 21E Disposal Site at 49-63 Union Street. The Site has been assigned the Release Tracking Numbers (RTNs) 3-23541 and 3-25755 that are associated with oil and hazardous material (OHM) releases to soil and groundwater from previous dry cleaning operations and historic fill. No work shall occur within either of these disposal sites. Additional details regarding these sites are available through DEP's searchable sites database.

https://eeaonline.eea.state.ma.us/portal#!/wastesite/3-0023541

https://eeaonline.eea.state.ma.us/portal#!/wastesite/3-0025755

D. Contractor shall note that based on the pre-construction subsurface investigation results and depth of proposed construction, the Project is not anticipated to involve handling soil or groundwater with contaminant concentrations greater than applicable reportable concentrations. If soil or groundwater containing concentrations greater than reportable concentrations is encountered, then the Contractor shall immediately notify the Engineer. If required, a Utility Related Abatement Measure (URAM) will be prepared and filed by the Owner for work involving the handling of contaminated materials regulated under the MCP.

1.08 QUALITY CONTROL:

A. The Contractor shall engage the services of a LSP or Environmental Consultant prior to and during the Work. The responsibilities and requirements of the Contractor's Environmental Consultant shall include, but not be limited to, the following:

1. Staff of the Contractor's LSP / Environmental Consultant shall have completed the 40-hour OSHA health and safety training course, with 8-hour OSHA refresher training, as needed to maintain continual certification.

2. Evaluation of existing analytical data to identify suitable off-site reuse, recycling and disposal facilities for surplus excavated materials generated during the work.

3. Prepare NPDES Notices of Intent for coverage under the EPA's Dewatering and Remediation General Permit (DRGP).

4. Ensure compliance with all references listed in Paragraph 1.04 of this Section.

5. Ensure the work conforms to local, State and Federal regulatory agencies governing the handling of contaminated and hazardous materials.

6. Ensure that best management practices take place while performing the work described in this Section.

7. Develop and implement site-specific emergency response and health and safety protocols and procedures.

8. Notify the Engineer at least three working days in advance of the schedule for off-site disposal/recycling and coordinate handling, transport, and off-site disposal of Excavated Materials in accordance with state and federal regulations.

9. Perform any required supplemental disposal characterization testing and laboratory analysis to facilitate the removal of surplus excavated materials.

10. Perform any required supplemental field screening of surplus excavated materials proposed to be transported off-site for reuse/disposal according to the intended facility's acceptance requirements.

11. Keep records, including daily logs, of all waste streams, weights, stockpiles, and excavated materials for the purposes of tracking points of origin for excavated materials.

PART 2 – PRODUCTS

2.01 GENERAL:

A. All the Contractor's personnel and Sub-Contractors shall wear personal protective equipment and protective clothing consistent with the levels of protection for this Work as indicated in Section 01380, HEALTH AND SAFETY PLAN.

B. Containers and truck beds used by the Contractor for storing and/or hauling the excavated material shall be constructed of steel, in good condition and designed for the intended purpose of safe, secure storage of contaminated and hazardous materials during loading and transport. The containers shall have a secure cover that will prevent a release of material from trucks during transportation. The containers and covers shall be provided at no additional cost to the Owner and shall be approved by the Engineer prior to mobilization of any trucks/containers. The containers must be approved by and labeled in accordance with the U.S Department of Transportation (DOT). The containers shall be sift proof and water resistant in accordance with the DOT.

C. The Contractor shall decontaminate vehicles, construction equipment, tools and appliances used during the Work according to Section 01380, HEALTH AND SAFETY PLAN.

2.02 CONTAINERS:

A. Containers used for storing surplus excavated soil (i.e. roll-off containers), if required, and hauling contaminated material shall be constructed of steel, in good condition and designed for the intended purpose of safe, secure storage of contaminated material during loading and transport to an approved facility. The containers shall have a secure cover, which will prevent a release of material from truck during transportation. The containers must be approved by and labeled in accordance with the U.S Department of Transportation (DOT). The containers shall be sift proof and water resistant in accordance with the DOT regulations.

2.03 EXCAVATION AND BACKFILL MATERIALS:

A. The Contractor shall maximize the reuse of all excavated materials on-site as backfill unless otherwise indicated by the Engineer or in Section 02300, EARTHWORK. No off-site material shall be brought to the site without prior approval of the Engineer.

PART 3 – EXECUTION

3.01 GENERAL:

A. The Contractor shall note that soil within the work zone has been partially pre-characterized so that the Contractor can obtain acceptance for surplus excavated materials prior to excavation. The Contractor shall select an appropriate off-site facility based on the pre- characterization data appended to the specifications and the excavated material categories listed in Paragraph 3.05. The Engineer will provide a signed LSP Opinion Letter along with all required facility acceptance forms and shipping documents for the Contractor's use in securing acceptance letters for the material after approving the Contractor's intended disposal facilities.

B. The Contractor shall maximize the reuse of all excavated materials on-site as backfill. The excavated materials shall be reused as backfill in the general area where they were generated.

C. The Owner will be the generator of all excavated materials removed from the site and will sign all Material Shipping Records and Massachusetts Bills of Lading. The Contractor shall be the generator of material contaminated as a result of the Contractor or Sub-Contractors release of oil/hazardous materials on the site caused by them.

D. Excavated materials with no contamination or concentrations less than RCS-1shall be transported using a Material Shipping Record. Excavated materials with concentrations greater than RCS-1 shall be transported using a Massachusetts Bill of Lading.

E. The Owner shall have final approval over all reuse/disposal/recycling options based on the analytical data.

F. The Contractor shall immediately notify the Engineer of suspected contaminated materials with visible stains or unnatural odor, or if other potentially contaminated and/or hazardous material is encountered. The Contractor shall excavate and manage areas of suspected contaminated and/or hazardous material as required by the Engineer.

G. If an Imminent Hazard, Potential Imminent Hazard, or any other condition requiring an Immediate Response Action as defined in the Massachusetts Contingency Plan 310 CMR 40.0000 is encountered, activities shall be suspended and the Engineer notified immediately.

3.02 DISPOSAL CHARACTERIZATION SAMPLING – GENERAL:

A. Pre-characterization sampling soil data and the associated laboratory reports are provided as an attachment to these specifications. No additional samples shall be collected without approval by the Engineer.

B. If necessary, the Contractor shall perform any additional sampling and characterizing of excavated materials for the purpose of obtaining approvals from reuse/disposal/recycling facilities. No additional sampling or analysis shall be performed in lieu of profiling excavated materials using the pre-characterization sampling conducted by Engineer, only where supplementing the existing data set is required.

C. The Owner may conduct additional sampling upon excavation of the work site. The Engineer may stop the Contractor's work in a particular location at any time in order to have samples taken and analyzed. If necessary, the Contractor shall assist the Engineer in collecting samples. The work shall not resume in that area until required by the Engineer. Stoppage of work for this reason, or until laboratory results are delivered to the Engineer, shall not be a cause for the Contractor to request additional compensation or an extension of time to the Contract or to other intermediate Contract deadlines.

3.03 HANDLING AND TEMPORARY STOCKPILING OF EXCAVATED MATERIALS:

A. The Site has very limited space for stockpiling; therefore, the Contractor shall secure a separate space in the City of Newton for stockpiling or perform additional precharacterization testing (if needed) to facilitate a load-and-go operation. The Contractor shall communicate the location of the stockpile and site provisions for Owner final approval over all stockpile locations. No stockpiling will be allowed at the work Site.

B. Stockpiled material must be removed and reused/disposed/recycled off-site as soon as possible and in all cases within two (2) weeks from the day of its initial excavation.

C. The Contractor shall manage temporary stockpiles to prevent the cross-contamination of excavated materials between different excavated materials categories, and to prevent cross-contamination between the stockpiles and underlying materials.

D. Temporary stockpiles shall not exceed 250 cubic yards.

E. All excavated material shall be stored in a secure manner to prevent exposure to humans and the environment. The stockpiles shall be clearly and securely barricaded from contact by workers and the general public.

F. All excavated material shall be placed entirely on 10-mil (minimum) NRPE or 20-mil (minimum) polyethylene sheeting, as indicated in Paragraph 2.02 of this Section, and shall be covered at the end of each day's work with the same material to minimize the infiltration of precipitation and erosion of the stockpile. Any cover material used shall be properly secured and possess the necessary physical strength to resist tearing by the wind and other elements.

G. The Contractor shall prevent run-off and erosion of temporary stockpiles by placing hay bales and silt fence around temporary stockpile locations.

H. Any failure of materials or procedures used in employing the base layer or cover layer shall be immediately repaired, replaced or re-secured so as to minimize precipitation infiltration, and erosion/runoff of the excavated material.

3.04 HANDLING EXCAVATED MATERIALS:

A. Contractor shall segregate materials of different excavated materials categories as defined by this Section. Cross contamination of excavated material of differing soil categories for off-site disposal is prohibited.

B. Disposal of material that is contaminated as a result of careless handling or use of unauthorized procedures shall be disposed of off-site at no additional cost to the Owner. Delays of Work resulting from temporary storage of excavated material, regardless of the classification shall be at no additional cost to the Owner.

3.05 EXCAVATED MATERIAL CATEGORIES:

Material shall be categorized and managed as described in Paragraphs 3.02 and 3.03 of this Section. Based on the soil pre-characterization analytical results, the excavated material will be categorized as follows:

A. Group A-1 – Excavated materials with contaminant concentrations less than (<) MCP Reportable Concentrations, category S-1 (RCS-1) that meets the acceptance criteria for in-state RCS-1 soil reclamation project or similar soils reuse facility.

1. The Contractor shall handle and transport soil classified as Group A-1 materials using a Material Shipping Record. Group A-1 material may be reused on-site where

applicable and in accordance with Section 02300 – EARTHWORK, or otherwise appropriately disposed of off-site in accordance with local, state, and federal regulations and requirements of this Section.

2. Contractor shall supply pertinent information for all proposed reuse facilities as part of the EMMP. Only reuse facilities with a written Soil Management Plan (SMP) and approved Administrative Consent Order (ACO) from DEP will be permitted for use during the Project.

3. Disposal of all rubble shall be in accordance with these Specifications and all applicable local, State, and Federal regulations.

B. Group B-1 – Excavated material with contaminant concentrations that exceed the acceptance criteria for an in-state <RCS-1 soil reclamation or similar soils site, including, but not limited to, materials with contaminant concentrations exceeding MCP RCS-1 criteria, that require reuse, recycling or disposal at an in-state lined or unlined landfill, according to DEP's COMM-97-001 policy, or licensed asphalt batch or thermal desorption facility.

1. The Contractor shall handle and transport Group B materials using a Material Shipping Record or Massachusetts Bill of Lading. The Contractor shall submit the names and addresses of the proposed landfills or facilities, as required by the EMMP, to the Engineer and the Owner for review and approval in accordance with this Section prior to transportation of Group B material.

2. Group B material shipped to an in-state lined or unlined landfill or asphalt batching facility must meet the selected facility's chemical and physical acceptance criteria. Selected facilities must be established, fully operational, appropriately insured, and be operating in compliance with all applicable local, State, and Federal regulations.

3. Group B excavated material that meets the destination state's solid and hazardous waste regulations and the receiving facility's operating permit(s) may be used for daily cover, intermediate cover, and pre-cap contouring material or material shipped for disposal.

4. Group B excavated material that meets the destination state's criteria for disposal or recycling and the receiving facility's operating permit(s) may be transported to the selected facility given the selected facility must be established, fully operational, appropriately insured, and be operating in compliance with all applicable local, state, and federal regulations.

C. Group B-2 – Excavated material with contaminant concentrations that do not meet acceptance for an in-state lined or unlined landfill in accordance with DEP's COMM-97-001 policy, or licensed asphalt batch or thermal desorption facility (i.e., Group B-1), requiring disposal at an out-of-state landfill or licensed thermal desorption/recycling facility.

1. The Contractor shall handle and transport Group B-2 material using a Massachusetts Bill of Lading for transport to out-of-state recycling/disposal

facilities. The Contractor shall submit the names and addresses of the proposed landfills or facilities, as required by the EMMP, to the Engineer and the Owner for review and approval in accordance with this Section prior to transportation of Group B-2 material.

2. Group B-2 material shipped to an out-of-state disposal/recycling facility must meet the selected facility's chemical and physical acceptance criteria. Selected facilities must be established, fully operational, appropriately insured, and be operating in compliance with all applicable local, State, and Federal regulations.

3. Group B-2 excavated material that meets the destination state's solid and hazardous waste regulations and the receiving facility's operating permit(s) may be used for daily cover, intermediate cover, and pre-cap contouring material or material shipped for disposal.

4. Group B-2 excavated material that meets the destination state's criteria for disposal or recycling and the receiving facility's operating permit(s) may be transported to the selected facility given the selected facility must be established, fully operational, appropriately insured, and be operating in compliance with all applicable local, State, and Federal regulations.

D. The Contractor will not be allowed to dispose of excavated material at disposal facilities listed in the EPA Superfund Program.

3.06 WEIGHT AND MEASUREMENT:

A. The Contractor shall provide certified tare and gross weight slips for each load received at the accepted facility and these shall be attached to each returned hazardous waste manifests, Massachusetts Bill of Ladings or Material Shipping Records within 21 days of obtaining all final signatures from a representative of the reuse/disposal/recycling facility, the Contractor (transporter), LSP (if applicable), and the Owner.

B. Measurement for payment will be based on the actual weight in tons of material excavated as measured at the receiving facility as per Paragraph 3.01.

3.07 WASTE PROFILES AND MANIFESTS:

A. The Contractor shall submit to the Engineer for review all waste profile applications and questionnaires, and coordinate with disposal facilities and all Federal and State Environmental Agencies.

B. The Owner will be designated as generator and will sign all manifests and waste profile application or questionnaires.

C. The Contractor shall submit to the Engineer, prior to receiving progress payment, documentation certifying that all materials were transported to, accepted, and disposed of, at the selected disposal facility(ies). The documentation shall include the following, as a minimum:

1. Documentation shall be provided for each load from the site to the disposal facility,

including all manifests and any other transfer documentation as applicable.

3.08 TRANSPORT OF EXCAVATED MATERIAL:

A. The Contractor shall not be permitted to transport excavated materials off-site until all applicable disposal or recycling facility documentation has been received, reviewed, and approved by the Engineer. The Contractor shall transport the excavated material under a Material Shipping Record and Massachusetts Bill of Lading and the requirements of this Section. The Contractor is responsible for ensuring that each load of excavated material transported off-site is accompanied with a copy of the appropriate MSR or BOL.

B. The Contractor shall take all precautions and any actions necessary, at no additional cost to the Owner, to prevent cross-contamination from transport vehicles to areas outside the Limit of Work.

C. The Contractor shall transport excavated materials from the site to the storage, disposal, reuse of recycling facility or off-site reuse location in accordance with all United States Department of Transportation (DOT), USEPA, DEP, and applicable state and local regulations.

D. The Hauler(s) shall be licensed in all states affected by transport.

E. The Contractor shall be responsible for ensuring that free liquid is properly transported. "Wet soils" shall not be loaded for transport. The Contractor shall dewater "wet soils", and properly dispose of free liquid in accordance with local, State, and Federal regulations and at no additional cost to the Owner. The Contractor shall also dispose of any free liquids that may result during transportation in accordance with local, State, and Federal regulations and at no additional cost to the Owner.

F. Transporters shall submit proof of permit, license, or authorization to transport excavated material, when applicable, in all affected states.

G. The Contractor or their environmental consultant is responsible for any supplemental field screening required for facility acceptance of excavated material. Daily logs with any supplemental field screening conducted by the Contractor shall be provided to the intended receiving facility and the Engineer.

3.08 REUSE, RECYCLING AND DISPOSAL:

A. Groups A-1, B-1, and B-2 excavated material shall be reused, recycled or disposed of at an approved facility as specified in this Section and in accordance with all Federal, State and Local regulations.

END OF SECTION

ATTACHMENT

SUBSURFACE INVESTIGATION SOIL & GROUNDWATER
SAMPLE RESULTS

Table 1
Soil Analytical Results
October 11, 2022

Union Street and Herrick Road Drain Extension
Newton, Massachusetts

Parameter	Units	MCP RCS-1	COMM-97 In-State Landfill Acceptance Criteria		Sample Location and Depth (feet)					
			Lined	Unlined	SB/MW-1 1 - 3 feet	SB/MW-2 2 - 4 feet	SB/MW-3 2 - 4 feet	SB/MW-4 12 - 14 feet	SB-1/MW-1-2 0 - 11 and 0 - 7 ft	SB-1/MW-3-4 0 - 7 feet
General Chemistry										
Conductivity	umhos/cm	NA	4,000	8,000	NA	NA	NA	NA	**1,040**	**1,300**
Flashpoint	°F	NA	NA	NA	NA	NA	NA	NA	> 200	> 200
Reactive Cyanide	mg/kg	NA	NA	NA	NA	NA	NA	NA	< 2	< 2
Reactive Sulfide	mg/kg	NA	NA	NA	NA	NA	NA	NA	< 2	< 2
Corrosivity (pH)	S.U.	NA	NA	NA	NA	NA	NA	NA	**7.29**	**7.18**
Metals										
Antimony	mg/Kg	20	NA	NA	NA	NA	NA	NA	< 4.87	< 4.04
Arsenic	mg/Kg	20	40	40	NA	NA	NA	NA	< 2.44	< 2.02
Barium	mg/Kg	1,000	NA	NA	NA	NA	NA	NA	**19**	**29.8**
Beryllium	mg/Kg	90	NA	NA	NA	NA	NA	NA	**0.23**	**0.25**
Cadmium	mg/Kg	70	30	30	NA	NA	NA	NA	< 0.49	< 0.40
Chromium	mg/Kg	100	1,000	NA	NA	NA	NA	NA	**9.13**	**13.4**
Lead	mg/Kg	200	1,000	2,000	NA	NA	NA	NA	**9.25**	**5.53**
Mercury	mg/Kg	20	10	10	NA	NA	NA	NA	**0.036**	< 0.022
Nickel	mg/Kg	600	NA	NA	NA	NA	NA	NA	**8.53**	**9.58**
Selenium	mg/Kg	400	NA	NA	NA	NA	NA	NA	< 4.87	< 4.04
Silver	mg/Kg	100	NA	NA	NA	NA	NA	NA	< 0.49	< 0.81
Thallium	mg/Kg	8	NA	NA	NA	NA	NA	NA	< 4.87	< 4.04
Vanadium	mg/Kg	400	NA	NA	NA	NA	NA	NA	**15.5**	**23.2**
Zinc	mg/Kg	1,000	NA	NA	NA	NA	NA	NA	**25.5**	**25.6**
Polychlorinated Biphenyls (PCBs)										
Total PCBs	mg/Kg	1	<2	<2	NA	NA	NA	NA	**ND**	**ND**
Total Petroleum Hydrocarbons (C9-C	mg/Kg	1,000	2,500	5,000	NA	NA	NA	NA	**85.4**	**39.5**
Volatile Organic Compounds (VOCs)										
Tetrahydrofuran	mg/Kg	500	NA	NA	**0.0119**	**0.0138**	**0.011**	**0.0099**	**0.0118**	**0.0107**
Total VOCs	mg/Kg	various	10	4	**0.0119**	**0.0138**	**0.011**	**0.0099**	**0.0118**	**0.0107**
Semivolatile Organic Compounds (SVOCs)					NA	NA	NA	NA		
Acenaphthylene	mg/Kg	1	NA	NA	NA	NA	NA	NA	**0.461**	< 0.276
Anthracene	mg/Kg	1,000	NA	NA	NA	NA	NA	NA	**0.410**	< 0.276
Benzo(a)anthracene	mg/Kg	7	NA	NA	NA	NA	NA	NA	**0.899**	**0.651**
Benzo(a)pyrene	mg/Kg	2	NA	NA	NA	NA	NA	NA	**0.918**	**0.686**
Benzo(b)fluoranthene	mg/Kg	7	NA	NA	NA	NA	NA	NA	**0.591**	**0.472**
Benzo(g,h,i)perylene	mg/Kg	1,000	NA	NA	NA	NA	NA	NA	**0.445**	**0.366**
Benzo(k)fluoranthene	mg/Kg	70	NA	NA	NA	NA	NA	NA	**0.667**	**0.517**
Chrysene	mg/Kg	70	NA	NA	NA	NA	NA	NA	**0.807**	**0.592**
Fluoranthene	mg/Kg	1,000	NA	NA	NA	NA	NA	NA	**1.43**	**0.998**
Indeno(1,2,3-cd)Pyrene	mg/Kg	7	NA	NA	NA	NA	NA	NA	**0.516**	**0.418**
Phenanthrene	mg/Kg	10	NA	NA	NA	NA	NA	NA	**0.888**	**0.491**
Pyrene	mg/Kg	1,000	NA	NA	NA	NA	NA	NA	**1.35**	**0.915**
Total SVOCs	mg/Kg	NA	100	100	NA	NA	NA	NA	**9.38**	**6.11**
Preliminary Soil Disposal Category		~	~	~	-	-	-	-	Group A	Group A

NOTES:
< = parameter not detected above laboratory method reporting limit
MCP = Massachusetts Contingency Plan, 310 CMR 40.0000
mg/Kg = milligrams per kilogram
NA = Not applicable/no data available
ND = Not detected
Total Concentrations represent the sum of detected analytes

BOLD Parameter detected above laboratory detection limit
BOLD Parameter exceeds the MCP Reportable Concentration (RCS-1)

Soil Disposal Categories:
Group A-1: Excavated material with contaminant concentrations less than <RCS-1 that meeets the acceptance criteria for an in-state <RCS-1 soil reclamation or similar soil reuse facility.
Group A-2: Excavated material with contaminant concentrations less than <RCS-1 standard but exceeed the acceptance criteria for a <RCS-1 facility, requiring reuse at an in-state <RCS-2 soil reclamation or similar soil reuse facility.
Group B: Excavated materials with contaminant concentrations greater than or equal to RCS-1 that meets the acceptance criteria for an in-state lined or unlined landfill as outlined by DEP's COMM-97-001 policy or asphalt batch/recycling facility.
Group C: Excavated materials with contaminant concentrations greater than or equal to MCP RCS-1 that does not meet criteria for disposal/recycling at in-state unlined or lined landfill, recycling or asphalt batching facility, requiring disposal at an out-of-state landfill, recycling or thermal desorption facility.

Table 2
Groundwater Analytical Results
October 25, 2022

Union Street and Herrick Road Drain Extension
Newton, Massachusetts

Parameter	Units	MCP Reportable Concentration (RCGW-2)	Sample Location		
			MW-1	MW-2	MW-3
Field Measurements					
Depth to water	feet below PVC	NA	14.99	15.38	14.71
Turbidity	NTUs	NA	2.6	2.4	2.3
Purge water observations	NA	NA	no odor	no odor	no odor
ORP	mV	NA	-153.2	28.4	-189.6
Temperature	deg C	NA	14.7	15.5	15.6
Specific Conductivity	mS/cm	NA	3.31	1.34	2.99
Dissolved Oxygen	mg/L	NA	0.89	0.31	0.91
pH	std. units	NA	6.82	7.27	6.73
Volatile Petroleum Hydrocarbons (VPH)					
C5-C8 Aliphatics	ug/L	3,000	<150	<150	<150
C9-C12 Aliphatics	ug/L	5,000	<150	<150	<150
C9-C10 Aromatics	ug/L	4,000	<100	<100	<100
Volatile Organic Compounds (VOCs)					
TOTAL VOCs	ug/L	various	**ND**	**ND**	**ND**
Extractable Petroleum Hydrocarbons (EPH)					
C9-C18 Aliphatics	ug/L	5,000	<94	<94	<93
C19-C36 Aliphatics	ug/L	50,000	<94	<94	<93
C11-C22 Aromatics	ug/L	5,000	<94.3	<94.3	<93.5
Polynuclear Aromatic Hydrocarbons (PAHs)					
Fluoranthene	ug/L	200	<0.19	<0.19	**0.19**
TOTAL PAHs	ug/L	NA	**ND**	**ND**	**0.19**
Dissolved Metals					
Arsenic	ug/L	900	<5	<5	<5
Barium	ug/L	50,000	**114**	**63.9**	**88.6**
Cadmium	ug/L	4	<1	<1	<1
Chromium	ug/L	300	<10	<10	<10
Lead	ug/L	10	<1	<1	<1
Mercury	ug/L	20	<0.2	<0.2	<0.2
Selenium	ug/L	100	<50	<50	<50
Silver	ug/L	100,000	<5	<5	<5

NOTES:
Dissolved samples were field-filtered.
NA = Not applicable
ND = Not detected above the laboratory analtyical detction limits, also expressed as "<(detection limit)"
NTUs = nephlometric turbidity units
Total Concentrations represent the sum of detected analytes
ug/L = micrograms per liter, or parts per billion

BOLD Parameter detected above laboratory detection limit
BOLD Parameter exceeds the MCP Reportable Concentration (RCGW-2)

CERTIFICATE OF ANALYSIS

Annika Willis-Scanlon
Weston and Sampson Engineers, Inc.
5 Centennial Drive
Peabody, MA 01960

RE: Newton - Union St (2191018.A)
ESS Laboratory Work Order Number: 22J0374

This signed Certificate of Analysis is our approved release of your analytical results. These results are only representative of sample aliquots received at the laboratory. ESS Laboratory expects its clients to follow all regulatory sampling guidelines. Beginning with this page, the entire report has been paginated. This report should not be copied except in full without the approval of the laboratory. Samples will be disposed of thirty days after the final report has been delivered. If you have any questions or concerns, please feel free to call our Customer Service Department.

Laurel Stoddard
Laboratory Director

REVIEWED
By ESS Laboratory at 3:05 pm, Dec 20, 2022

Analytical Summary
The project as described above has been analyzed in accordance with the ESS Quality Assurance Plan. This plan utilizes the following methodologies: US EPA SW-846, US EPA Methods for Chemical Analysis of Water and Wastes per 40 CFR Part 136, APHA Standard Methods for the Examination of Water and Wastewater, American Society for Testing and Materials (ASTM), and other recognized methodologies. The analyses with these noted observations are in conformance to the Quality Assurance Plan. In chromatographic analysis, manual integration is frequently used instead of automated integration because it produces more accurate results.

The test results present in this report are in compliance with TNI and relative state standards, and/or client Quality Assurance Project Plans (QAPP). The laboratory has reviewed the following: Sample Preservations, Hold Times, Initial Calibrations, Continuing Calibrations, Method Blanks, Blank Spikes, Blank Spike Duplicates, Duplicates, Matrix Spikes, Matrix Spike Duplicates, Surrogates and Internal Standards. Any results which were found to be outside of the recommended ranges stated in our SOPs will be noted in the Project Narrative.

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St

ESS Laboratory Work Order: 22J0374

SAMPLE RECEIPT

The following samples were received on October 12, 2022 for the analyses specified on the enclosed Chain of Custody Record.

To achieve CAM compliance for MCP data, ESS Laboratory has reviewed all QA/QC Requirements and Performance Standards listed in each method. Holding times and preservation have also been reviewed. All CAM requirements have been performed and achieved unless noted in the project narrative.

Each method has been set-up in the laboratory to reach required MCP standards. The methods for aqueous VOA and Soil Methanol VOA have known limitations for certain analytes. The regulatory standards may not be achieved due to these limitations. In addition, for all methods, matrix interferences, dilutions, and %Solids may elevate method reporting limits above regulatory standards. ESS Laboratory can provide, upon request, a Limit Checker (regulatory standard comparison spreadsheet) electronic deliverable which will highlight these exceedances.

Low Level VOA vials were frozen by ESS Laboratory on October 12, 2022 at 21:22.

Question I: All samples for EPH were analyzed for a subset of the required MCP list per the client's request.

Question I: Samples -01,-02,-03 and -04 for VOC were analyzed for a subset of the required MCP list per the client's request.

Revision 1 December 20, 2022: This report has been revised to include Tetrahydrofuran for samples 22J0374-01 through 04 per the client's request.

Lab Number	Sample Name	Matrix	Analysis
22J0374-01	SB-1 MW-4 12-14ft	Soil	8260B Low
22J0374-02	SB-1 MW-3 2-4ft	Soil	8260B Low
22J0374-03	SB-1 MW-2 2-4ft	Soil	8260B Low
22J0374-04	SB-1 MW-1 1-3ft	Soil	8260B Low
22J0374-05	SB-1 MW-1-2	Soil	1010A, 6010C, 7.3.3.2, 7.3.4.1, 7471B, 8082A, 8100M, 8260B Low, 8270D, 9045, 9050A
22J0374-06	SB-1 MW-3-4	Soil	1010A, 6010C, 7.3.3.2, 7.3.4.1, 7471B, 8082A, 8100M, 8260B Low, 8270D, 9045, 9050A
22J0374-07	Trip Blank	Solid	8260B Low

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St

ESS Laboratory Work Order: 22J0374

PROJECT NARRATIVE

5035/8260B Volatile Organic Compounds / Low Level

D2J0227-CCV1 **Calibration required quadratic regression (Q).**
Acetone (98% @ 80-120%), Naphthalene (105% @ 80-120%)

D2J0264-CCV1 **Calibration required quadratic regression (Q).**
Acetone (107% @ 80-120%), Naphthalene (103% @ 80-120%)

D2J0264-CCV1 **Continuing Calibration %Diff/Drift is above control limit (CD+).**
Bromomethane (21% @ 20%)

DJ21428-BSD1 **Blank Spike recovery is above upper control limit (B+).**
Bromomethane (133% @ 70-130%)

8270D Semi-Volatile Organic Compounds

D2J0309-CCV1 **Calibration required quadratic regression (Q).**
2,4-Dinitrophenol (51% @ 80-120%), Pentachlorophenol (85% @ 80-120%)

D2J0309-CCV1 **Continuing Calibration %Diff/Drift is above control limit (CD+).**
2,4,6-Tribromophenol (22% @ 20%)

D2J0309-CCV1 **Continuing Calibration %Diff/Drift is below control limit (CD-).**
2,4-Dinitrophenol (49% @ 20%)

D2J0347-CCV1 **Calibration required quadratic regression (Q).**
2,4-Dinitrophenol (54% @ 80-120%), Pentachlorophenol (96% @ 80-120%)

D2J0347-CCV1 **Continuing Calibration %Diff/Drift is above control limit (CD+).**
2,4,5-Trichlorophenol (21% @ 20%), 2,4,6-Tribromophenol (29% @ 20%)

D2J0347-CCV1 **Continuing Calibration %Diff/Drift is below control limit (CD-).**
2,4-Dinitrophenol (46% @ 20%), 4-Nitrophenol (33% @ 20%)

D2J0347-TUN1 **Benzidine tailing factor >2.**

DJ21357-BSD1 **Relative percent difference for duplicate is outside of criteria (D+).**
2,4-Dinitrophenol (31% @ 30%)

No other observations noted.

End of Project Narrative.

DATA USABILITY LINKS

To ensure you are viewing the most current version of the documents below, please clear your internet cookies for www.ESSLaboratory.com. Consult your IT Support personnel for information on how to clear your internet cookies.

Definitions of Quality Control Parameters

Semivolatile Organics Internal Standard Information

Semivolatile Organics Surrogate Information

Volatile Organics Internal Standard Information

Volatile Organics Surrogate Information

EPH and VPH Alkane Lists

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St

ESS Laboratory Work Order: 22J0374

CURRENT SW-846 METHODOLOGY VERSIONS

Analytical Methods

1010A - Flashpoint
6010C - ICP
6020A - ICP MS
7010 - Graphite Furnace
7196A - Hexavalent Chromium
7470A - Aqueous Mercury
7471B - Solid Mercury
8011 - EDB/DBCP/TCP
8015C - GRO/DRO
8081B - Pesticides
8082A - PCB
8100M - TPH
8151A - Herbicides
8260B - VOA
8270D - SVOA
8270D SIM - SVOA Low Level
9014 - Cyanide
9038 - Sulfate
9040C - Aqueous pH
9045D - Solid pH (Corrosivity)
9050A - Specific Conductance
9056A - Anions (IC)
9060A - TOC
9095B - Paint Filter
MADEP 04-1.1 - EPH
MADEP 18-2.1 - VPH

Prep Methods

3005A - Aqueous ICP Digestion
3020A - Aqueous Graphite Furnace / ICP MS Digestion
3050B - Solid ICP / Graphite Furnace / ICP MS Digestion
3060A - Solid Hexavalent Chromium Digestion
3510C - Separatory Funnel Extraction
3520C - Liquid / Liquid Extraction
3540C - Manual Soxhlet Extraction
3541 - Automated Soxhlet Extraction
3546 - Microwave Extraction
3580A - Waste Dilution
5030B - Aqueous Purge and Trap
5030C - Aqueous Purge and Trap
5035A - Solid Purge and Trap

SW846 Reactivity Methods 7.3.3.2 (Reactive Cyanide) and 7.3.4.1 (Reactive Sulfide) have been withdrawn by EPA. These methods are reported per client request and are not NELAP accredited.

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St

ESS Laboratory Work Order: 22J0374

MassDEP Analytical Protocol Certification Form

MADEP RTN: _____

This form provides certification for the following data set: **22J0374-01 through 22J0374-07**

Matrices: ( ) Ground Water/Surface Water (x) Soil/Sediment ( ) Drinking Water ( ) Air ( ) Other:_____

CAM Protocol (check all that apply below):

(x) 8260 VOC CAM II A	(x) 7470/7471 Hg CAM III B	( ) MassDEP VPH (GC/PID/FID) CAM IV A	(x) 8082 PCB CAM V A	( ) 9014 Total Cyanide/PAC CAM VI A	( ) 6860 Perchlorate CAM VIII B
(x) 8270 SVOC CAM II B	( ) 7010 Metals CAM III C	( ) MassDEP VPH (GC/MS) CAM IV C	( ) 8081 Pesticides CAM V B	( ) 7196 Hex Cr CAM VI B	( ) MassDEP APH CAM IX A
(x) 6010 Metals CAM III A	( ) 6020 Metals CAM III D	(x) MassDEP EPH CAM IV B	( ) 8151 Herbicides CAM V C	( ) Explosives CAM VIII A	( ) TO-15 VOC CAM IX B

Affirmative responses to questions A through F are required for "Presumptive Certainty" status

A	Were all samples received in a condition consistent with those described on the Chain-of-Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding times?	Yes (x) No ( )
B	Were the analytical method(s) and all associated QC requirements specified in the selected CAM protocol(s) followed?	Yes (x) No ( )
C	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?	Yes (x) No ( )
D	Does the laboratory report comply with all the reporting requirements specified in the CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data"?	Yes (x) No ( )
E	VPH, EPH, APH and TO-15 only: a. Was each method conducted without significant modification(s)? (Refer to the individual method(s) for a list of significant modifications).	Yes (x) No ( )
	b. APH and TO-15 Methods only: Was the complete analyte list reported for each method?	Yes ( ) No ( )
F	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all "No" responses to Questions A through E)?	Yes (x) No ( )

Responses to Questions G, H and I below are required for "'Presumptive Certainty" status

G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocols(s)?	Yes (x) No ( )*
	***Data User Note:* Data that achieve "Presumptive Certainty" status may not necessarily meet the data usability and representativeness requirements described in 310 CMR 40. 1056 (2)(k) and WSC-07-350.**	
H	Were **all** QC performance standards specified in the CAM protocol(s) achieved?	Yes ( ) No (x)*
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?	Yes ( ) No (x)*

All negative responses must be addressed in an attached laboratory narrative.

I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this analytical report is, to the best of my knowledge and belief, accurate and complete.

Signature: Laurel Stoddard Date: October 21, 2022

Printed Name: Laurel Stoddard Position: Laboratory Director

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St
Client Sample ID: SB-1 MW-4 12-14ft
Date Sampled: 10/11/22 09:30
Percent Solids: 92
Initial Volume: 8.8g
Final Volume: 10ml
Extraction Method: 5035

ESS Laboratory Work Order: 22J0374
ESS Laboratory Sample ID: 22J0374-01
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,1,1,2-Tetrachloroethane	ND (0.0031)		8260B Low		1	10/13/22 23:34	D2J0227	DJ21328
1,1,1-Trichloroethane	ND (0.0031)		8260B Low		1	10/13/22 23:34	D2J0227	DJ21328
1,1,2,2-Tetrachloroethane	ND (0.0012)		8260B Low		1	10/13/22 23:34	D2J0227	DJ21328
1,1,2-Trichloroethane	ND (0.0031)		8260B Low		1	10/13/22 23:34	D2J0227	DJ21328
1,1-Dichloroethane	ND (0.0031)		8260B Low		1	10/13/22 23:34	D2J0227	DJ21328
1,1-Dichloroethene	ND (0.0031)		8260B Low		1	10/13/22 23:34	D2J0227	DJ21328
1,1-Dichloropropene	ND (0.0031)		8260B Low		1	10/13/22 23:34	D2J0227	DJ21328
1,2,3-Trichlorobenzene	ND (0.0031)		8260B Low		1	10/13/22 23:34	D2J0227	DJ21328
1,2,3-Trichloropropane	ND (0.0031)		8260B Low		1	10/13/22 23:34	D2J0227	DJ21328
1,2,4-Trichlorobenzene	ND (0.0031)		8260B Low		1	10/13/22 23:34	D2J0227	DJ21328
1,2-Dibromo-3-Chloropropane	ND (0.0031)		8260B Low		1	10/13/22 23:34	D2J0227	DJ21328
1,2-Dichlorobenzene	ND (0.0031)		8260B Low		1	10/13/22 23:34	D2J0227	DJ21328
1,2-Dichloroethane	ND (0.0031)		8260B Low		1	10/13/22 23:34	D2J0227	DJ21328
1,2-Dichloropropane	ND (0.0031)		8260B Low		1	10/13/22 23:34	D2J0227	DJ21328
1,3-Dichlorobenzene	ND (0.0031)		8260B Low		1	10/13/22 23:34	D2J0227	DJ21328
1,3-Dichloropropane	ND (0.0031)		8260B Low		1	10/13/22 23:34	D2J0227	DJ21328
1,4-Dichlorobenzene	ND (0.0031)		8260B Low		1	10/13/22 23:34	D2J0227	DJ21328
2,2-Dichloropropane	ND (0.0031)		8260B Low		1	10/13/22 23:34	D2J0227	DJ21328
2-Chlorotoluene	ND (0.0031)		8260B Low		1	10/13/22 23:34	D2J0227	DJ21328
4-Chlorotoluene	ND (0.0031)		8260B Low		1	10/13/22 23:34	D2J0227	DJ21328
Bromochloromethane	ND (0.0031)		8260B Low		1	10/13/22 23:34	D2J0227	DJ21328
Bromodichloromethane	ND (0.0031)		8260B Low		1	10/13/22 23:34	D2J0227	DJ21328
Chlorobenzene	ND (0.0031)		8260B Low		1	10/13/22 23:34	D2J0227	DJ21328
Chloroethane	ND (0.0061)		8260B Low		1	10/13/22 23:34	D2J0227	DJ21328
Chloroform	ND (0.0031)		8260B Low		1	10/13/22 23:34	D2J0227	DJ21328
Chloromethane	ND (0.0061)		8260B Low		1	10/13/22 23:34	D2J0227	DJ21328
cis-1,2-Dichloroethene	ND (0.0031)		8260B Low		1	10/13/22 23:34	D2J0227	DJ21328
cis-1,3-Dichloropropene	ND (0.0031)		8260B Low		1	10/13/22 23:34	D2J0227	DJ21328
Dibromochloromethane	ND (0.0012)		8260B Low		1	10/13/22 23:34	D2J0227	DJ21328
Dichlorodifluoromethane	ND (0.0061)		8260B Low		1	10/13/22 23:34	D2J0227	DJ21328
Hexachlorobutadiene	ND (0.0031)		8260B Low		1	10/13/22 23:34	D2J0227	DJ21328
Methylene Chloride	ND (0.0061)		8260B Low		1	10/13/22 23:34	D2J0227	DJ21328

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St
Client Sample ID: SB-1 MW-4 12-14ft
Date Sampled: 10/11/22 09:30
Percent Solids: 92
Initial Volume: 8.8g
Final Volume: 10ml
Extraction Method: 5035

ESS Laboratory Work Order: 22J0374
ESS Laboratory Sample ID: 22J0374-01
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Tetrachloroethene	ND (0.0031)		8260B Low		1	10/13/22 23:34	D2J0227	DJ21328
Tetrahydrofuran	**0.0099** (0.0031)		8260B Low		1	10/13/22 23:34	D2J0227	DJ21328
trans-1,2-Dichloroethene	ND (0.0031)		8260B Low		1	10/13/22 23:34	D2J0227	DJ21328
trans-1,3-Dichloropropene	ND (0.0031)		8260B Low		1	10/13/22 23:34	D2J0227	DJ21328
Trichloroethene	ND (0.0031)		8260B Low		1	10/13/22 23:34	D2J0227	DJ21328
Trichlorofluoromethane	ND (0.0031)		8260B Low		1	10/13/22 23:34	D2J0227	DJ21328
Vinyl Chloride	ND (0.0061)		8260B Low		1	10/13/22 23:34	D2J0227	DJ21328

	%Recovery	Qualifier	Limits
Surrogate: 1,2-Dichloroethane-d4	*114 %*		*70-130*
Surrogate: 4-Bromofluorobenzene	*98 %*		*70-130*
Surrogate: Dibromofluoromethane	*106 %*		*70-130*
Surrogate: Toluene-d8	*98 %*		*70-130*

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St
Client Sample ID: SB-1 MW-3 2-4ft
Date Sampled: 10/11/22 11:00
Percent Solids: 94
Initial Volume: 7.4g
Final Volume: 10ml
Extraction Method: 5035

ESS Laboratory Work Order: 22J0374
ESS Laboratory Sample ID: 22J0374-02
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,1,1,2-Tetrachloroethane	ND (0.0036)		8260B Low		1	10/14/22 0:00	D2J0227	DJ21328
1,1,1-Trichloroethane	ND (0.0036)		8260B Low		1	10/14/22 0:00	D2J0227	DJ21328
1,1,2,2-Tetrachloroethane	ND (0.0014)		8260B Low		1	10/14/22 0:00	D2J0227	DJ21328
1,1,2-Trichloroethane	ND (0.0036)		8260B Low		1	10/14/22 0:00	D2J0227	DJ21328
1,1-Dichloroethane	ND (0.0036)		8260B Low		1	10/14/22 0:00	D2J0227	DJ21328
1,1-Dichloroethene	ND (0.0036)		8260B Low		1	10/14/22 0:00	D2J0227	DJ21328
1,1-Dichloropropene	ND (0.0036)		8260B Low		1	10/14/22 0:00	D2J0227	DJ21328
1,2,3-Trichlorobenzene	ND (0.0036)		8260B Low		1	10/14/22 0:00	D2J0227	DJ21328
1,2,3-Trichloropropane	ND (0.0036)		8260B Low		1	10/14/22 0:00	D2J0227	DJ21328
1,2,4-Trichlorobenzene	ND (0.0036)		8260B Low		1	10/14/22 0:00	D2J0227	DJ21328
1,2-Dibromo-3-Chloropropane	ND (0.0036)		8260B Low		1	10/14/22 0:00	D2J0227	DJ21328
1,2-Dichlorobenzene	ND (0.0036)		8260B Low		1	10/14/22 0:00	D2J0227	DJ21328
1,2-Dichloroethane	ND (0.0036)		8260B Low		1	10/14/22 0:00	D2J0227	DJ21328
1,2-Dichloropropane	ND (0.0036)		8260B Low		1	10/14/22 0:00	D2J0227	DJ21328
1,3-Dichlorobenzene	ND (0.0036)		8260B Low		1	10/14/22 0:00	D2J0227	DJ21328
1,3-Dichloropropane	ND (0.0036)		8260B Low		1	10/14/22 0:00	D2J0227	DJ21328
1,4-Dichlorobenzene	ND (0.0036)		8260B Low		1	10/14/22 0:00	D2J0227	DJ21328
2,2-Dichloropropane	ND (0.0036)		8260B Low		1	10/14/22 0:00	D2J0227	DJ21328
2-Chlorotoluene	ND (0.0036)		8260B Low		1	10/14/22 0:00	D2J0227	DJ21328
4-Chlorotoluene	ND (0.0036)		8260B Low		1	10/14/22 0:00	D2J0227	DJ21328
Bromochloromethane	ND (0.0036)		8260B Low		1	10/14/22 0:00	D2J0227	DJ21328
Bromodichloromethane	ND (0.0036)		8260B Low		1	10/14/22 0:00	D2J0227	DJ21328
Chlorobenzene	ND (0.0036)		8260B Low		1	10/14/22 0:00	D2J0227	DJ21328
Chloroethane	ND (0.0072)		8260B Low		1	10/14/22 0:00	D2J0227	DJ21328
Chloroform	ND (0.0036)		8260B Low		1	10/14/22 0:00	D2J0227	DJ21328
Chloromethane	ND (0.0072)		8260B Low		1	10/14/22 0:00	D2J0227	DJ21328
cis-1,2-Dichloroethene	ND (0.0036)		8260B Low		1	10/14/22 0:00	D2J0227	DJ21328
cis-1,3-Dichloropropene	ND (0.0036)		8260B Low		1	10/14/22 0:00	D2J0227	DJ21328
Dibromochloromethane	ND (0.0014)		8260B Low		1	10/14/22 0:00	D2J0227	DJ21328
Dichlorodifluoromethane	ND (0.0072)		8260B Low		1	10/14/22 0:00	D2J0227	DJ21328
Hexachlorobutadiene	ND (0.0036)		8260B Low		1	10/14/22 0:00	D2J0227	DJ21328
Methylene Chloride	ND (0.0072)		8260B Low		1	10/14/22 0:00	D2J0227	DJ21328

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St
Client Sample ID: SB-1 MW-3 2-4ft
Date Sampled: 10/11/22 11:00
Percent Solids: 94
Initial Volume: 7.4g
Final Volume: 10ml
Extraction Method: 5035

ESS Laboratory Work Order: 22J0374
ESS Laboratory Sample ID: 22J0374-02
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Tetrachloroethene	ND (0.0036)		8260B Low		1	10/14/22 0:00	D2J0227	DJ21328
Tetrahydrofuran	**0.0110** (0.0036)		8260B Low		1	10/14/22 0:00	D2J0227	DJ21328
trans-1,2-Dichloroethene	ND (0.0036)		8260B Low		1	10/14/22 0:00	D2J0227	DJ21328
trans-1,3-Dichloropropene	ND (0.0036)		8260B Low		1	10/14/22 0:00	D2J0227	DJ21328
Trichloroethene	ND (0.0036)		8260B Low		1	10/14/22 0:00	D2J0227	DJ21328
Trichlorofluoromethane	ND (0.0036)		8260B Low		1	10/14/22 0:00	D2J0227	DJ21328
Vinyl Chloride	ND (0.0072)		8260B Low		1	10/14/22 0:00	D2J0227	DJ21328

	%Recovery	Qualifier	Limits
Surrogate: 1,2-Dichloroethane-d4	*117 %*		*70-130*
Surrogate: 4-Bromofluorobenzene	*95 %*		*70-130*
Surrogate: Dibromofluoromethane	*109 %*		*70-130*
Surrogate: Toluene-d8	*99 %*		*70-130*

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St
Client Sample ID: SB-1 MW-2 2-4ft
Date Sampled: 10/11/22 12:00
Percent Solids: 90
Initial Volume: 7.6g
Final Volume: 10ml
Extraction Method: 5035

ESS Laboratory Work Order: 22J0374
ESS Laboratory Sample ID: 22J0374-03
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,1,1,2-Tetrachloroethane	ND (0.0037)		8260B Low		1	10/14/22 14:15	D2J0264	DJ21428
1,1,1-Trichloroethane	ND (0.0037)		8260B Low		1	10/14/22 14:15	D2J0264	DJ21428
1,1,2,2-Tetrachloroethane	ND (0.0015)		8260B Low		1	10/14/22 14:15	D2J0264	DJ21428
1,1,2-Trichloroethane	ND (0.0037)		8260B Low		1	10/14/22 14:15	D2J0264	DJ21428
1,1-Dichloroethane	ND (0.0037)		8260B Low		1	10/14/22 14:15	D2J0264	DJ21428
1,1-Dichloroethene	ND (0.0037)		8260B Low		1	10/14/22 14:15	D2J0264	DJ21428
1,1-Dichloropropene	ND (0.0037)		8260B Low		1	10/14/22 14:15	D2J0264	DJ21428
1,2,3-Trichlorobenzene	ND (0.0037)		8260B Low		1	10/14/22 14:15	D2J0264	DJ21428
1,2,3-Trichloropropane	ND (0.0037)		8260B Low		1	10/14/22 14:15	D2J0264	DJ21428
1,2,4-Trichlorobenzene	ND (0.0037)		8260B Low		1	10/14/22 14:15	D2J0264	DJ21428
1,2-Dibromo-3-Chloropropane	ND (0.0037)		8260B Low		1	10/14/22 14:15	D2J0264	DJ21428
1,2-Dichlorobenzene	ND (0.0037)		8260B Low		1	10/14/22 14:15	D2J0264	DJ21428
1,2-Dichloroethane	ND (0.0037)		8260B Low		1	10/14/22 14:15	D2J0264	DJ21428
1,2-Dichloropropane	ND (0.0037)		8260B Low		1	10/14/22 14:15	D2J0264	DJ21428
1,3-Dichlorobenzene	ND (0.0037)		8260B Low		1	10/14/22 14:15	D2J0264	DJ21428
1,3-Dichloropropane	ND (0.0037)		8260B Low		1	10/14/22 14:15	D2J0264	DJ21428
1,4-Dichlorobenzene	ND (0.0037)		8260B Low		1	10/14/22 14:15	D2J0264	DJ21428
2,2-Dichloropropane	ND (0.0037)		8260B Low		1	10/14/22 14:15	D2J0264	DJ21428
2-Chlorotoluene	ND (0.0037)		8260B Low		1	10/14/22 14:15	D2J0264	DJ21428
4-Chlorotoluene	ND (0.0037)		8260B Low		1	10/14/22 14:15	D2J0264	DJ21428
Bromochloromethane	ND (0.0037)		8260B Low		1	10/14/22 14:15	D2J0264	DJ21428
Bromodichloromethane	ND (0.0037)		8260B Low		1	10/14/22 14:15	D2J0264	DJ21428
Chlorobenzene	ND (0.0037)		8260B Low		1	10/14/22 14:15	D2J0264	DJ21428
Chloroethane	ND (0.0073)		8260B Low		1	10/14/22 14:15	D2J0264	DJ21428
Chloroform	ND (0.0037)		8260B Low		1	10/14/22 14:15	D2J0264	DJ21428
Chloromethane	ND (0.0073)		8260B Low		1	10/14/22 14:15	D2J0264	DJ21428
cis-1,2-Dichloroethene	ND (0.0037)		8260B Low		1	10/14/22 14:15	D2J0264	DJ21428
cis-1,3-Dichloropropene	ND (0.0037)		8260B Low		1	10/14/22 14:15	D2J0264	DJ21428
Dibromochloromethane	ND (0.0015)		8260B Low		1	10/14/22 14:15	D2J0264	DJ21428
Dichlorodifluoromethane	ND (0.0073)		8260B Low		1	10/14/22 14:15	D2J0264	DJ21428
Hexachlorobutadiene	ND (0.0037)		8260B Low		1	10/14/22 14:15	D2J0264	DJ21428
Methylene Chloride	ND (0.0073)		8260B Low		1	10/14/22 14:15	D2J0264	DJ21428

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St
Client Sample ID: SB-1 MW-2 2-4ft
Date Sampled: 10/11/22 12:00
Percent Solids: 90
Initial Volume: 7.6g
Final Volume: 10ml
Extraction Method: 5035

ESS Laboratory Work Order: 22J0374
ESS Laboratory Sample ID: 22J0374-03
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Tetrachloroethene	ND (0.0037)		8260B Low		1	10/14/22 14:15	D2J0264	DJ21428
Tetrahydrofuran	**0.0138** (0.0037)		8260B Low		1	10/14/22 14:15	D2J0264	DJ21428
trans-1,2-Dichloroethene	ND (0.0037)		8260B Low		1	10/14/22 14:15	D2J0264	DJ21428
trans-1,3-Dichloropropene	ND (0.0037)		8260B Low		1	10/14/22 14:15	D2J0264	DJ21428
Trichloroethene	ND (0.0037)		8260B Low		1	10/14/22 14:15	D2J0264	DJ21428
Trichlorofluoromethane	ND (0.0037)		8260B Low		1	10/14/22 14:15	D2J0264	DJ21428
Vinyl Chloride	ND (0.0073)		8260B Low		1	10/14/22 14:15	D2J0264	DJ21428

	%Recovery	Qualifier	Limits
Surrogate: 1,2-Dichloroethane-d4	*117 %*		*70-130*
Surrogate: 4-Bromofluorobenzene	*97 %*		*70-130*
Surrogate: Dibromofluoromethane	*109 %*		*70-130*
Surrogate: Toluene-d8	*99 %*		*70-130*

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St
Client Sample ID: SB-1 MW-1 1-3ft
Date Sampled: 10/11/22 13:30
Percent Solids: 96
Initial Volume: 7.7g
Final Volume: 10ml
Extraction Method: 5035

ESS Laboratory Work Order: 22J0374
ESS Laboratory Sample ID: 22J0374-04
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,1,1,2-Tetrachloroethane	ND (0.0034)		8260B Low		1	10/14/22 14:40	D2J0264	DJ21428
1,1,1-Trichloroethane	ND (0.0034)		8260B Low		1	10/14/22 14:40	D2J0264	DJ21428
1,1,2,2-Tetrachloroethane	ND (0.0014)		8260B Low		1	10/14/22 14:40	D2J0264	DJ21428
1,1,2-Trichloroethane	ND (0.0034)		8260B Low		1	10/14/22 14:40	D2J0264	DJ21428
1,1-Dichloroethane	ND (0.0034)		8260B Low		1	10/14/22 14:40	D2J0264	DJ21428
1,1-Dichloroethene	ND (0.0034)		8260B Low		1	10/14/22 14:40	D2J0264	DJ21428
1,1-Dichloropropene	ND (0.0034)		8260B Low		1	10/14/22 14:40	D2J0264	DJ21428
1,2,3-Trichlorobenzene	ND (0.0034)		8260B Low		1	10/14/22 14:40	D2J0264	DJ21428
1,2,3-Trichloropropane	ND (0.0034)		8260B Low		1	10/14/22 14:40	D2J0264	DJ21428
1,2,4-Trichlorobenzene	ND (0.0034)		8260B Low		1	10/14/22 14:40	D2J0264	DJ21428
1,2-Dibromo-3-Chloropropane	ND (0.0034)		8260B Low		1	10/14/22 14:40	D2J0264	DJ21428
1,2-Dichlorobenzene	ND (0.0034)		8260B Low		1	10/14/22 14:40	D2J0264	DJ21428
1,2-Dichloroethane	ND (0.0034)		8260B Low		1	10/14/22 14:40	D2J0264	DJ21428
1,2-Dichloropropane	ND (0.0034)		8260B Low		1	10/14/22 14:40	D2J0264	DJ21428
1,3-Dichlorobenzene	ND (0.0034)		8260B Low		1	10/14/22 14:40	D2J0264	DJ21428
1,3-Dichloropropane	ND (0.0034)		8260B Low		1	10/14/22 14:40	D2J0264	DJ21428
1,4-Dichlorobenzene	ND (0.0034)		8260B Low		1	10/14/22 14:40	D2J0264	DJ21428
2,2-Dichloropropane	ND (0.0034)		8260B Low		1	10/14/22 14:40	D2J0264	DJ21428
2-Chlorotoluene	ND (0.0034)		8260B Low		1	10/14/22 14:40	D2J0264	DJ21428
4-Chlorotoluene	ND (0.0034)		8260B Low		1	10/14/22 14:40	D2J0264	DJ21428
Bromochloromethane	ND (0.0034)		8260B Low		1	10/14/22 14:40	D2J0264	DJ21428
Bromodichloromethane	ND (0.0034)		8260B Low		1	10/14/22 14:40	D2J0264	DJ21428
Chlorobenzene	ND (0.0034)		8260B Low		1	10/14/22 14:40	D2J0264	DJ21428
Chloroethane	ND (0.0068)		8260B Low		1	10/14/22 14:40	D2J0264	DJ21428
Chloroform	ND (0.0034)		8260B Low		1	10/14/22 14:40	D2J0264	DJ21428
Chloromethane	ND (0.0068)		8260B Low		1	10/14/22 14:40	D2J0264	DJ21428
cis-1,2-Dichloroethene	ND (0.0034)		8260B Low		1	10/14/22 14:40	D2J0264	DJ21428
cis-1,3-Dichloropropene	ND (0.0034)		8260B Low		1	10/14/22 14:40	D2J0264	DJ21428
Dibromochloromethane	ND (0.0014)		8260B Low		1	10/14/22 14:40	D2J0264	DJ21428
Dichlorodifluoromethane	ND (0.0068)		8260B Low		1	10/14/22 14:40	D2J0264	DJ21428
Hexachlorobutadiene	ND (0.0034)		8260B Low		1	10/14/22 14:40	D2J0264	DJ21428
Methylene Chloride	ND (0.0068)		8260B Low		1	10/14/22 14:40	D2J0264	DJ21428

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St
Client Sample ID: SB-1 MW-1 1-3ft
Date Sampled: 10/11/22 13:30
Percent Solids: 96
Initial Volume: 7.7g
Final Volume: 10ml
Extraction Method: 5035

ESS Laboratory Work Order: 22J0374
ESS Laboratory Sample ID: 22J0374-04
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Tetrachloroethene	ND (0.0034)		8260B Low		1	10/14/22 14:40	D2J0264	DJ21428
Tetrahydrofuran	**0.0119** (0.0034)		8260B Low		1	10/14/22 14:40	D2J0264	DJ21428
trans-1,2-Dichloroethene	ND (0.0034)		8260B Low		1	10/14/22 14:40	D2J0264	DJ21428
trans-1,3-Dichloropropene	ND (0.0034)		8260B Low		1	10/14/22 14:40	D2J0264	DJ21428
Trichloroethene	ND (0.0034)		8260B Low		1	10/14/22 14:40	D2J0264	DJ21428
Trichlorofluoromethane	ND (0.0034)		8260B Low		1	10/14/22 14:40	D2J0264	DJ21428
Vinyl Chloride	ND (0.0068)		8260B Low		1	10/14/22 14:40	D2J0264	DJ21428

	%Recovery	Qualifier	Limits
Surrogate: 1,2-Dichloroethane-d4	*115 %*		*70-130*
Surrogate: 4-Bromofluorobenzene	*99 %*		*70-130*
Surrogate: Dibromofluoromethane	*107 %*		*70-130*
Surrogate: Toluene-d8	*99 %*		*70-130*

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St
Client Sample ID: SB-1 MW-1-2
Date Sampled: 10/11/22 14:00
Percent Solids: 95

ESS Laboratory Work Order: 22J0374
ESS Laboratory Sample ID: 22J0374-05
Sample Matrix: Soil
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	I/V	F/V	Batch
Antimony	ND (4.87)		6010C		1	CEV	10/17/22 20:24	2.17	100	DJ21729
Arsenic	ND (2.44)		6010C		1	CEV	10/17/22 20:24	2.17	100	DJ21729
Barium	**19.0** (2.44)		6010C		1	CEV	10/17/22 20:24	2.17	100	DJ21729
Beryllium	**0.23** (0.11)		6010C		1	KJK	10/18/22 12:11	2.17	100	DJ21729
Cadmium	ND (0.49)		6010C		1	CEV	10/17/22 20:24	2.17	100	DJ21729
Chromium	**9.13** (0.97)		6010C		1	CEV	10/17/22 20:24	2.17	100	DJ21729
Lead	**9.25** (4.87)		6010C		1	CEV	10/17/22 20:24	2.17	100	DJ21729
Mercury	**0.036** (0.024)		7471B		1	YIV	10/18/22 10:52	0.87	40	DJ21739
Nickel	**8.53** (2.44)		6010C		1	CEV	10/17/22 20:24	2.17	100	DJ21729
Selenium	ND (4.87)		6010C		1	CEV	10/17/22 20:24	2.17	100	DJ21729
Silver	ND (0.49)		6010C		1	CEV	10/17/22 20:24	2.17	100	DJ21729
Thallium	ND (4.87)		6010C		1	CEV	10/17/22 20:24	2.17	100	DJ21729
Vanadium	**15.5** (0.97)		6010C		1	CEV	10/17/22 20:24	2.17	100	DJ21729
Zinc	**25.5** (2.44)		6010C		1	CEV	10/17/22 20:24	2.17	100	DJ21729

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St
Client Sample ID: SB-1 MW-1-2
Date Sampled: 10/11/22 14:00
Percent Solids: 95
Initial Volume: 7.3g
Final Volume: 10ml
Extraction Method: 5035

ESS Laboratory Work Order: 22J0374
ESS Laboratory Sample ID: 22J0374-05
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,1,1,2-Tetrachloroethane	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
1,1,1-Trichloroethane	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
1,1,2,2-Tetrachloroethane	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
1,1,2-Trichloroethane	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
1,1-Dichloroethane	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
1,1-Dichloroethene	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
1,1-Dichloropropene	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
1,2,3-Trichlorobenzene	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
1,2,3-Trichloropropane	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
1,2,4-Trichlorobenzene	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
1,2,4-Trimethylbenzene	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
1,2-Dibromo-3-Chloropropane	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
1,2-Dibromoethane	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
1,2-Dichlorobenzene	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
1,2-Dichloroethane	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
1,2-Dichloropropane	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
1,3,5-Trimethylbenzene	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
1,3-Dichlorobenzene	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
1,3-Dichloropropane	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
1,4-Dichlorobenzene	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
1,4-Dioxane	ND (0.0580)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
2,2-Dichloropropane	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
2-Butanone	ND (0.0362)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
2-Chlorotoluene	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
2-Hexanone	ND (0.0362)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
4-Chlorotoluene	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
4-Isopropyltoluene	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
4-Methyl-2-Pentanone	ND (0.0362)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
Acetone	ND (0.0362)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
Benzene	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
Bromobenzene	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
Bromochloromethane	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St
Client Sample ID: SB-1 MW-1-2
Date Sampled: 10/11/22 14:00
Percent Solids: 95
Initial Volume: 7.3g
Final Volume: 10ml
Extraction Method: 5035

ESS Laboratory Work Order: 22J0374
ESS Laboratory Sample ID: 22J0374-05
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Bromodichloromethane	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
Bromoform	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
Bromomethane	ND (0.0072)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
Carbon Disulfide	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
Carbon Tetrachloride	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
Chlorobenzene	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
Chloroethane	ND (0.0072)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
Chloroform	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
Chloromethane	ND (0.0072)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
cis-1,2-Dichloroethene	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
cis-1,3-Dichloropropene	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
Dibromochloromethane	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
Dibromomethane	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
Dichlorodifluoromethane	ND (0.0072)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
Diethyl Ether	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
Di-isopropyl ether	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
Ethyl tertiary-butyl ether	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
Ethylbenzene	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
Hexachlorobutadiene	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
Isopropylbenzene	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
Methyl tert-Butyl Ether	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
Methylene Chloride	ND (0.0181)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
Naphthalene	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
n-Butylbenzene	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
n-Propylbenzene	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
sec-Butylbenzene	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
Styrene	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
tert-Butylbenzene	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
Tertiary-amyl methyl ether	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
Tetrachloroethene	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
Tetrahydrofuran	**0.0118** (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
Toluene	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St
Client Sample ID: SB-1 MW-1-2
Date Sampled: 10/11/22 14:00
Percent Solids: 95
Initial Volume: 7.3g
Final Volume: 10ml
Extraction Method: 5035

ESS Laboratory Work Order: 22J0374
ESS Laboratory Sample ID: 22J0374-05
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
trans-1,2-Dichloroethene	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
trans-1,3-Dichloropropene	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
Trichloroethene	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
Trichlorofluoromethane	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
Vinyl Chloride	ND (0.0072)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
Xylene O	ND (0.0036)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
Xylene P,M	ND (0.0072)		8260B Low		1	10/14/22 15:06	D2J0264	DJ21428
Xylenes (Total)	ND (0.00724)		8260B Low		1	10/14/22 15:06		[CALC]

	%Recovery	*Qualifier*	*Limits*
Surrogate: 1,2-Dichloroethane-d4	*115 %*		*70-130*
Surrogate: 4-Bromofluorobenzene	*97 %*		*70-130*
Surrogate: Dibromofluoromethane	*106 %*		*70-130*
Surrogate: Toluene-d8	*98 %*		*70-130*

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St
Client Sample ID: SB-1 MW-1-2
Date Sampled: 10/11/22 14:00
Percent Solids: 95
Initial Volume: 20.4g
Final Volume: 10ml
Extraction Method: 3540C

ESS Laboratory Work Order: 22J0374
ESS Laboratory Sample ID: 22J0374-05
Sample Matrix: Soil
Units: mg/kg dry
Analyst: DMC
Prepared: 10/19/22 14:30

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.05)		8082A		1	10/20/22 20:42		DJ21914
Aroclor 1221	ND (0.05)		8082A		1	10/20/22 20:42		DJ21914
Aroclor 1232	ND (0.05)		8082A		1	10/20/22 20:42		DJ21914
Aroclor 1242	ND (0.05)		8082A		1	10/20/22 20:42		DJ21914
Aroclor 1248	ND (0.05)		8082A		1	10/20/22 20:42		DJ21914
Aroclor 1254	ND (0.05)		8082A		1	10/20/22 20:42		DJ21914
Aroclor 1260	ND (0.05)		8082A		1	10/20/22 20:42		DJ21914
Aroclor 1262	ND (0.05)		8082A		1	10/20/22 20:42		DJ21914
Aroclor 1268	ND (0.05)		8082A		1	10/20/22 20:42		DJ21914

	%Recovery	*Qualifier*	*Limits*
Surrogate: Decachlorobiphenyl	*62 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*71 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*77 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*75 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St
Client Sample ID: SB-1 MW-1-2
Date Sampled: 10/11/22 14:00
Percent Solids: 95
Initial Volume: 20.2g
Final Volume: 1ml
Extraction Method: 3546

ESS Laboratory Work Order: 22J0374
ESS Laboratory Sample ID: 22J0374-05
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TLW
Prepared: 10/12/22 22:00

8100M Total Petroleum Hydrocarbons

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Total Petroleum Hydrocarbons (C9-C36)	**85.4** (10.5)		8100M		1	10/14/22 8:29		DJ21251

	%Recovery	Qualifier	Limits
Surrogate: O-Terphenyl	*85 %*		*40-140*

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St
Client Sample ID: SB-1 MW-1-2
Date Sampled: 10/11/22 14:00
Percent Solids: 95
Initial Volume: 19.4g
Final Volume: 1ml
Extraction Method: 3546

ESS Laboratory Work Order: 22J0374
ESS Laboratory Sample ID: 22J0374-05
Sample Matrix: Soil
Units: mg/kg dry
Analyst: IBM
Prepared: 10/13/22 18:00

8270D Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,1-Biphenyl	ND (0.027)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
1,2,4-Trichlorobenzene	ND (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
1,2-Dichlorobenzene	ND (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
1,3-Dichlorobenzene	ND (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
1,4-Dichlorobenzene	ND (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
2,4,5-Trichlorophenol	ND (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
2,4,6-Trichlorophenol	ND (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
2,4-Dichlorophenol	ND (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
2,4-Dimethylphenol	ND (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
2,4-Dinitrophenol	ND (1.09)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
2,4-Dinitrotoluene	ND (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
2,6-Dinitrotoluene	ND (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
2-Chloronaphthalene	ND (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
2-Chlorophenol	ND (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
2-Methylnaphthalene	ND (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
2-Methylphenol	ND (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
2-Nitrophenol	ND (0.545)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
3,3′-Dichlorobenzidine	ND (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
3+4-Methylphenol	ND (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
4-Bromophenyl-phenylether	ND (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
4-Chloroaniline	ND (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
4-Nitrophenol	ND (1.09)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
Acenaphthene	ND (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
Acenaphthylene	**0.461** (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
Acetophenone	ND (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
Aniline	ND (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
Anthracene	**0.410** (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
Azobenzene	ND (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
Benzo(a)anthracene	**0.899** (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
Benzo(a)pyrene	**0.918** (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
Benzo(b)fluoranthene	**0.591** (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
Benzo(g,h,i)perylene	**0.445** (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St
Client Sample ID: SB-1 MW-1-2
Date Sampled: 10/11/22 14:00
Percent Solids: 95
Initial Volume: 19.4g
Final Volume: 1ml
Extraction Method: 3546

ESS Laboratory Work Order: 22J0374
ESS Laboratory Sample ID: 22J0374-05
Sample Matrix: Soil
Units: mg/kg dry
Analyst: IBM
Prepared: 10/13/22 18:00

8270D Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Benzo(k)fluoranthene	**0.667** (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
bis(2-Chloroethoxy)methane	ND (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
bis(2-Chloroethyl)ether	ND (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
bis(2-chloroisopropyl)Ether	ND (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
bis(2-Ethylhexyl)phthalate	ND (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
Butylbenzylphthalate	ND (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
Chrysene	**0.807** (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
Dibenzo(a,h)Anthracene	ND (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
Dibenzofuran	ND (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
Diethylphthalate	ND (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
Dimethylphthalate	ND (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
Di-n-butylphthalate	ND (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
Di-n-octylphthalate	ND (0.545)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
Fluoranthene	**1.43** (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
Fluorene	ND (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
Hexachlorobenzene	ND (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
Hexachlorobutadiene	ND (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
Hexachloroethane	ND (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
Indeno(1,2,3-cd)Pyrene	**0.516** (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
Isophorone	ND (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
Naphthalene	ND (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
Nitrobenzene	ND (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
N-Nitrosodimethylamine	ND (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
Pentachlorophenol	ND (1.09)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
Phenanthrene	**0.888** (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
Phenol	ND (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357
Pyrene	**1.35** (0.273)		8270D		1	10/20/22 22:05	D2J0347	DJ21357

	%Recovery	Qualifier	Limits
Surrogate: 1,2-Dichlorobenzene-d4	*81 %*		*30-130*
Surrogate: 2,4,6-Tribromophenol	*119 %*		*30-130*
Surrogate: 2-Chlorophenol-d4	*80 %*		*30-130*

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St
Client Sample ID: SB-1 MW-1-2
Date Sampled: 10/11/22 14:00
Percent Solids: 95
Initial Volume: 19.4g
Final Volume: 1ml
Extraction Method: 3546

ESS Laboratory Work Order: 22J0374
ESS Laboratory Sample ID: 22J0374-05
Sample Matrix: Soil
Units: mg/kg dry
Analyst: IBM
Prepared: 10/13/22 18:00

8270D Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Surrogate: 2-Fluorobiphenyl		*73 %*		*30-130*				
Surrogate: 2-Fluorophenol		*76 %*		*30-130*				
Surrogate: Nitrobenzene-d5		*58 %*		*30-130*				
Surrogate: Phenol-d6		*79 %*		*30-130*				
Surrogate: p-Terphenyl-d14		*91 %*		*30-130*				

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St
Client Sample ID: SB-1 MW-1-2
Date Sampled: 10/11/22 14:00
Percent Solids: 95

ESS Laboratory Work Order: 22J0374
ESS Laboratory Sample ID: 22J0374-05
Sample Matrix: Soil

Classical Chemistry

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Units	Batch
Conductivity	**WL 1040** (5)		9050A		1	JLK	10/13/22 19:23	umhos/cm	DJ21352
Corrosivity (pH)	**7.29** (N/A)		9045		1	JLK	10/12/22 22:54	S.U.	DJ21263
Corrosivity (pH) Sample Temp	**Soil pH measured in water at 21.2 ºC.**								
Flashpoint	**> 200** (N/A)		1010A		1	CCP	10/13/22 16:00	°F	DJ21343
Reactive Cyanide	ND (2.0)		7.3.3.2		1	JLK	10/14/22 17:05	mg/kg	DJ21442
Reactive Sulfide	ND (2.0)		7.3.4.1		1	JLK	10/14/22 17:05	mg/kg	DJ21442

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St
Client Sample ID: SB-1 MW-3-4
Date Sampled: 10/11/22 11:30
Percent Solids: 94

ESS Laboratory Work Order: 22J0374
ESS Laboratory Sample ID: 22J0374-06
Sample Matrix: Soil
Units: mg/kg dry

Extraction Method: 3050B

Total Metals

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	I/V	F/V	Batch
Antimony	ND (4.04)		6010C		1	CEV	10/17/22 20:26	2.64	100	DJ21729
Arsenic	ND (2.02)		6010C		1	CEV	10/17/22 20:26	2.64	100	DJ21729
Barium	**29.8** (2.02)		6010C		1	CEV	10/17/22 20:26	2.64	100	DJ21729
Beryllium	**0.25** (0.09)		6010C		1	KJK	10/18/22 12:13	2.64	100	DJ21729
Cadmium	ND (0.40)		6010C		1	CEV	10/17/22 20:26	2.64	100	DJ21729
Chromium	**13.4** (0.81)		6010C		1	CEV	10/17/22 20:26	2.64	100	DJ21729
Lead	**5.53** (4.04)		6010C		1	CEV	10/17/22 20:26	2.64	100	DJ21729
Mercury	ND (0.022)		7471B		1	YIV	10/18/22 10:54	0.94	40	DJ21739
Nickel	**9.58** (2.02)		6010C		1	CEV	10/17/22 20:26	2.64	100	DJ21729
Selenium	ND (4.04)		6010C		1	CEV	10/17/22 20:26	2.64	100	DJ21729
Silver	ND (0.81)		6010C		2	CEV	10/17/22 22:48	2.64	100	DJ21729
Thallium	ND (4.04)		6010C		1	CEV	10/17/22 20:26	2.64	100	DJ21729
Vanadium	**23.2** (0.81)		6010C		1	CEV	10/17/22 20:26	2.64	100	DJ21729
Zinc	**25.6** (2.02)		6010C		1	CEV	10/17/22 20:26	2.64	100	DJ21729

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St
Client Sample ID: SB-1 MW-3-4
Date Sampled: 10/11/22 11:30
Percent Solids: 94
Initial Volume: 7.9g
Final Volume: 10ml
Extraction Method: 5035

ESS Laboratory Work Order: 22J0374
ESS Laboratory Sample ID: 22J0374-06
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,1,1,2-Tetrachloroethane	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
1,1,1-Trichloroethane	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
1,1,2,2-Tetrachloroethane	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
1,1,2-Trichloroethane	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
1,1-Dichloroethane	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
1,1-Dichloroethene	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
1,1-Dichloropropene	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
1,2,3-Trichlorobenzene	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
1,2,3-Trichloropropane	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
1,2,4-Trichlorobenzene	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
1,2,4-Trimethylbenzene	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
1,2-Dibromo-3-Chloropropane	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
1,2-Dibromoethane	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
1,2-Dichlorobenzene	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
1,2-Dichloroethane	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
1,2-Dichloropropane	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
1,3,5-Trimethylbenzene	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
1,3-Dichlorobenzene	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
1,3-Dichloropropane	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
1,4-Dichlorobenzene	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
1,4-Dioxane	ND (0.0539)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
2,2-Dichloropropane	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
2-Butanone	ND (0.0337)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
2-Chlorotoluene	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
2-Hexanone	ND (0.0337)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
4-Chlorotoluene	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
4-Isopropyltoluene	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
4-Methyl-2-Pentanone	ND (0.0337)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
Acetone	ND (0.0337)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
Benzene	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
Bromobenzene	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
Bromochloromethane	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St
Client Sample ID: SB-1 MW-3-4
Date Sampled: 10/11/22 11:30
Percent Solids: 94
Initial Volume: 7.9g
Final Volume: 10ml
Extraction Method: 5035

ESS Laboratory Work Order: 22J0374
ESS Laboratory Sample ID: 22J0374-06
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Bromodichloromethane	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
Bromoform	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
Bromomethane	ND (0.0067)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
Carbon Disulfide	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
Carbon Tetrachloride	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
Chlorobenzene	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
Chloroethane	ND (0.0067)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
Chloroform	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
Chloromethane	ND (0.0067)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
cis-1,2-Dichloroethene	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
cis-1,3-Dichloropropene	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
Dibromochloromethane	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
Dibromomethane	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
Dichlorodifluoromethane	ND (0.0067)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
Diethyl Ether	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
Di-isopropyl ether	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
Ethyl tertiary-butyl ether	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
Ethylbenzene	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
Hexachlorobutadiene	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
Isopropylbenzene	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
Methyl tert-Butyl Ether	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
Methylene Chloride	ND (0.0169)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
Naphthalene	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
n-Butylbenzene	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
n-Propylbenzene	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
sec-Butylbenzene	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
Styrene	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
tert-Butylbenzene	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
Tertiary-amyl methyl ether	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
Tetrachloroethene	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
Tetrahydrofuran	**0.0107** (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
Toluene	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St
Client Sample ID: SB-1 MW-3-4
Date Sampled: 10/11/22 11:30
Percent Solids: 94
Initial Volume: 7.9g
Final Volume: 10ml
Extraction Method: 5035

ESS Laboratory Work Order: 22J0374
ESS Laboratory Sample ID: 22J0374-06
Sample Matrix: Soil
Units: mg/kg dry
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
trans-1,2-Dichloroethene	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
trans-1,3-Dichloropropene	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
Trichloroethene	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
Trichlorofluoromethane	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
Vinyl Chloride	ND (0.0067)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
Xylene O	ND (0.0034)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
Xylene P,M	ND (0.0067)		8260B Low		1	10/14/22 15:32	D2J0264	DJ21428
Xylenes (Total)	ND (0.00674)		8260B Low		1	10/14/22 15:32		[CALC]

	%Recovery	Qualifier	Limits
Surrogate: 1,2-Dichloroethane-d4	*115 %*		*70-130*
Surrogate: 4-Bromofluorobenzene	*97 %*		*70-130*
Surrogate: Dibromofluoromethane	*105 %*		*70-130*
Surrogate: Toluene-d8	*98 %*		*70-130*

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St
Client Sample ID: SB-1 MW-3-4
Date Sampled: 10/11/22 11:30
Percent Solids: 94
Initial Volume: 20.3g
Final Volume: 10ml
Extraction Method: 3540C

ESS Laboratory Work Order: 22J0374
ESS Laboratory Sample ID: 22J0374-06
Sample Matrix: Soil
Units: mg/kg dry
Analyst: DMC
Prepared: 10/19/22 14:30

8082A Polychlorinated Biphenyls (PCB)

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Aroclor 1016	ND (0.05)		8082A		1	10/20/22 21:01		DJ21914
Aroclor 1221	ND (0.05)		8082A		1	10/20/22 21:01		DJ21914
Aroclor 1232	ND (0.05)		8082A		1	10/20/22 21:01		DJ21914
Aroclor 1242	ND (0.05)		8082A		1	10/20/22 21:01		DJ21914
Aroclor 1248	ND (0.05)		8082A		1	10/20/22 21:01		DJ21914
Aroclor 1254	ND (0.05)		8082A		1	10/20/22 21:01		DJ21914
Aroclor 1260	ND (0.05)		8082A		1	10/20/22 21:01		DJ21914
Aroclor 1262	ND (0.05)		8082A		1	10/20/22 21:01		DJ21914
Aroclor 1268	ND (0.05)		8082A		1	10/20/22 21:01		DJ21914

	%Recovery	Qualifier	Limits
Surrogate: Decachlorobiphenyl	*75 %*		*30-150*
Surrogate: Decachlorobiphenyl [2C]	*84 %*		*30-150*
Surrogate: Tetrachloro-m-xylene	*91 %*		*30-150*
Surrogate: Tetrachloro-m-xylene [2C]	*87 %*		*30-150*

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St
Client Sample ID: SB-1 MW-3-4
Date Sampled: 10/11/22 11:30
Percent Solids: 94
Initial Volume: 20.5g
Final Volume: 1ml
Extraction Method: 3546

ESS Laboratory Work Order: 22J0374
ESS Laboratory Sample ID: 22J0374-06
Sample Matrix: Soil
Units: mg/kg dry
Analyst: TLW
Prepared: 10/12/22 22:00

8100M Total Petroleum Hydrocarbons

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Total Petroleum Hydrocarbons (C9-C36)	**39.5** (10.4)		8100M		1	10/14/22 9:04		DJ21251

	%Recovery	Qualifier	Limits
Surrogate: O-Terphenyl	*97 %*		*40-140*

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St
Client Sample ID: SB-1 MW-3-4
Date Sampled: 10/11/22 11:30
Percent Solids: 94
Initial Volume: 19.3g
Final Volume: 1ml
Extraction Method: 3546

ESS Laboratory Work Order: 22J0374
ESS Laboratory Sample ID: 22J0374-06
Sample Matrix: Soil
Units: mg/kg dry
Analyst: IBM
Prepared: 10/13/22 18:00

8270D Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,1-Biphenyl	ND (0.028)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
1,2,4-Trichlorobenzene	ND (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
1,2-Dichlorobenzene	ND (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
1,3-Dichlorobenzene	ND (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
1,4-Dichlorobenzene	ND (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
2,4,5-Trichlorophenol	ND (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
2,4,6-Trichlorophenol	ND (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
2,4-Dichlorophenol	ND (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
2,4-Dimethylphenol	ND (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
2,4-Dinitrophenol	ND (1.10)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
2,4-Dinitrotoluene	ND (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
2,6-Dinitrotoluene	ND (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
2-Chloronaphthalene	ND (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
2-Chlorophenol	ND (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
2-Methylnaphthalene	ND (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
2-Methylphenol	ND (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
2-Nitrophenol	ND (0.552)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
3,3′-Dichlorobenzidine	ND (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
3+4-Methylphenol	ND (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
4-Bromophenyl-phenylether	ND (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
4-Chloroaniline	ND (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
4-Nitrophenol	ND (1.10)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
Acenaphthene	ND (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
Acenaphthylene	ND (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
Acetophenone	ND (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
Aniline	ND (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
Anthracene	ND (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
Azobenzene	ND (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
Benzo(a)anthracene	**0.651** (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
Benzo(a)pyrene	**0.686** (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
Benzo(b)fluoranthene	**0.472** (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
Benzo(g,h,i)perylene	**0.366** (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St
Client Sample ID: SB-1 MW-3-4
Date Sampled: 10/11/22 11:30
Percent Solids: 94
Initial Volume: 19.3g
Final Volume: 1ml
Extraction Method: 3546

ESS Laboratory Work Order: 22J0374
ESS Laboratory Sample ID: 22J0374-06
Sample Matrix: Soil
Units: mg/kg dry
Analyst: IBM
Prepared: 10/13/22 18:00

8270D Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Benzo(k)fluoranthene	**0.517** (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
bis(2-Chloroethoxy)methane	ND (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
bis(2-Chloroethyl)ether	ND (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
bis(2-chloroisopropyl)Ether	ND (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
bis(2-Ethylhexyl)phthalate	ND (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
Butylbenzylphthalate	ND (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
Chrysene	**0.592** (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
Dibenzo(a,h)Anthracene	ND (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
Dibenzofuran	ND (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
Diethylphthalate	ND (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
Dimethylphthalate	ND (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
Di-n-butylphthalate	ND (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
Di-n-octylphthalate	ND (0.552)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
Fluoranthene	**0.998** (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
Fluorene	ND (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
Hexachlorobenzene	ND (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
Hexachlorobutadiene	ND (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
Hexachloroethane	ND (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
Indeno(1,2,3-cd)Pyrene	**0.418** (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
Isophorone	ND (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
Naphthalene	ND (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
Nitrobenzene	ND (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
N-Nitrosodimethylamine	ND (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
Pentachlorophenol	ND (1.10)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
Phenanthrene	**0.491** (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
Phenol	ND (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357
Pyrene	**0.915** (0.276)		8270D		1	10/20/22 22:35	D2J0347	DJ21357

	%Recovery	Qualifier	Limits
Surrogate: 1,2-Dichlorobenzene-d4	*80 %*		*30-130*
Surrogate: 2,4,6-Tribromophenol	*115 %*		*30-130*
Surrogate: 2-Chlorophenol-d4	*77 %*		*30-130*

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St
Client Sample ID: SB-1 MW-3-4
Date Sampled: 10/11/22 11:30
Percent Solids: 94
Initial Volume: 19.3g
Final Volume: 1ml
Extraction Method: 3546

ESS Laboratory Work Order: 22J0374
ESS Laboratory Sample ID: 22J0374-06
Sample Matrix: Soil
Units: mg/kg dry
Analyst: IBM
Prepared: 10/13/22 18:00

8270D Semi-Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Surrogate: 2-Fluorobiphenyl		*73 %*		*30-130*				
Surrogate: 2-Fluorophenol		*72 %*		*30-130*				
Surrogate: Nitrobenzene-d5		*59 %*		*30-130*				
Surrogate: Phenol-d6		*74 %*		*30-130*				
Surrogate: p-Terphenyl-d14		*91 %*		*30-130*				

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St
Client Sample ID: SB-1 MW-3-4
Date Sampled: 10/11/22 11:30
Percent Solids: 94

ESS Laboratory Work Order: 22J0374
ESS Laboratory Sample ID: 22J0374-06
Sample Matrix: Soil

Classical Chemistry

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Units	Batch
Conductivity	**WL 1300** (5)		9050A		1	JLK	10/13/22 19:23	umhos/cm	DJ21352
Corrosivity (pH)	**7.18** (N/A)		9045		1	JLK	10/12/22 22:54	S.U.	DJ21263
Corrosivity (pH) Sample Temp	**Soil pH measured in water at 21.2 ºC.**								
Flashpoint	**> 200** (N/A)		1010A		1	CCP	10/13/22 16:00	°F	DJ21343
Reactive Cyanide	ND (2.0)		7.3.3.2		1	JLK	10/14/22 17:05	mg/kg	DJ21442
Reactive Sulfide	ND (2.0)		7.3.4.1		1	JLK	10/14/22 17:05	mg/kg	DJ21442

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St
Client Sample ID: Trip Blank
Date Sampled: 10/11/22 00:00
Percent Solids: N/A
Initial Volume: 5g
Final Volume: 10ml
Extraction Method: 5035

ESS Laboratory Work Order: 22J0374
ESS Laboratory Sample ID: 22J0374-07
Sample Matrix: Solid
Units: mg/kg wet
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,1,1,2-Tetrachloroethane	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
1,1,1-Trichloroethane	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
1,1,2,2-Tetrachloroethane	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
1,1,2-Trichloroethane	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
1,1-Dichloroethane	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
1,1-Dichloroethene	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
1,1-Dichloropropene	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
1,2,3-Trichlorobenzene	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
1,2,3-Trichloropropane	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
1,2,4-Trichlorobenzene	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
1,2,4-Trimethylbenzene	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
1,2-Dibromo-3-Chloropropane	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
1,2-Dibromoethane	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
1,2-Dichlorobenzene	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
1,2-Dichloroethane	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
1,2-Dichloropropane	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
1,3,5-Trimethylbenzene	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
1,3-Dichlorobenzene	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
1,3-Dichloropropane	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
1,4-Dichlorobenzene	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
1,4-Dioxane	ND (0.0800)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
2,2-Dichloropropane	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
2-Butanone	ND (0.0500)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
2-Chlorotoluene	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
2-Hexanone	ND (0.0500)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
4-Chlorotoluene	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
4-Isopropyltoluene	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
4-Methyl-2-Pentanone	ND (0.0500)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
Acetone	**0.0588** (0.0500)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
Benzene	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
Bromobenzene	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
Bromochloromethane	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St
Client Sample ID: Trip Blank
Date Sampled: 10/11/22 00:00
Percent Solids: N/A
Initial Volume: 5g
Final Volume: 10ml
Extraction Method: 5035

ESS Laboratory Work Order: 22J0374
ESS Laboratory Sample ID: 22J0374-07
Sample Matrix: Solid
Units: mg/kg wet
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Bromodichloromethane	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
Bromoform	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
Bromomethane	ND (0.0100)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
Carbon Disulfide	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
Carbon Tetrachloride	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
Chlorobenzene	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
Chloroethane	ND (0.0100)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
Chloroform	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
Chloromethane	ND (0.0100)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
cis-1,2-Dichloroethene	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
cis-1,3-Dichloropropene	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
Dibromochloromethane	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
Dibromomethane	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
Dichlorodifluoromethane	ND (0.0100)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
Diethyl Ether	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
Di-isopropyl ether	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
Ethyl tertiary-butyl ether	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
Ethylbenzene	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
Hexachlorobutadiene	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
Isopropylbenzene	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
Methyl tert-Butyl Ether	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
Methylene Chloride	ND (0.0250)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
Naphthalene	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
n-Butylbenzene	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
n-Propylbenzene	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
sec-Butylbenzene	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
Styrene	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
tert-Butylbenzene	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
Tertiary-amyl methyl ether	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
Tetrachloroethene	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
Tetrahydrofuran	**0.0486** (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
Toluene	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St
Client Sample ID: Trip Blank
Date Sampled: 10/11/22 00:00
Percent Solids: N/A
Initial Volume: 5g
Final Volume: 10ml
Extraction Method: 5035

ESS Laboratory Work Order: 22J0374
ESS Laboratory Sample ID: 22J0374-07
Sample Matrix: Solid
Units: mg/kg wet
Analyst: MEK

5035/8260B Volatile Organic Compounds / Low Level

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
trans-1,2-Dichloroethene	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
trans-1,3-Dichloropropene	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
Trichloroethene	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
Trichlorofluoromethane	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
Vinyl Chloride	ND (0.0100)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
Xylene O	ND (0.0050)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
Xylene P,M	ND (0.0100)		8260B Low		1	10/13/22 17:10	D2J0227	DJ21328
Xylenes (Total)	ND (0.0100)		8260B Low		1	10/13/22 17:10		[CALC]

	%Recovery	*Qualifier*	*Limits*
Surrogate: 1,2-Dichloroethane-d4	*108 %*		*70-130*
Surrogate: 4-Bromofluorobenzene	*98 %*		*70-130*
Surrogate: Dibromofluoromethane	*101 %*		*70-130*
Surrogate: Toluene-d8	*99 %*		*70-130*

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St

ESS Laboratory Work Order: 22J0374

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Total Metals										
Batch DJ21729 - 3050B										
Blank										
Antimony	ND	5.00	mg/kg wet							
Arsenic	ND	2.50	mg/kg wet							
Barium	ND	2.50	mg/kg wet							
Beryllium	ND	0.11	mg/kg wet							
Cadmium	ND	0.50	mg/kg wet							
Chromium	ND	1.00	mg/kg wet							
Lead	ND	5.00	mg/kg wet							
Nickel	ND	2.50	mg/kg wet							
Selenium	ND	5.00	mg/kg wet							
Silver	ND	0.50	mg/kg wet							
Thallium	ND	5.00	mg/kg wet							
Vanadium	ND	1.00	mg/kg wet							
Zinc	ND	2.50	mg/kg wet							
LCS										
Antimony	54.7	14.7	mg/kg wet	59.10		93	80-120			
Arsenic	61.7	7.35	mg/kg wet	65.20		95	80-120			
Barium	583	7.35	mg/kg wet	626.0		93	80-120			
Beryllium	66.9	0.32	mg/kg wet	72.20		93	80-120			
Cadmium	103	1.47	mg/kg wet	118.0		87	80-120			
Chromium	143	2.94	mg/kg wet	159.0		90	80-120			
Lead	203	14.7	mg/kg wet	230.0		88	80-120			
Nickel	171	7.35	mg/kg wet	183.0		94	80-120			
Selenium	48.4	14.7	mg/kg wet	55.70		87	80-120			
Silver	43.7	1.47	mg/kg wet	46.20		95	80-120			
Thallium	74.8	14.7	mg/kg wet	83.30		90	80-120			
Vanadium	85.3	2.94	mg/kg wet	94.80		90	80-120			
Zinc	328	7.35	mg/kg wet	375.0		88	80-120			
LCS Dup										
Antimony	55.1	14.3	mg/kg wet	59.10		93	80-120	0.8	20	
Arsenic	64.8	7.14	mg/kg wet	65.20		99	80-120	5	20	
Barium	615	7.14	mg/kg wet	626.0		98	80-120	5	20	
Beryllium	69.3	0.31	mg/kg wet	72.20		96	80-120	4	20	
Cadmium	106	1.43	mg/kg wet	118.0		90	80-120	4	20	
Chromium	148	2.86	mg/kg wet	159.0		93	80-120	4	20	
Lead	209	14.3	mg/kg wet	230.0		91	80-120	3	20	
Nickel	177	7.14	mg/kg wet	183.0		97	80-120	3	20	
Selenium	49.3	14.3	mg/kg wet	55.70		88	80-120	2	20	
Silver	45.1	1.43	mg/kg wet	46.20		98	80-120	3	20	
Thallium	77.1	14.3	mg/kg wet	83.30		93	80-120	3	20	
Vanadium	88.6	2.86	mg/kg wet	94.80		93	80-120	4	20	
Zinc	342	7.14	mg/kg wet	375.0		91	80-120	4	20	
Batch DJ21739 - 245.1/7470A										
Blank										

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St

ESS Laboratory Work Order: 22J0374

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Total Metals										
Batch DJ21739 - 245.1/7470A										
Mercury	ND	0.033	mg/kg wet							
LCS										
Mercury	3.84	0.609	mg/kg wet	3.310		116	80-120			
LCS Dup										
Mercury	3.36	0.609	mg/kg wet	3.310		101	80-120	13	20	
5035/8260B Volatile Organic Compounds / Low Level										
Batch DJ21328 - 5035										
Blank										
1,1,1,2-Tetrachloroethane	ND	0.0050	mg/kg wet							
1,1,1,2-Tetrachloroethane	ND	0.0050	mg/kg wet							
1,1,1-Trichloroethane	ND	0.0050	mg/kg wet							
1,1,1-Trichloroethane	ND	0.0050	mg/kg wet							
1,1,2,2-Tetrachloroethane	ND	0.0020	mg/kg wet							
1,1,2,2-Tetrachloroethane	ND	0.0050	mg/kg wet							
1,1,2-Trichloroethane	ND	0.0050	mg/kg wet							
1,1,2-Trichloroethane	ND	0.0050	mg/kg wet							
1,1-Dichloroethane	ND	0.0050	mg/kg wet							
1,1-Dichloroethane	ND	0.0050	mg/kg wet							
1,1-Dichloroethene	ND	0.0050	mg/kg wet							
1,1-Dichloroethene	ND	0.0050	mg/kg wet							
1,1-Dichloropropene	ND	0.0050	mg/kg wet							
1,1-Dichloropropene	ND	0.0050	mg/kg wet							
1,2,3-Trichlorobenzene	ND	0.0050	mg/kg wet							
1,2,3-Trichlorobenzene	ND	0.0050	mg/kg wet							
1,2,3-Trichloropropane	ND	0.0050	mg/kg wet							
1,2,3-Trichloropropane	ND	0.0050	mg/kg wet							
1,2,4-Trichlorobenzene	ND	0.0050	mg/kg wet							
1,2,4-Trichlorobenzene	ND	0.0050	mg/kg wet							
1,2,4-Trimethylbenzene	ND	0.0050	mg/kg wet							
1,2-Dibromo-3-Chloropropane	ND	0.0050	mg/kg wet							
1,2-Dibromo-3-Chloropropane	ND	0.0050	mg/kg wet							
1,2-Dibromoethane	ND	0.0050	mg/kg wet							
1,2-Dichlorobenzene	ND	0.0050	mg/kg wet							
1,2-Dichlorobenzene	ND	0.0050	mg/kg wet							
1,2-Dichloroethane	ND	0.0050	mg/kg wet							
1,2-Dichloroethane	ND	0.0050	mg/kg wet							
1,2-Dichloropropane	ND	0.0050	mg/kg wet							
1,2-Dichloropropane	ND	0.0050	mg/kg wet							
1,3,5-Trimethylbenzene	ND	0.0050	mg/kg wet							
1,3-Dichlorobenzene	ND	0.0050	mg/kg wet							
1,3-Dichlorobenzene	ND	0.0050	mg/kg wet							
1,3-Dichloropropane	ND	0.0050	mg/kg wet							
1,3-Dichloropropane	ND	0.0050	mg/kg wet							

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St

ESS Laboratory Work Order: 22J0374

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
5035/8260B Volatile Organic Compounds / Low Level										
Batch DJ21328 - 5035										
1,4-Dichlorobenzene	ND	0.0050	mg/kg wet							
1,4-Dichlorobenzene	ND	0.0050	mg/kg wet							
1,4-Dioxane	ND	0.0800	mg/kg wet							
2,2-Dichloropropane	ND	0.0050	mg/kg wet							
2,2-Dichloropropane	ND	0.0050	mg/kg wet							
2-Butanone	ND	0.0500	mg/kg wet							
2-Chlorotoluene	ND	0.0050	mg/kg wet							
2-Chlorotoluene	ND	0.0050	mg/kg wet							
2-Hexanone	ND	0.0500	mg/kg wet							
4-Chlorotoluene	ND	0.0050	mg/kg wet							
4-Chlorotoluene	ND	0.0050	mg/kg wet							
4-Isopropyltoluene	ND	0.0050	mg/kg wet							
4-Methyl-2-Pentanone	ND	0.0500	mg/kg wet							
Acetone	ND	0.0500	mg/kg wet							
Benzene	ND	0.0050	mg/kg wet							
Bromobenzene	ND	0.0050	mg/kg wet							
Bromochloromethane	ND	0.0050	mg/kg wet							
Bromochloromethane	ND	0.0050	mg/kg wet							
Bromodichloromethane	ND	0.0050	mg/kg wet							
Bromodichloromethane	ND	0.0050	mg/kg wet							
Bromoform	ND	0.0050	mg/kg wet							
Bromomethane	ND	0.0100	mg/kg wet							
Carbon Disulfide	ND	0.0050	mg/kg wet							
Carbon Tetrachloride	ND	0.0050	mg/kg wet							
Chlorobenzene	ND	0.0050	mg/kg wet							
Chlorobenzene	ND	0.0050	mg/kg wet							
Chloroethane	ND	0.0100	mg/kg wet							
Chloroethane	ND	0.0100	mg/kg wet							
Chloroform	ND	0.0050	mg/kg wet							
Chloroform	ND	0.0050	mg/kg wet							
Chloromethane	ND	0.0100	mg/kg wet							
Chloromethane	ND	0.0100	mg/kg wet							
cis-1,2-Dichloroethene	ND	0.0050	mg/kg wet							
cis-1,2-Dichloroethene	ND	0.0050	mg/kg wet							
cis-1,3-Dichloropropene	ND	0.0050	mg/kg wet							
cis-1,3-Dichloropropene	ND	0.0050	mg/kg wet							
Dibromochloromethane	ND	0.0050	mg/kg wet							
Dibromochloromethane	ND	0.0020	mg/kg wet							
Dibromomethane	ND	0.0050	mg/kg wet							
Dichlorodifluoromethane	ND	0.0100	mg/kg wet							
Dichlorodifluoromethane	ND	0.0100	mg/kg wet							
Diethyl Ether	ND	0.0050	mg/kg wet							
Di-isopropyl ether	ND	0.0050	mg/kg wet							
Ethyl tertiary-butyl ether	ND	0.0050	mg/kg wet							
Ethylbenzene	ND	0.0050	mg/kg wet							

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St

ESS Laboratory Work Order: 22J0374

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
5035/8260B Volatile Organic Compounds / Low Level										
Batch DJ21328 - 5035										
Hexachlorobutadiene	ND	0.0050	mg/kg wet							
Hexachlorobutadiene	ND	0.0050	mg/kg wet							
Isopropylbenzene	ND	0.0050	mg/kg wet							
Methyl tert-Butyl Ether	ND	0.0050	mg/kg wet							
Methylene Chloride	ND	0.0100	mg/kg wet							
Methylene Chloride	ND	0.0250	mg/kg wet							
Naphthalene	ND	0.0050	mg/kg wet							
n-Butylbenzene	ND	0.0050	mg/kg wet							
n-Propylbenzene	ND	0.0050	mg/kg wet							
sec-Butylbenzene	ND	0.0050	mg/kg wet							
Styrene	ND	0.0050	mg/kg wet							
tert-Butylbenzene	ND	0.0050	mg/kg wet							
Tertiary-amyl methyl ether	ND	0.0050	mg/kg wet							
Tetrachloroethene	ND	0.0050	mg/kg wet							
Tetrachloroethene	ND	0.0050	mg/kg wet							
Tetrahydrofuran	0.00		mg/kg wet							
Tetrahydrofuran	ND	0.0050	mg/kg wet							
Toluene	ND	0.0050	mg/kg wet							
trans-1,2-Dichloroethene	ND	0.0050	mg/kg wet							
trans-1,2-Dichloroethene	ND	0.0050	mg/kg wet							
trans-1,3-Dichloropropene	ND	0.0050	mg/kg wet							
trans-1,3-Dichloropropene	ND	0.0050	mg/kg wet							
Trichloroethene	ND	0.0050	mg/kg wet							
Trichloroethene	ND	0.0050	mg/kg wet							
Trichlorofluoromethane	ND	0.0050	mg/kg wet							
Trichlorofluoromethane	ND	0.0050	mg/kg wet							
Vinyl Chloride	ND	0.0100	mg/kg wet							
Vinyl Chloride	ND	0.0100	mg/kg wet							
Xylene O	ND	0.0050	mg/kg wet							
Xylene P,M	ND	0.0100	mg/kg wet							
Surrogate: 1,2-Dichloroethane-d4	*0.0504*		mg/kg wet	*0.05000*		*101*	*70-130*			
Surrogate: 1,2-Dichloroethane-d4	*0.0504*		mg/kg wet	*0.05000*		*101*	*70-130*			
Surrogate: 4-Bromofluorobenzene	*0.0489*		mg/kg wet	*0.05000*		*98*	*70-130*			
Surrogate: 4-Bromofluorobenzene	*0.0489*		mg/kg wet	*0.05000*		*98*	*70-130*			
Surrogate: Dibromofluoromethane	*0.0495*		mg/kg wet	*0.05000*		*99*	*70-130*			
Surrogate: Dibromofluoromethane	*0.0495*		mg/kg wet	*0.05000*		*99*	*70-130*			
Surrogate: Toluene-d8	*0.0496*		mg/kg wet	*0.05000*		*99*	*70-130*			
Surrogate: Toluene-d8	*0.0496*		mg/kg wet	*0.05000*		*99*	*70-130*			
LCS										
1,1,1,2-Tetrachloroethane	0.0531	0.0050	mg/kg wet	0.05000		106	70-130			
1,1,1,2-Tetrachloroethane	0.0531	0.0050	mg/kg wet	0.05000		106	70-130			
1,1,1-Trichloroethane	0.0521	0.0050	mg/kg wet	0.05000		104	70-130			
1,1,1-Trichloroethane	0.0521	0.0050	mg/kg wet	0.05000		104	70-130			
1,1,2,2-Tetrachloroethane	0.0532	0.0050	mg/kg wet	0.05000		106	70-130			
1,1,2,2-Tetrachloroethane	0.0532	0.0020	mg/kg wet	0.05000		106	70-130			

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St

ESS Laboratory Work Order: 22J0374

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
5035/8260B Volatile Organic Compounds / Low Level										
Batch DJ21328 - 5035										
1,1,2-Trichloroethane	0.0504	0.0050	mg/kg wet	0.05000		101	70-130			
1,1,2-Trichloroethane	0.0504	0.0050	mg/kg wet	0.05000		101	70-130			
1,1-Dichloroethane	0.0528	0.0050	mg/kg wet	0.05000		106	70-130			
1,1-Dichloroethane	0.0528	0.0050	mg/kg wet	0.05000		106	70-130			
1,1-Dichloroethene	0.0589	0.0050	mg/kg wet	0.05000		118	70-130			
1,1-Dichloroethene	0.0589	0.0050	mg/kg wet	0.05000		118	70-130			
1,1-Dichloropropene	0.0523	0.0050	mg/kg wet	0.05000		105	70-130			
1,1-Dichloropropene	0.0523	0.0050	mg/kg wet	0.05000		105	70-130			
1,2,3-Trichlorobenzene	0.0543	0.0050	mg/kg wet	0.05000		109	70-130			
1,2,3-Trichlorobenzene	0.0543	0.0050	mg/kg wet	0.05000		109	70-130			
1,2,3-Trichloropropane	0.0515	0.0050	mg/kg wet	0.05000		103	70-130			
1,2,3-Trichloropropane	0.0515	0.0050	mg/kg wet	0.05000		103	70-130			
1,2,4-Trichlorobenzene	0.0553	0.0050	mg/kg wet	0.05000		111	70-130			
1,2,4-Trichlorobenzene	0.0553	0.0050	mg/kg wet	0.05000		111	70-130			
1,2,4-Trimethylbenzene	0.0520	0.0050	mg/kg wet	0.05000		104	70-130			
1,2-Dibromo-3-Chloropropane	0.0494	0.0050	mg/kg wet	0.05000		99	70-130			
1,2-Dibromo-3-Chloropropane	0.0494	0.0050	mg/kg wet	0.05000		99	70-130			
1,2-Dibromoethane	0.0535	0.0050	mg/kg wet	0.05000		107	70-130			
1,2-Dichlorobenzene	0.0522	0.0050	mg/kg wet	0.05000		104	70-130			
1,2-Dichlorobenzene	0.0522	0.0050	mg/kg wet	0.05000		104	70-130			
1,2-Dichloroethane	0.0516	0.0050	mg/kg wet	0.05000		103	70-130			
1,2-Dichloroethane	0.0516	0.0050	mg/kg wet	0.05000		103	70-130			
1,2-Dichloropropane	0.0521	0.0050	mg/kg wet	0.05000		104	70-130			
1,2-Dichloropropane	0.0521	0.0050	mg/kg wet	0.05000		104	70-130			
1,3,5-Trimethylbenzene	0.0543	0.0050	mg/kg wet	0.05000		109	70-130			
1,3-Dichlorobenzene	0.0527	0.0050	mg/kg wet	0.05000		105	70-130			
1,3-Dichlorobenzene	0.0527	0.0050	mg/kg wet	0.05000		105	70-130			
1,3-Dichloropropane	0.0545	0.0050	mg/kg wet	0.05000		109	70-130			
1,3-Dichloropropane	0.0545	0.0050	mg/kg wet	0.05000		109	70-130			
1,4-Dichlorobenzene	0.0530	0.0050	mg/kg wet	0.05000		106	70-130			
1,4-Dichlorobenzene	0.0530	0.0050	mg/kg wet	0.05000		106	70-130			
1,4-Dioxane	0.831	0.0800	mg/kg wet	1.000		83	70-130			
2,2-Dichloropropane	0.0536	0.0050	mg/kg wet	0.05000		107	70-130			
2,2-Dichloropropane	0.0536	0.0050	mg/kg wet	0.05000		107	70-130			
2-Butanone	0.299	0.0500	mg/kg wet	0.2500		120	70-130			
2-Chlorotoluene	0.0532	0.0050	mg/kg wet	0.05000		106	70-130			
2-Chlorotoluene	0.0532	0.0050	mg/kg wet	0.05000		106	70-130			
2-Hexanone	0.298	0.0500	mg/kg wet	0.2500		119	70-130			
4-Chlorotoluene	0.0533	0.0050	mg/kg wet	0.05000		107	70-130			
4-Chlorotoluene	0.0533	0.0050	mg/kg wet	0.05000		107	70-130			
4-Isopropyltoluene	0.0532	0.0050	mg/kg wet	0.05000		106	70-130			
4-Methyl-2-Pentanone	0.238	0.0500	mg/kg wet	0.2500		95	70-130			
Acetone	0.326	0.0500	mg/kg wet	0.2500		130	70-130			
Benzene	0.0530	0.0050	mg/kg wet	0.05000		106	70-130			
Bromobenzene	0.0529	0.0050	mg/kg wet	0.05000		106	70-130			

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St

ESS Laboratory Work Order: 22J0374

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
5035/8260B Volatile Organic Compounds / Low Level										
Batch DJ21328 - 5035										
Bromochloromethane	0.0531	0.0050	mg/kg wet	0.05000		106	70-130			
Bromochloromethane	0.0531	0.0050	mg/kg wet	0.05000		106	70-130			
Bromodichloromethane	0.0551	0.0050	mg/kg wet	0.05000		110	70-130			
Bromodichloromethane	0.0551	0.0050	mg/kg wet	0.05000		110	70-130			
Bromoform	0.0458	0.0050	mg/kg wet	0.05000		92	70-130			
Bromomethane	0.0607	0.0100	mg/kg wet	0.05000		121	70-130			
Carbon Disulfide	0.0555	0.0050	mg/kg wet	0.05000		111	70-130			
Carbon Tetrachloride	0.0537	0.0050	mg/kg wet	0.05000		107	70-130			
Chlorobenzene	0.0528	0.0050	mg/kg wet	0.05000		106	70-130			
Chlorobenzene	0.0528	0.0050	mg/kg wet	0.05000		106	70-130			
Chloroethane	0.0577	0.0100	mg/kg wet	0.05000		115	70-130			
Chloroethane	0.0577	0.0100	mg/kg wet	0.05000		115	70-130			
Chloroform	0.0524	0.0050	mg/kg wet	0.05000		105	70-130			
Chloroform	0.0524	0.0050	mg/kg wet	0.05000		105	70-130			
Chloromethane	0.0476	0.0100	mg/kg wet	0.05000		95	70-130			
Chloromethane	0.0476	0.0100	mg/kg wet	0.05000		95	70-130			
cis-1,2-Dichloroethene	0.0540	0.0050	mg/kg wet	0.05000		108	70-130			
cis-1,2-Dichloroethene	0.0540	0.0050	mg/kg wet	0.05000		108	70-130			
cis-1,3-Dichloropropene	0.0509	0.0050	mg/kg wet	0.05000		102	70-130			
cis-1,3-Dichloropropene	0.0509	0.0050	mg/kg wet	0.05000		102	70-130			
Dibromochloromethane	0.0501	0.0050	mg/kg wet	0.05000		100	70-130			
Dibromochloromethane	0.0501	0.0020	mg/kg wet	0.05000		100	70-130			
Dibromomethane	0.0524	0.0050	mg/kg wet	0.05000		105	70-130			
Dichlorodifluoromethane	0.0509	0.0100	mg/kg wet	0.05000		102	70-130			
Dichlorodifluoromethane	0.0509	0.0100	mg/kg wet	0.05000		102	70-130			
Diethyl Ether	0.0528	0.0050	mg/kg wet	0.05000		106	70-130			
Di-isopropyl ether	0.0533	0.0050	mg/kg wet	0.05000		107	70-130			
Ethyl tertiary-butyl ether	0.0524	0.0050	mg/kg wet	0.05000		105	70-130			
Ethylbenzene	0.0528	0.0050	mg/kg wet	0.05000		106	70-130			
Hexachlorobutadiene	0.0540	0.0050	mg/kg wet	0.05000		108	70-130			
Hexachlorobutadiene	0.0540	0.0050	mg/kg wet	0.05000		108	70-130			
Isopropylbenzene	0.0541	0.0050	mg/kg wet	0.05000		108	70-130			
Methyl tert-Butyl Ether	0.0518	0.0050	mg/kg wet	0.05000		104	70-130			
Methylene Chloride	0.0527	0.0250	mg/kg wet	0.05000		105	70-130			
Methylene Chloride	0.0527	0.0100	mg/kg wet	0.05000		105	70-130			
Naphthalene	0.0528	0.0050	mg/kg wet	0.05000		106	70-130			
n-Butylbenzene	0.0546	0.0050	mg/kg wet	0.05000		109	70-130			
n-Propylbenzene	0.0541	0.0050	mg/kg wet	0.05000		108	70-130			
sec-Butylbenzene	0.0516	0.0050	mg/kg wet	0.05000		103	70-130			
Styrene	0.0537	0.0050	mg/kg wet	0.05000		107	70-130			
tert-Butylbenzene	0.0531	0.0050	mg/kg wet	0.05000		106	70-130			
Tertiary-amyl methyl ether	0.0519	0.0050	mg/kg wet	0.05000		104	70-130			
Tetrachloroethene	0.0535	0.0050	mg/kg wet	0.05000		107	70-130			
Tetrachloroethene	0.0535	0.0050	mg/kg wet	0.05000		107	70-130			
Tetrahydrofuran	0.0473	0.0050	mg/kg wet	0.05000		95	70-130			

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St

ESS Laboratory Work Order: 22J0374

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
5035/8260B Volatile Organic Compounds / Low Level										
Batch DJ21328 - 5035										
Tetrahydrofuran	0.0457		mg/kg wet	0.05000		91				
Toluene	0.0519	0.0050	mg/kg wet	0.05000		104	70-130			
trans-1,2-Dichloroethene	0.0565	0.0050	mg/kg wet	0.05000		113	70-130			
trans-1,2-Dichloroethene	0.0565	0.0050	mg/kg wet	0.05000		113	70-130			
trans-1,3-Dichloropropene	0.0475	0.0050	mg/kg wet	0.05000		95	70-130			
trans-1,3-Dichloropropene	0.0475	0.0050	mg/kg wet	0.05000		95	70-130			
Trichloroethene	0.0521	0.0050	mg/kg wet	0.05000		104	70-130			
Trichloroethene	0.0521	0.0050	mg/kg wet	0.05000		104	70-130			
Trichlorofluoromethane	0.0559	0.0050	mg/kg wet	0.05000		112	70-130			
Trichlorofluoromethane	0.0559	0.0050	mg/kg wet	0.05000		112	70-130			
Vinyl Chloride	0.0566	0.0100	mg/kg wet	0.05000		113	70-130			
Vinyl Chloride	0.0566	0.0100	mg/kg wet	0.05000		113	70-130			
Xylene O	0.0543	0.0050	mg/kg wet	0.05000		109	70-130			
Xylene P,M	0.109	0.0100	mg/kg wet	0.1000		109	70-130			
Surrogate: 1,2-Dichloroethane-d4	*0.0501*		mg/kg wet	*0.05000*		*100*	*70-130*			
Surrogate: 1,2-Dichloroethane-d4	*0.0501*		mg/kg wet	*0.05000*		*100*	*70-130*			
Surrogate: 4-Bromofluorobenzene	*0.0502*		mg/kg wet	*0.05000*		*100*	*70-130*			
Surrogate: 4-Bromofluorobenzene	*0.0502*		mg/kg wet	*0.05000*		*100*	*70-130*			
Surrogate: Dibromofluoromethane	*0.0506*		mg/kg wet	*0.05000*		*101*	*70-130*			
Surrogate: Dibromofluoromethane	*0.0506*		mg/kg wet	*0.05000*		*101*	*70-130*			
Surrogate: Toluene-d8	*0.0511*		mg/kg wet	*0.05000*		*102*	*70-130*			
Surrogate: Toluene-d8	*0.0511*		mg/kg wet	*0.05000*		*102*	*70-130*			
LCS Dup										
1,1,1,2-Tetrachloroethane	0.0558	0.0050	mg/kg wet	0.05000		112	70-130	5	20	
1,1,1,2-Tetrachloroethane	0.0558	0.0050	mg/kg wet	0.05000		112	70-130	5	25	
1,1,1-Trichloroethane	0.0545	0.0050	mg/kg wet	0.05000		109	70-130	4	20	
1,1,1-Trichloroethane	0.0545	0.0050	mg/kg wet	0.05000		109	70-130	4	25	
1,1,2,2-Tetrachloroethane	0.0530	0.0020	mg/kg wet	0.05000		106	70-130	0.5	25	
1,1,2,2-Tetrachloroethane	0.0530	0.0050	mg/kg wet	0.05000		106	70-130	0.5	20	
1,1,2-Trichloroethane	0.0514	0.0050	mg/kg wet	0.05000		103	70-130	2	25	
1,1,2-Trichloroethane	0.0514	0.0050	mg/kg wet	0.05000		103	70-130	2	20	
1,1-Dichloroethane	0.0551	0.0050	mg/kg wet	0.05000		110	70-130	4	20	
1,1-Dichloroethane	0.0551	0.0050	mg/kg wet	0.05000		110	70-130	4	25	
1,1-Dichloroethene	0.0617	0.0050	mg/kg wet	0.05000		123	70-130	5	20	
1,1-Dichloroethene	0.0617	0.0050	mg/kg wet	0.05000		123	70-130	5	25	
1,1-Dichloropropene	0.0548	0.0050	mg/kg wet	0.05000		110	70-130	5	20	
1,1-Dichloropropene	0.0548	0.0050	mg/kg wet	0.05000		110	70-130	5	25	
1,2,3-Trichlorobenzene	0.0563	0.0050	mg/kg wet	0.05000		113	70-130	4	20	
1,2,3-Trichlorobenzene	0.0563	0.0050	mg/kg wet	0.05000		113	70-130	4	25	
1,2,3-Trichloropropane	0.0507	0.0050	mg/kg wet	0.05000		101	70-130	1	20	
1,2,3-Trichloropropane	0.0507	0.0050	mg/kg wet	0.05000		101	70-130	1	25	
1,2,4-Trichlorobenzene	0.0573	0.0050	mg/kg wet	0.05000		115	70-130	4	20	
1,2,4-Trichlorobenzene	0.0573	0.0050	mg/kg wet	0.05000		115	70-130	4	25	
1,2,4-Trimethylbenzene	0.0546	0.0050	mg/kg wet	0.05000		109	70-130	5	20	
1,2-Dibromo-3-Chloropropane	0.0479	0.0050	mg/kg wet	0.05000		96	70-130	3	20	

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St

ESS Laboratory Work Order: 22J0374

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
5035/8260B Volatile Organic Compounds / Low Level										
Batch DJ21328 - 5035										
1,2-Dibromo-3-Chloropropane	0.0479	0.0050	mg/kg wet	0.05000		96	70-130	3	25	
1,2-Dibromoethane	0.0542	0.0050	mg/kg wet	0.05000		108	70-130	1	20	
1,2-Dichlorobenzene	0.0539	0.0050	mg/kg wet	0.05000		108	70-130	3	20	
1,2-Dichlorobenzene	0.0539	0.0050	mg/kg wet	0.05000		108	70-130	3	25	
1,2-Dichloroethane	0.0529	0.0050	mg/kg wet	0.05000		106	70-130	3	20	
1,2-Dichloroethane	0.0529	0.0050	mg/kg wet	0.05000		106	70-130	3	25	
1,2-Dichloropropane	0.0539	0.0050	mg/kg wet	0.05000		108	70-130	3	20	
1,2-Dichloropropane	0.0539	0.0050	mg/kg wet	0.05000		108	70-130	3	25	
1,3,5-Trimethylbenzene	0.0567	0.0050	mg/kg wet	0.05000		113	70-130	4	20	
1,3-Dichlorobenzene	0.0558	0.0050	mg/kg wet	0.05000		112	70-130	6	20	
1,3-Dichlorobenzene	0.0558	0.0050	mg/kg wet	0.05000		112	70-130	6	25	
1,3-Dichloropropane	0.0557	0.0050	mg/kg wet	0.05000		111	70-130	2	20	
1,3-Dichloropropane	0.0557	0.0050	mg/kg wet	0.05000		111	70-130	2	25	
1,4-Dichlorobenzene	0.0550	0.0050	mg/kg wet	0.05000		110	70-130	4	20	
1,4-Dichlorobenzene	0.0550	0.0050	mg/kg wet	0.05000		110	70-130	4	25	
1,4-Dioxane	0.816	0.0800	mg/kg wet	1.000		82	70-130	2	20	
2,2-Dichloropropane	0.0560	0.0050	mg/kg wet	0.05000		112	70-130	4	20	
2,2-Dichloropropane	0.0560	0.0050	mg/kg wet	0.05000		112	70-130	4	25	
2-Butanone	0.298	0.0500	mg/kg wet	0.2500		119	70-130	0.5	20	
2-Chlorotoluene	0.0557	0.0050	mg/kg wet	0.05000		111	70-130	5	20	
2-Chlorotoluene	0.0557	0.0050	mg/kg wet	0.05000		111	70-130	5	25	
2-Hexanone	0.285	0.0500	mg/kg wet	0.2500		114	70-130	5	20	
4-Chlorotoluene	0.0561	0.0050	mg/kg wet	0.05000		112	70-130	5	20	
4-Chlorotoluene	0.0561	0.0050	mg/kg wet	0.05000		112	70-130	5	25	
4-Isopropyltoluene	0.0552	0.0050	mg/kg wet	0.05000		110	70-130	4	20	
4-Methyl-2-Pentanone	0.231	0.0500	mg/kg wet	0.2500		93	70-130	3	20	
Acetone	0.321	0.0500	mg/kg wet	0.2500		128	70-130	1	20	
Benzene	0.0552	0.0050	mg/kg wet	0.05000		110	70-130	4	20	
Bromobenzene	0.0558	0.0050	mg/kg wet	0.05000		112	70-130	5	20	
Bromochloromethane	0.0549	0.0050	mg/kg wet	0.05000		110	70-130	3	20	
Bromochloromethane	0.0549	0.0050	mg/kg wet	0.05000		110	70-130	3	25	
Bromodichloromethane	0.0566	0.0050	mg/kg wet	0.05000		113	70-130	3	20	
Bromodichloromethane	0.0566	0.0050	mg/kg wet	0.05000		113	70-130	3	25	
Bromoform	0.0455	0.0050	mg/kg wet	0.05000		91	70-130	0.6	20	
Bromomethane	0.0643	0.0100	mg/kg wet	0.05000		129	70-130	6	20	
Carbon Disulfide	0.0580	0.0050	mg/kg wet	0.05000		116	70-130	4	20	
Carbon Tetrachloride	0.0563	0.0050	mg/kg wet	0.05000		113	70-130	5	20	
Chlorobenzene	0.0557	0.0050	mg/kg wet	0.05000		111	70-130	5	20	
Chlorobenzene	0.0557	0.0050	mg/kg wet	0.05000		111	70-130	5	25	
Chloroethane	0.0601	0.0100	mg/kg wet	0.05000		120	70-130	4	20	
Chloroethane	0.0601	0.0100	mg/kg wet	0.05000		120	70-130	4	25	
Chloroform	0.0549	0.0050	mg/kg wet	0.05000		110	70-130	5	20	
Chloroform	0.0549	0.0050	mg/kg wet	0.05000		110	70-130	5	25	
Chloromethane	0.0497	0.0100	mg/kg wet	0.05000		99	70-130	4	20	
Chloromethane	0.0497	0.0100	mg/kg wet	0.05000		99	70-130	4	25	

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St

ESS Laboratory Work Order: 22J0374

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
5035/8260B Volatile Organic Compounds / Low Level										
Batch DJ21328 - 5035										
cis-1,2-Dichloroethene	0.0567	0.0050	mg/kg wet	0.05000		113	70-130	5	20	
cis-1,2-Dichloroethene	0.0567	0.0050	mg/kg wet	0.05000		113	70-130	5	25	
cis-1,3-Dichloropropene	0.0528	0.0050	mg/kg wet	0.05000		106	70-130	4	20	
cis-1,3-Dichloropropene	0.0528	0.0050	mg/kg wet	0.05000		106	70-130	4	25	
Dibromochloromethane	0.0516	0.0050	mg/kg wet	0.05000		103	70-130	3	20	
Dibromochloromethane	0.0516	0.0020	mg/kg wet	0.05000		103	70-130	3	25	
Dibromomethane	0.0535	0.0050	mg/kg wet	0.05000		107	70-130	2	20	
Dichlorodifluoromethane	0.0528	0.0100	mg/kg wet	0.05000		106	70-130	4	20	
Dichlorodifluoromethane	0.0528	0.0100	mg/kg wet	0.05000		106	70-130	4	25	
Diethyl Ether	0.0542	0.0050	mg/kg wet	0.05000		108	70-130	3	20	
Di-isopropyl ether	0.0553	0.0050	mg/kg wet	0.05000		111	70-130	4	20	
Ethyl tertiary-butyl ether	0.0539	0.0050	mg/kg wet	0.05000		108	70-130	3	20	
Ethylbenzene	0.0553	0.0050	mg/kg wet	0.05000		111	70-130	5	20	
Hexachlorobutadiene	0.0556	0.0050	mg/kg wet	0.05000		111	70-130	3	25	
Hexachlorobutadiene	0.0556	0.0050	mg/kg wet	0.05000		111	70-130	3	20	
Isopropylbenzene	0.0566	0.0050	mg/kg wet	0.05000		113	70-130	4	20	
Methyl tert-Butyl Ether	0.0527	0.0050	mg/kg wet	0.05000		105	70-130	2	20	
Methylene Chloride	0.0544	0.0250	mg/kg wet	0.05000		109	70-130	3	20	
Methylene Chloride	0.0544	0.0100	mg/kg wet	0.05000		109	70-130	3	25	
Naphthalene	0.0534	0.0050	mg/kg wet	0.05000		107	70-130	1	20	
n-Butylbenzene	0.0569	0.0050	mg/kg wet	0.05000		114	70-130	4	20	
n-Propylbenzene	0.0565	0.0050	mg/kg wet	0.05000		113	70-130	4	20	
sec-Butylbenzene	0.0544	0.0050	mg/kg wet	0.05000		109	70-130	5	20	
Styrene	0.0557	0.0050	mg/kg wet	0.05000		111	70-130	4	20	
tert-Butylbenzene	0.0557	0.0050	mg/kg wet	0.05000		111	70-130	5	20	
Tertiary-amyl methyl ether	0.0527	0.0050	mg/kg wet	0.05000		105	70-130	2	20	
Tetrachloroethene	0.0544	0.0050	mg/kg wet	0.05000		109	70-130	2	25	
Tetrachloroethene	0.0544	0.0050	mg/kg wet	0.05000		109	70-130	2	20	
Tetrahydrofuran	0.0473		mg/kg wet	0.05000		95		3		
Tetrahydrofuran	0.0457	0.0050	mg/kg wet	0.05000		91	70-130	3	20	
Toluene	0.0547	0.0050	mg/kg wet	0.05000		109	70-130	5	20	
trans-1,2-Dichloroethene	0.0594	0.0050	mg/kg wet	0.05000		119	70-130	5	25	
trans-1,2-Dichloroethene	0.0594	0.0050	mg/kg wet	0.05000		119	70-130	5	20	
trans-1,3-Dichloropropene	0.0487	0.0050	mg/kg wet	0.05000		97	70-130	2	25	
trans-1,3-Dichloropropene	0.0487	0.0050	mg/kg wet	0.05000		97	70-130	2	20	
Trichloroethene	0.0545	0.0050	mg/kg wet	0.05000		109	70-130	5	25	
Trichloroethene	0.0545	0.0050	mg/kg wet	0.05000		109	70-130	5	20	
Trichlorofluoromethane	0.0585	0.0050	mg/kg wet	0.05000		117	70-130	5	25	
Trichlorofluoromethane	0.0585	0.0050	mg/kg wet	0.05000		117	70-130	5	20	
Vinyl Chloride	0.0590	0.0100	mg/kg wet	0.05000		118	70-130	4	25	
Vinyl Chloride	0.0590	0.0100	mg/kg wet	0.05000		118	70-130	4	20	
Xylene O	0.0567	0.0050	mg/kg wet	0.05000		113	70-130	4	20	
Xylene P,M	0.116	0.0100	mg/kg wet	0.1000		116	70-130	5	20	
Surrogate: 1,2-Dichloroethane-d4	*0.0496*		mg/kg wet	*0.05000*		*99*	*70-130*			
Surrogate: 1,2-Dichloroethane-d4	*0.0496*		mg/kg wet	*0.05000*		*99*	*70-130*			

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St

ESS Laboratory Work Order: 22J0374

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
5035/8260B Volatile Organic Compounds / Low Level										
Batch DJ21328 - 5035										
Surrogate: 4-Bromofluorobenzene	*0.0499*		mg/kg wet	*0.05000*		*100*	*70-130*			
Surrogate: 4-Bromofluorobenzene	*0.0499*		mg/kg wet	*0.05000*		*100*	*70-130*			
Surrogate: Dibromofluoromethane	*0.0507*		mg/kg wet	*0.05000*		*101*	*70-130*			
Surrogate: Dibromofluoromethane	*0.0507*		mg/kg wet	*0.05000*		*101*	*70-130*			
Surrogate: Toluene-d8	*0.0519*		mg/kg wet	*0.05000*		*104*	*70-130*			
Surrogate: Toluene-d8	*0.0519*		mg/kg wet	*0.05000*		*104*	*70-130*			
Batch DJ21428 - 5035										
Blank										
1,1,1,2-Tetrachloroethane	ND	0.0050	mg/kg wet							
1,1,1,2-Tetrachloroethane	ND	0.0050	mg/kg wet							
1,1,1-Trichloroethane	ND	0.0050	mg/kg wet							
1,1,1-Trichloroethane	ND	0.0050	mg/kg wet							
1,1,2,2-Tetrachloroethane	ND	0.0050	mg/kg wet							
1,1,2,2-Tetrachloroethane	ND	0.0020	mg/kg wet							
1,1,2-Trichloroethane	ND	0.0050	mg/kg wet							
1,1,2-Trichloroethane	ND	0.0050	mg/kg wet							
1,1-Dichloroethane	ND	0.0050	mg/kg wet							
1,1-Dichloroethane	ND	0.0050	mg/kg wet							
1,1-Dichloroethene	ND	0.0050	mg/kg wet							
1,1-Dichloroethene	ND	0.0050	mg/kg wet							
1,1-Dichloropropene	ND	0.0050	mg/kg wet							
1,1-Dichloropropene	ND	0.0050	mg/kg wet							
1,2,3-Trichlorobenzene	ND	0.0050	mg/kg wet							
1,2,3-Trichlorobenzene	ND	0.0050	mg/kg wet							
1,2,3-Trichloropropane	ND	0.0050	mg/kg wet							
1,2,3-Trichloropropane	ND	0.0050	mg/kg wet							
1,2,4-Trichlorobenzene	ND	0.0050	mg/kg wet							
1,2,4-Trichlorobenzene	ND	0.0050	mg/kg wet							
1,2,4-Trimethylbenzene	ND	0.0050	mg/kg wet							
1,2-Dibromo-3-Chloropropane	ND	0.0050	mg/kg wet							
1,2-Dibromo-3-Chloropropane	ND	0.0050	mg/kg wet							
1,2-Dibromoethane	ND	0.0050	mg/kg wet							
1,2-Dichlorobenzene	ND	0.0050	mg/kg wet							
1,2-Dichlorobenzene	ND	0.0050	mg/kg wet							
1,2-Dichloroethane	ND	0.0050	mg/kg wet							
1,2-Dichloroethane	ND	0.0050	mg/kg wet							
1,2-Dichloropropane	ND	0.0050	mg/kg wet							
1,2-Dichloropropane	ND	0.0050	mg/kg wet							
1,3,5-Trimethylbenzene	ND	0.0050	mg/kg wet							
1,3-Dichlorobenzene	ND	0.0050	mg/kg wet							
1,3-Dichlorobenzene	ND	0.0050	mg/kg wet							
1,3-Dichloropropane	ND	0.0050	mg/kg wet							
1,3-Dichloropropane	ND	0.0050	mg/kg wet							
1,4-Dichlorobenzene	ND	0.0050	mg/kg wet							

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St

ESS Laboratory Work Order: 22J0374

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
5035/8260B Volatile Organic Compounds / Low Level										
Batch DJ21428 - 5035										
1,4-Dichlorobenzene	ND	0.0050	mg/kg wet							
1,4-Dioxane	ND	0.0800	mg/kg wet							
2,2-Dichloropropane	ND	0.0050	mg/kg wet							
2,2-Dichloropropane	ND	0.0050	mg/kg wet							
2-Butanone	ND	0.0500	mg/kg wet							
2-Chlorotoluene	ND	0.0050	mg/kg wet							
2-Chlorotoluene	ND	0.0050	mg/kg wet							
2-Hexanone	ND	0.0500	mg/kg wet							
4-Chlorotoluene	ND	0.0050	mg/kg wet							
4-Chlorotoluene	ND	0.0050	mg/kg wet							
4-Isopropyltoluene	ND	0.0050	mg/kg wet							
4-Methyl-2-Pentanone	ND	0.0500	mg/kg wet							
Acetone	ND	0.0500	mg/kg wet							
Benzene	ND	0.0050	mg/kg wet							
Bromobenzene	ND	0.0050	mg/kg wet							
Bromochloromethane	ND	0.0050	mg/kg wet							
Bromochloromethane	ND	0.0050	mg/kg wet							
Bromodichloromethane	ND	0.0050	mg/kg wet							
Bromodichloromethane	ND	0.0050	mg/kg wet							
Bromoform	ND	0.0050	mg/kg wet							
Bromomethane	ND	0.0100	mg/kg wet							
Carbon Disulfide	ND	0.0050	mg/kg wet							
Carbon Tetrachloride	ND	0.0050	mg/kg wet							
Chlorobenzene	ND	0.0050	mg/kg wet							
Chlorobenzene	ND	0.0050	mg/kg wet							
Chloroethane	ND	0.0100	mg/kg wet							
Chloroethane	ND	0.0100	mg/kg wet							
Chloroform	ND	0.0050	mg/kg wet							
Chloroform	ND	0.0050	mg/kg wet							
Chloromethane	ND	0.0100	mg/kg wet							
Chloromethane	ND	0.0100	mg/kg wet							
cis-1,2-Dichloroethene	ND	0.0050	mg/kg wet							
cis-1,2-Dichloroethene	ND	0.0050	mg/kg wet							
cis-1,3-Dichloropropene	ND	0.0050	mg/kg wet							
cis-1,3-Dichloropropene	ND	0.0050	mg/kg wet							
Dibromochloromethane	ND	0.0020	mg/kg wet							
Dibromochloromethane	ND	0.0050	mg/kg wet							
Dibromomethane	ND	0.0050	mg/kg wet							
Dichlorodifluoromethane	ND	0.0100	mg/kg wet							
Dichlorodifluoromethane	ND	0.0100	mg/kg wet							
Diethyl Ether	ND	0.0050	mg/kg wet							
Di-isopropyl ether	ND	0.0050	mg/kg wet							
Ethyl tertiary-butyl ether	ND	0.0050	mg/kg wet							
Ethylbenzene	ND	0.0050	mg/kg wet							
Hexachlorobutadiene	ND	0.0050	mg/kg wet							

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St

ESS Laboratory Work Order: 22J0374

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
5035/8260B Volatile Organic Compounds / Low Level										
Batch DJ21428 - 5035										
Hexachlorobutadiene	ND	0.0050	mg/kg wet							
Isopropylbenzene	ND	0.0050	mg/kg wet							
Methyl tert-Butyl Ether	ND	0.0050	mg/kg wet							
Methylene Chloride	ND	0.0100	mg/kg wet							
Methylene Chloride	ND	0.0250	mg/kg wet							
Naphthalene	ND	0.0050	mg/kg wet							
n-Butylbenzene	ND	0.0050	mg/kg wet							
n-Propylbenzene	ND	0.0050	mg/kg wet							
sec-Butylbenzene	ND	0.0050	mg/kg wet							
Styrene	ND	0.0050	mg/kg wet							
tert-Butylbenzene	ND	0.0050	mg/kg wet							
Tertiary-amyl methyl ether	ND	0.0050	mg/kg wet							
Tetrachloroethene	ND	0.0050	mg/kg wet							
Tetrachloroethene	ND	0.0050	mg/kg wet							
Tetrahydrofuran	0.00		mg/kg wet							
Tetrahydrofuran	ND	0.0050	mg/kg wet							
Toluene	ND	0.0050	mg/kg wet							
trans-1,2-Dichloroethene	ND	0.0050	mg/kg wet							
trans-1,2-Dichloroethene	ND	0.0050	mg/kg wet							
trans-1,3-Dichloropropene	ND	0.0050	mg/kg wet							
trans-1,3-Dichloropropene	ND	0.0050	mg/kg wet							
Trichloroethene	ND	0.0050	mg/kg wet							
Trichloroethene	ND	0.0050	mg/kg wet							
Trichlorofluoromethane	ND	0.0050	mg/kg wet							
Trichlorofluoromethane	ND	0.0050	mg/kg wet							
Vinyl Chloride	ND	0.0100	mg/kg wet							
Vinyl Chloride	ND	0.0100	mg/kg wet							
Xylene O	ND	0.0050	mg/kg wet							
Xylene P,M	ND	0.0100	mg/kg wet							
Surrogate: 1,2-Dichloroethane-d4	*0.0527*		mg/kg wet	*0.05000*		*105*	*70-130*			
Surrogate: 1,2-Dichloroethane-d4	*0.0527*		mg/kg wet	*0.05000*		*105*	*70-130*			
Surrogate: 4-Bromofluorobenzene	*0.0484*		mg/kg wet	*0.05000*		*97*	*70-130*			
Surrogate: 4-Bromofluorobenzene	*0.0484*		mg/kg wet	*0.05000*		*97*	*70-130*			
Surrogate: Dibromofluoromethane	*0.0507*		mg/kg wet	*0.05000*		*101*	*70-130*			
Surrogate: Dibromofluoromethane	*0.0507*		mg/kg wet	*0.05000*		*101*	*70-130*			
Surrogate: Toluene-d8	*0.0487*		mg/kg wet	*0.05000*		*97*	*70-130*			
Surrogate: Toluene-d8	*0.0487*		mg/kg wet	*0.05000*		*97*	*70-130*			
LCS										
1,1,1,2-Tetrachloroethane	0.0500	0.0050	mg/kg wet	0.05000		100	70-130			
1,1,1,2-Tetrachloroethane	0.0500	0.0050	mg/kg wet	0.05000		100	70-130			
1,1,1-Trichloroethane	0.0524	0.0050	mg/kg wet	0.05000		105	70-130			
1,1,1-Trichloroethane	0.0524	0.0050	mg/kg wet	0.05000		105	70-130			
1,1,2,2-Tetrachloroethane	0.0501	0.0020	mg/kg wet	0.05000		100	70-130			
1,1,2,2-Tetrachloroethane	0.0501	0.0050	mg/kg wet	0.05000		100	70-130			
1,1,2-Trichloroethane	0.0501	0.0050	mg/kg wet	0.05000		100	70-130			

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St

ESS Laboratory Work Order: 22J0374

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
5035/8260B Volatile Organic Compounds / Low Level										
Batch DJ21428 - 5035										
1,1,2-Trichloroethane	0.0501	0.0050	mg/kg wet	0.05000		100	70-130			
1,1-Dichloroethane	0.0525	0.0050	mg/kg wet	0.05000		105	70-130			
1,1-Dichloroethane	0.0525	0.0050	mg/kg wet	0.05000		105	70-130			
1,1-Dichloroethene	0.0585	0.0050	mg/kg wet	0.05000		117	70-130			
1,1-Dichloroethene	0.0585	0.0050	mg/kg wet	0.05000		117	70-130			
1,1-Dichloropropene	0.0520	0.0050	mg/kg wet	0.05000		104	70-130			
1,1-Dichloropropene	0.0520	0.0050	mg/kg wet	0.05000		104	70-130			
1,2,3-Trichlorobenzene	0.0508	0.0050	mg/kg wet	0.05000		102	70-130			
1,2,3-Trichlorobenzene	0.0508	0.0050	mg/kg wet	0.05000		102	70-130			
1,2,3-Trichloropropane	0.0475	0.0050	mg/kg wet	0.05000		95	70-130			
1,2,3-Trichloropropane	0.0475	0.0050	mg/kg wet	0.05000		95	70-130			
1,2,4-Trichlorobenzene	0.0517	0.0050	mg/kg wet	0.05000		103	70-130			
1,2,4-Trichlorobenzene	0.0517	0.0050	mg/kg wet	0.05000		103	70-130			
1,2,4-Trimethylbenzene	0.0508	0.0050	mg/kg wet	0.05000		102	70-130			
1,2-Dibromo-3-Chloropropane	0.0426	0.0050	mg/kg wet	0.05000		85	70-130			
1,2-Dibromo-3-Chloropropane	0.0426	0.0050	mg/kg wet	0.05000		85	70-130			
1,2-Dibromoethane	0.0494	0.0050	mg/kg wet	0.05000		99	70-130			
1,2-Dichlorobenzene	0.0510	0.0050	mg/kg wet	0.05000		102	70-130			
1,2-Dichlorobenzene	0.0510	0.0050	mg/kg wet	0.05000		102	70-130			
1,2-Dichloroethane	0.0503	0.0050	mg/kg wet	0.05000		101	70-130			
1,2-Dichloroethane	0.0503	0.0050	mg/kg wet	0.05000		101	70-130			
1,2-Dichloropropane	0.0518	0.0050	mg/kg wet	0.05000		104	70-130			
1,2-Dichloropropane	0.0518	0.0050	mg/kg wet	0.05000		104	70-130			
1,3,5-Trimethylbenzene	0.0529	0.0050	mg/kg wet	0.05000		106	70-130			
1,3-Dichlorobenzene	0.0517	0.0050	mg/kg wet	0.05000		103	70-130			
1,3-Dichlorobenzene	0.0517	0.0050	mg/kg wet	0.05000		103	70-130			
1,3-Dichloropropane	0.0512	0.0050	mg/kg wet	0.05000		102	70-130			
1,3-Dichloropropane	0.0512	0.0050	mg/kg wet	0.05000		102	70-130			
1,4-Dichlorobenzene	0.0520	0.0050	mg/kg wet	0.05000		104	70-130			
1,4-Dichlorobenzene	0.0520	0.0050	mg/kg wet	0.05000		104	70-130			
1,4-Dioxane	0.748	0.0800	mg/kg wet	1.000		75	70-130			
2,2-Dichloropropane	0.0535	0.0050	mg/kg wet	0.05000		107	70-130			
2,2-Dichloropropane	0.0535	0.0050	mg/kg wet	0.05000		107	70-130			
2-Butanone	0.271	0.0500	mg/kg wet	0.2500		109	70-130			
2-Chlorotoluene	0.0531	0.0050	mg/kg wet	0.05000		106	70-130			
2-Chlorotoluene	0.0531	0.0050	mg/kg wet	0.05000		106	70-130			
2-Hexanone	0.241	0.0500	mg/kg wet	0.2500		96	70-130			
4-Chlorotoluene	0.0523	0.0050	mg/kg wet	0.05000		105	70-130			
4-Chlorotoluene	0.0523	0.0050	mg/kg wet	0.05000		105	70-130			
4-Isopropyltoluene	0.0508	0.0050	mg/kg wet	0.05000		102	70-130			
4-Methyl-2-Pentanone	0.217	0.0500	mg/kg wet	0.2500		87	70-130			
Acetone	0.273	0.0500	mg/kg wet	0.2500		109	70-130			
Benzene	0.0529	0.0050	mg/kg wet	0.05000		106	70-130			
Bromobenzene	0.0524	0.0050	mg/kg wet	0.05000		105	70-130			
Bromochloromethane	0.0526	0.0050	mg/kg wet	0.05000		105	70-130			

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St

ESS Laboratory Work Order: 22J0374

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
5035/8260B Volatile Organic Compounds / Low Level										
Batch DJ21428 - 5035										
Bromochloromethane	0.0526	0.0050	mg/kg wet	0.05000		105	70-130			
Bromodichloromethane	0.0538	0.0050	mg/kg wet	0.05000		108	70-130			
Bromodichloromethane	0.0538	0.0050	mg/kg wet	0.05000		108	70-130			
Bromoform	0.0400	0.0050	mg/kg wet	0.05000		80	70-130			
Bromomethane	0.0625	0.0100	mg/kg wet	0.05000		125	70-130			
Carbon Disulfide	0.0545	0.0050	mg/kg wet	0.05000		109	70-130			
Carbon Tetrachloride	0.0528	0.0050	mg/kg wet	0.05000		106	70-130			
Chlorobenzene	0.0509	0.0050	mg/kg wet	0.05000		102	70-130			
Chlorobenzene	0.0509	0.0050	mg/kg wet	0.05000		102	70-130			
Chloroethane	0.0577	0.0100	mg/kg wet	0.05000		115	70-130			
Chloroethane	0.0577	0.0100	mg/kg wet	0.05000		115	70-130			
Chloroform	0.0519	0.0050	mg/kg wet	0.05000		104	70-130			
Chloroform	0.0519	0.0050	mg/kg wet	0.05000		104	70-130			
Chloromethane	0.0439	0.0100	mg/kg wet	0.05000		88	70-130			
Chloromethane	0.0439	0.0100	mg/kg wet	0.05000		88	70-130			
cis-1,2-Dichloroethene	0.0540	0.0050	mg/kg wet	0.05000		108	70-130			
cis-1,2-Dichloroethene	0.0540	0.0050	mg/kg wet	0.05000		108	70-130			
cis-1,3-Dichloropropene	0.0503	0.0050	mg/kg wet	0.05000		101	70-130			
cis-1,3-Dichloropropene	0.0503	0.0050	mg/kg wet	0.05000		101	70-130			
Dibromochloromethane	0.0459	0.0020	mg/kg wet	0.05000		92	70-130			
Dibromochloromethane	0.0459	0.0050	mg/kg wet	0.05000		92	70-130			
Dibromomethane	0.0506	0.0050	mg/kg wet	0.05000		101	70-130			
Dichlorodifluoromethane	0.0493	0.0100	mg/kg wet	0.05000		99	70-130			
Dichlorodifluoromethane	0.0493	0.0100	mg/kg wet	0.05000		99	70-130			
Diethyl Ether	0.0521	0.0050	mg/kg wet	0.05000		104	70-130			
Di-isopropyl ether	0.0528	0.0050	mg/kg wet	0.05000		106	70-130			
Ethyl tertiary-butyl ether	0.0523	0.0050	mg/kg wet	0.05000		105	70-130			
Ethylbenzene	0.0509	0.0050	mg/kg wet	0.05000		102	70-130			
Hexachlorobutadiene	0.0522	0.0050	mg/kg wet	0.05000		104	70-130			
Hexachlorobutadiene	0.0522	0.0050	mg/kg wet	0.05000		104	70-130			
Isopropylbenzene	0.0535	0.0050	mg/kg wet	0.05000		107	70-130			
Methyl tert-Butyl Ether	0.0513	0.0050	mg/kg wet	0.05000		103	70-130			
Methylene Chloride	0.0521	0.0250	mg/kg wet	0.05000		104	70-130			
Methylene Chloride	0.0521	0.0100	mg/kg wet	0.05000		104	70-130			
Naphthalene	0.0469	0.0050	mg/kg wet	0.05000		94	70-130			
n-Butylbenzene	0.0525	0.0050	mg/kg wet	0.05000		105	70-130			
n-Propylbenzene	0.0535	0.0050	mg/kg wet	0.05000		107	70-130			
sec-Butylbenzene	0.0509	0.0050	mg/kg wet	0.05000		102	70-130			
Styrene	0.0510	0.0050	mg/kg wet	0.05000		102	70-130			
tert-Butylbenzene	0.0519	0.0050	mg/kg wet	0.05000		104	70-130			
Tertiary-amyl methyl ether	0.0520	0.0050	mg/kg wet	0.05000		104	70-130			
Tetrachloroethene	0.0454	0.0050	mg/kg wet	0.05000		91	70-130			
Tetrachloroethene	0.0454	0.0050	mg/kg wet	0.05000		91	70-130			
Tetrahydrofuran	0.0416	0.0050	mg/kg wet	0.05000		83	70-130			
Tetrahydrofuran	0.0416		mg/kg wet	0.05000		83				

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St

ESS Laboratory Work Order: 22J0374

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
5035/8260B Volatile Organic Compounds / Low Level										
Batch DJ21428 - 5035										
Toluene	0.0525	0.0050	mg/kg wet	0.05000		105	70-130			
trans-1,2-Dichloroethene	0.0565	0.0050	mg/kg wet	0.05000		113	70-130			
trans-1,2-Dichloroethene	0.0565	0.0050	mg/kg wet	0.05000		113	70-130			
trans-1,3-Dichloropropene	0.0470	0.0050	mg/kg wet	0.05000		94	70-130			
trans-1,3-Dichloropropene	0.0470	0.0050	mg/kg wet	0.05000		94	70-130			
Trichloroethene	0.0515	0.0050	mg/kg wet	0.05000		103	70-130			
Trichloroethene	0.0515	0.0050	mg/kg wet	0.05000		103	70-130			
Trichlorofluoromethane	0.0553	0.0050	mg/kg wet	0.05000		111	70-130			
Trichlorofluoromethane	0.0553	0.0050	mg/kg wet	0.05000		111	70-130			
Vinyl Chloride	0.0531	0.0100	mg/kg wet	0.05000		106	70-130			
Vinyl Chloride	0.0531	0.0100	mg/kg wet	0.05000		106	70-130			
Xylene O	0.0523	0.0050	mg/kg wet	0.05000		105	70-130			
Xylene P,M	0.105	0.0100	mg/kg wet	0.1000		105	70-130			
Surrogate: 1,2-Dichloroethane-d4	*0.0512*		mg/kg wet	*0.05000*		*102*	*70-130*			
Surrogate: 1,2-Dichloroethane-d4	*0.0512*		mg/kg wet	*0.05000*		*102*	*70-130*			
Surrogate: 4-Bromofluorobenzene	*0.0489*		mg/kg wet	*0.05000*		*98*	*70-130*			
Surrogate: 4-Bromofluorobenzene	*0.0489*		mg/kg wet	*0.05000*		*98*	*70-130*			
Surrogate: Dibromofluoromethane	*0.0516*		mg/kg wet	*0.05000*		*103*	*70-130*			
Surrogate: Dibromofluoromethane	*0.0516*		mg/kg wet	*0.05000*		*103*	*70-130*			
Surrogate: Toluene-d8	*0.0501*		mg/kg wet	*0.05000*		*100*	*70-130*			
Surrogate: Toluene-d8	*0.0501*		mg/kg wet	*0.05000*		*100*	*70-130*			
LCS Dup										
1,1,1,2-Tetrachloroethane	0.0538	0.0050	mg/kg wet	0.05000		108	70-130	7	20	
1,1,1,2-Tetrachloroethane	0.0538	0.0050	mg/kg wet	0.05000		108	70-130	7	25	
1,1,1-Trichloroethane	0.0564	0.0050	mg/kg wet	0.05000		113	70-130	7	20	
1,1,1-Trichloroethane	0.0564	0.0050	mg/kg wet	0.05000		113	70-130	7	25	
1,1,2,2-Tetrachloroethane	0.0555	0.0050	mg/kg wet	0.05000		111	70-130	10	20	
1,1,2,2-Tetrachloroethane	0.0555	0.0020	mg/kg wet	0.05000		111	70-130	10	25	
1,1,2-Trichloroethane	0.0552	0.0050	mg/kg wet	0.05000		110	70-130	10	20	
1,1,2-Trichloroethane	0.0552	0.0050	mg/kg wet	0.05000		110	70-130	10	25	
1,1-Dichloroethane	0.0569	0.0050	mg/kg wet	0.05000		114	70-130	8	25	
1,1-Dichloroethane	0.0569	0.0050	mg/kg wet	0.05000		114	70-130	8	20	
1,1-Dichloroethene	0.0636	0.0050	mg/kg wet	0.05000		127	70-130	8	25	
1,1-Dichloroethene	0.0636	0.0050	mg/kg wet	0.05000		127	70-130	8	20	
1,1-Dichloropropene	0.0558	0.0050	mg/kg wet	0.05000		112	70-130	7	25	
1,1-Dichloropropene	0.0558	0.0050	mg/kg wet	0.05000		112	70-130	7	20	
1,2,3-Trichlorobenzene	0.0564	0.0050	mg/kg wet	0.05000		113	70-130	11	25	
1,2,3-Trichlorobenzene	0.0564	0.0050	mg/kg wet	0.05000		113	70-130	11	20	
1,2,3-Trichloropropane	0.0535	0.0050	mg/kg wet	0.05000		107	70-130	12	20	
1,2,3-Trichloropropane	0.0535	0.0050	mg/kg wet	0.05000		107	70-130	12	25	
1,2,4-Trichlorobenzene	0.0572	0.0050	mg/kg wet	0.05000		114	70-130	10	20	
1,2,4-Trichlorobenzene	0.0572	0.0050	mg/kg wet	0.05000		114	70-130	10	25	
1,2,4-Trimethylbenzene	0.0545	0.0050	mg/kg wet	0.05000		109	70-130	7	20	
1,2-Dibromo-3-Chloropropane	0.0495	0.0050	mg/kg wet	0.05000		99	70-130	15	20	
1,2-Dibromo-3-Chloropropane	0.0495	0.0050	mg/kg wet	0.05000		99	70-130	15	25	

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St

ESS Laboratory Work Order: 22J0374

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
5035/8260B Volatile Organic Compounds / Low Level										
Batch DJ21428 - 5035										
1,2-Dibromoethane	0.0545	0.0050	mg/kg wet	0.05000		109	70-130	10	20	
1,2-Dichlorobenzene	0.0550	0.0050	mg/kg wet	0.05000		110	70-130	7	25	
1,2-Dichlorobenzene	0.0550	0.0050	mg/kg wet	0.05000		110	70-130	7	20	
1,2-Dichloroethane	0.0556	0.0050	mg/kg wet	0.05000		111	70-130	10	25	
1,2-Dichloroethane	0.0556	0.0050	mg/kg wet	0.05000		111	70-130	10	20	
1,2-Dichloropropane	0.0561	0.0050	mg/kg wet	0.05000		112	70-130	8	20	
1,2-Dichloropropane	0.0561	0.0050	mg/kg wet	0.05000		112	70-130	8	25	
1,3,5-Trimethylbenzene	0.0566	0.0050	mg/kg wet	0.05000		113	70-130	7	20	
1,3-Dichlorobenzene	0.0559	0.0050	mg/kg wet	0.05000		112	70-130	8	20	
1,3-Dichlorobenzene	0.0559	0.0050	mg/kg wet	0.05000		112	70-130	8	25	
1,3-Dichloropropane	0.0555	0.0050	mg/kg wet	0.05000		111	70-130	8	20	
1,3-Dichloropropane	0.0555	0.0050	mg/kg wet	0.05000		111	70-130	8	25	
1,4-Dichlorobenzene	0.0555	0.0050	mg/kg wet	0.05000		111	70-130	6	25	
1,4-Dichlorobenzene	0.0555	0.0050	mg/kg wet	0.05000		111	70-130	6	20	
1,4-Dioxane	0.915	0.0800	mg/kg wet	1.000		92	70-130	20	20	
2,2-Dichloropropane	0.0584	0.0050	mg/kg wet	0.05000		117	70-130	9	25	
2,2-Dichloropropane	0.0584	0.0050	mg/kg wet	0.05000		117	70-130	9	20	
2-Butanone	0.311	0.0500	mg/kg wet	0.2500		124	70-130	13	20	
2-Chlorotoluene	0.0559	0.0050	mg/kg wet	0.05000		112	70-130	5	25	
2-Chlorotoluene	0.0559	0.0050	mg/kg wet	0.05000		112	70-130	5	20	
2-Hexanone	0.290	0.0500	mg/kg wet	0.2500		116	70-130	18	20	
4-Chlorotoluene	0.0560	0.0050	mg/kg wet	0.05000		112	70-130	7	25	
4-Chlorotoluene	0.0560	0.0050	mg/kg wet	0.05000		112	70-130	7	20	
4-Isopropyltoluene	0.0549	0.0050	mg/kg wet	0.05000		110	70-130	8	20	
4-Methyl-2-Pentanone	0.256	0.0500	mg/kg wet	0.2500		102	70-130	16	20	
Acetone	0.326	0.0500	mg/kg wet	0.2500		130	70-130	18	20	
Benzene	0.0573	0.0050	mg/kg wet	0.05000		115	70-130	8	20	
Bromobenzene	0.0559	0.0050	mg/kg wet	0.05000		112	70-130	7	20	
Bromochloromethane	0.0576	0.0050	mg/kg wet	0.05000		115	70-130	9	25	
Bromochloromethane	0.0576	0.0050	mg/kg wet	0.05000		115	70-130	9	20	
Bromodichloromethane	0.0587	0.0050	mg/kg wet	0.05000		117	70-130	9	25	
Bromodichloromethane	0.0587	0.0050	mg/kg wet	0.05000		117	70-130	9	20	
Bromoform	0.0444	0.0050	mg/kg wet	0.05000		89	70-130	10	20	
Bromomethane	0.0666	0.0100	mg/kg wet	0.05000		133	70-130	6	20	B+
Carbon Disulfide	0.0592	0.0050	mg/kg wet	0.05000		118	70-130	8	20	
Carbon Tetrachloride	0.0573	0.0050	mg/kg wet	0.05000		115	70-130	8	20	
Chlorobenzene	0.0536	0.0050	mg/kg wet	0.05000		107	70-130	5	25	
Chlorobenzene	0.0536	0.0050	mg/kg wet	0.05000		107	70-130	5	20	
Chloroethane	0.0625	0.0100	mg/kg wet	0.05000		125	70-130	8	25	
Chloroethane	0.0625	0.0100	mg/kg wet	0.05000		125	70-130	8	20	
Chloroform	0.0564	0.0050	mg/kg wet	0.05000		113	70-130	8	25	
Chloroform	0.0564	0.0050	mg/kg wet	0.05000		113	70-130	8	20	
Chloromethane	0.0473	0.0100	mg/kg wet	0.05000		95	70-130	8	25	
Chloromethane	0.0473	0.0100	mg/kg wet	0.05000		95	70-130	8	20	
cis-1,2-Dichloroethene	0.0586	0.0050	mg/kg wet	0.05000		117	70-130	8	25	

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St

ESS Laboratory Work Order: 22J0374

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
5035/8260B Volatile Organic Compounds / Low Level										
Batch DJ21428 - 5035										
cis-1,2-Dichloroethene	0.0586	0.0050	mg/kg wet	0.05000		117	70-130	8	20	
cis-1,3-Dichloropropene	0.0549	0.0050	mg/kg wet	0.05000		110	70-130	9	25	
cis-1,3-Dichloropropene	0.0549	0.0050	mg/kg wet	0.05000		110	70-130	9	20	
Dibromochloromethane	0.0499	0.0020	mg/kg wet	0.05000		100	70-130	8	25	
Dibromochloromethane	0.0499	0.0050	mg/kg wet	0.05000		100	70-130	8	20	
Dibromomethane	0.0568	0.0050	mg/kg wet	0.05000		114	70-130	12	20	
Dichlorodifluoromethane	0.0529	0.0100	mg/kg wet	0.05000		106	70-130	7	25	
Dichlorodifluoromethane	0.0529	0.0100	mg/kg wet	0.05000		106	70-130	7	20	
Diethyl Ether	0.0578	0.0050	mg/kg wet	0.05000		116	70-130	10	20	
Di-isopropyl ether	0.0577	0.0050	mg/kg wet	0.05000		115	70-130	9	20	
Ethyl tertiary-butyl ether	0.0574	0.0050	mg/kg wet	0.05000		115	70-130	9	20	
Ethylbenzene	0.0536	0.0050	mg/kg wet	0.05000		107	70-130	5	20	
Hexachlorobutadiene	0.0555	0.0050	mg/kg wet	0.05000		111	70-130	6	25	
Hexachlorobutadiene	0.0555	0.0050	mg/kg wet	0.05000		111	70-130	6	20	
Isopropylbenzene	0.0568	0.0050	mg/kg wet	0.05000		114	70-130	6	20	
Methyl tert-Butyl Ether	0.0568	0.0050	mg/kg wet	0.05000		114	70-130	10	20	
Methylene Chloride	0.0567	0.0100	mg/kg wet	0.05000		113	70-130	9	25	
Methylene Chloride	0.0567	0.0250	mg/kg wet	0.05000		113	70-130	9	20	
Naphthalene	0.0536	0.0050	mg/kg wet	0.05000		107	70-130	13	20	
n-Butylbenzene	0.0566	0.0050	mg/kg wet	0.05000		113	70-130	7	20	
n-Propylbenzene	0.0561	0.0050	mg/kg wet	0.05000		112	70-130	5	20	
sec-Butylbenzene	0.0541	0.0050	mg/kg wet	0.05000		108	70-130	6	20	
Styrene	0.0541	0.0050	mg/kg wet	0.05000		108	70-130	6	20	
tert-Butylbenzene	0.0550	0.0050	mg/kg wet	0.05000		110	70-130	6	20	
Tertiary-amyl methyl ether	0.0573	0.0050	mg/kg wet	0.05000		115	70-130	10	20	
Tetrachloroethene	0.0488	0.0050	mg/kg wet	0.05000		98	70-130	7	25	
Tetrachloroethene	0.0488	0.0050	mg/kg wet	0.05000		98	70-130	7	20	
Tetrahydrofuran	0.0501		mg/kg wet	0.05000		100		19		
Tetrahydrofuran	0.0501	0.0050	mg/kg wet	0.05000		100	70-130	19	20	
Toluene	0.0563	0.0050	mg/kg wet	0.05000		113	70-130	7	20	
trans-1,2-Dichloroethene	0.0611	0.0050	mg/kg wet	0.05000		122	70-130	8	25	
trans-1,2-Dichloroethene	0.0611	0.0050	mg/kg wet	0.05000		122	70-130	8	20	
trans-1,3-Dichloropropene	0.0516	0.0050	mg/kg wet	0.05000		103	70-130	9	25	
trans-1,3-Dichloropropene	0.0516	0.0050	mg/kg wet	0.05000		103	70-130	9	20	
Trichloroethene	0.0563	0.0050	mg/kg wet	0.05000		113	70-130	9	25	
Trichloroethene	0.0563	0.0050	mg/kg wet	0.05000		113	70-130	9	20	
Trichlorofluoromethane	0.0597	0.0050	mg/kg wet	0.05000		119	70-130	8	25	
Trichlorofluoromethane	0.0597	0.0050	mg/kg wet	0.05000		119	70-130	8	20	
Vinyl Chloride	0.0577	0.0100	mg/kg wet	0.05000		115	70-130	8	25	
Vinyl Chloride	0.0577	0.0100	mg/kg wet	0.05000		115	70-130	8	20	
Xylene O	0.0550	0.0050	mg/kg wet	0.05000		110	70-130	5	20	
Xylene P,M	0.111	0.0100	mg/kg wet	0.1000		111	70-130	6	20	
Surrogate: 1,2-Dichloroethane-d4	*0.0520*		mg/kg wet	*0.05000*		*104*	*70-130*			
Surrogate: 1,2-Dichloroethane-d4	*0.0520*		mg/kg wet	*0.05000*		*104*	*70-130*			
Surrogate: 4-Bromofluorobenzene	*0.0486*		mg/kg wet	*0.05000*		*97*	*70-130*			

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St

ESS Laboratory Work Order: 22J0374

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
5035/8260B Volatile Organic Compounds / Low Level										
Batch DJ21428 - 5035										
Surrogate: 4-Bromofluorobenzene	*0.0486*		mg/kg wet	*0.05000*		*97*	*70-130*			
Surrogate: Dibromofluoromethane	*0.0523*		mg/kg wet	*0.05000*		*105*	*70-130*			
Surrogate: Dibromofluoromethane	*0.0523*		mg/kg wet	*0.05000*		*105*	*70-130*			
Surrogate: Toluene-d8	*0.0491*		mg/kg wet	*0.05000*		*98*	*70-130*			
Surrogate: Toluene-d8	*0.0491*		mg/kg wet	*0.05000*		*98*	*70-130*			
8082A Polychlorinated Biphenyls (PCB)										
Batch DJ21914 - 3540C										
Blank										
Aroclor 1016	ND	0.05	mg/kg wet							
Aroclor 1016 [2C]	ND	0.05	mg/kg wet							
Aroclor 1221	ND	0.05	mg/kg wet							
Aroclor 1221 [2C]	ND	0.05	mg/kg wet							
Aroclor 1232	ND	0.05	mg/kg wet							
Aroclor 1232 [2C]	ND	0.05	mg/kg wet							
Aroclor 1242	ND	0.05	mg/kg wet							
Aroclor 1242 [2C]	ND	0.05	mg/kg wet							
Aroclor 1248	ND	0.05	mg/kg wet							
Aroclor 1248 [2C]	ND	0.05	mg/kg wet							
Aroclor 1254	ND	0.05	mg/kg wet							
Aroclor 1254 [2C]	ND	0.05	mg/kg wet							
Aroclor 1260	ND	0.05	mg/kg wet							
Aroclor 1260 [2C]	ND	0.05	mg/kg wet							
Aroclor 1262	ND	0.05	mg/kg wet							
Aroclor 1262 [2C]	ND	0.05	mg/kg wet							
Aroclor 1268	ND	0.05	mg/kg wet							
Aroclor 1268 [2C]	ND	0.05	mg/kg wet							
Surrogate: Decachlorobiphenyl	*0.0202*		mg/kg wet	*0.02500*		*81*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0212*		mg/kg wet	*0.02500*		*85*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.0209*		mg/kg wet	*0.02500*		*83*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.0191*		mg/kg wet	*0.02500*		*76*	*30-150*			
LCS										
Aroclor 1016	0.4	0.05	mg/kg wet	0.5000		84	40-140			
Aroclor 1016 [2C]	0.4	0.05	mg/kg wet	0.5000		78	40-140			
Aroclor 1260	0.4	0.05	mg/kg wet	0.5000		84	40-140			
Aroclor 1260 [2C]	0.4	0.05	mg/kg wet	0.5000		75	40-140			
Surrogate: Decachlorobiphenyl	*0.0195*		mg/kg wet	*0.02500*		*78*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0203*		mg/kg wet	*0.02500*		*81*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.0214*		mg/kg wet	*0.02500*		*86*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.0186*		mg/kg wet	*0.02500*		*74*	*30-150*			
LCS Dup										
Aroclor 1016	0.4	0.05	mg/kg wet	0.5000		87	40-140	3	30	

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Client Name: Weston and Sampson Engineers, Inc.
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Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8082A Polychlorinated Biphenyls (PCB)										
Batch DJ21914 - 3540C										
Aroclor 1016 [2C]	0.4	0.05	mg/kg wet	0.5000		80	40-140	2	30	
Aroclor 1260	0.4	0.05	mg/kg wet	0.5000		86	40-140	3	30	
Aroclor 1260 [2C]	0.4	0.05	mg/kg wet	0.5000		77	40-140	2	30	
Surrogate: Decachlorobiphenyl	*0.0204*		mg/kg wet	*0.02500*		*82*	*30-150*			
Surrogate: Decachlorobiphenyl [2C]	*0.0212*		mg/kg wet	*0.02500*		*85*	*30-150*			
Surrogate: Tetrachloro-m-xylene	*0.0223*		mg/kg wet	*0.02500*		*89*	*30-150*			
Surrogate: Tetrachloro-m-xylene [2C]	*0.0192*		mg/kg wet	*0.02500*		*77*	*30-150*			
8100M Total Petroleum Hydrocarbons										
Batch DJ21251 - 3546										
Blank										
Decane (C10)	ND	0.2	mg/kg wet							
Docosane (C22)	ND	0.2	mg/kg wet							
Dodecane (C12)	ND	0.2	mg/kg wet							
Eicosane (C20)	ND	0.2	mg/kg wet							
Hexacosane (C26)	ND	0.2	mg/kg wet							
Hexadecane (C16)	ND	0.2	mg/kg wet							
Hexatriacontane (C36)	ND	0.2	mg/kg wet							
Nonadecane (C19)	ND	0.2	mg/kg wet							
Nonane (C9)	ND	0.2	mg/kg wet							
Octacosane (C28)	ND	0.2	mg/kg wet							
Octadecane (C18)	ND	0.2	mg/kg wet							
Tetracosane (C24)	ND	0.2	mg/kg wet							
Tetradecane (C14)	ND	0.2	mg/kg wet							
Total Petroleum Hydrocarbons (C9-C36)	ND	10.0	mg/kg wet							
Triacontane (C30)	ND	0.2	mg/kg wet							
Surrogate: O-Terphenyl	*5.28*		mg/kg wet	*5.000*		*106*	*40-140*			
LCS										
Decane (C10)	2.1	0.2	mg/kg wet	2.500		82	40-140			
Docosane (C22)	2.5	0.2	mg/kg wet	2.500		99	40-140			
Dodecane (C12)	2.3	0.2	mg/kg wet	2.500		93	40-140			
Eicosane (C20)	2.5	0.2	mg/kg wet	2.500		98	40-140			
Hexacosane (C26)	2.4	0.2	mg/kg wet	2.500		98	40-140			
Hexadecane (C16)	2.4	0.2	mg/kg wet	2.500		97	40-140			
Hexatriacontane (C36)	2.5	0.2	mg/kg wet	2.500		98	40-140			
Nonadecane (C19)	2.4	0.2	mg/kg wet	2.500		97	40-140			
Nonane (C9)	1.6	0.2	mg/kg wet	2.500		64	30-140			
Octacosane (C28)	2.3	0.2	mg/kg wet	2.500		94	40-140			
Octadecane (C18)	2.5	0.2	mg/kg wet	2.500		98	40-140			
Tetracosane (C24)	2.2	0.2	mg/kg wet	2.500		88	40-140			
Tetradecane (C14)	2.4	0.2	mg/kg wet	2.500		95	40-140			
Total Petroleum Hydrocarbons (C9-C36)	33.8	10.0	mg/kg wet	35.00		96	40-140			
Triacontane (C30)	2.3	0.2	mg/kg wet	2.500		93	40-140			

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Client Name: Weston and Sampson Engineers, Inc.
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Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8100M Total Petroleum Hydrocarbons										
Batch DJ21251 - 3546										
Surrogate: O-Terphenyl	*5.24*		mg/kg wet	*5.000*		*105*	*40-140*			
LCS Dup										
Decane (C10)	2.1	0.2	mg/kg wet	2.500		83	40-140	0.8	25	
Docosane (C22)	2.5	0.2	mg/kg wet	2.500		99	40-140	0.07	25	
Dodecane (C12)	2.3	0.2	mg/kg wet	2.500		93	40-140	0.03	25	
Eicosane (C20)	2.4	0.2	mg/kg wet	2.500		98	40-140	0.1	25	
Hexacosane (C26)	2.4	0.2	mg/kg wet	2.500		98	40-140	0.3	25	
Hexadecane (C16)	2.4	0.2	mg/kg wet	2.500		97	40-140	0.2	25	
Hexatriacontane (C36)	2.4	0.2	mg/kg wet	2.500		97	40-140	1	25	
Nonadecane (C19)	2.4	0.2	mg/kg wet	2.500		96	40-140	1	25	
Nonane (C9)	1.7	0.2	mg/kg wet	2.500		66	30-140	3	25	
Octacosane (C28)	2.4	0.2	mg/kg wet	2.500		94	40-140	0.3	25	
Octadecane (C18)	2.5	0.2	mg/kg wet	2.500		98	40-140	0.2	25	
Tetracosane (C24)	2.2	0.2	mg/kg wet	2.500		89	40-140	0.4	25	
Tetradecane (C14)	2.4	0.2	mg/kg wet	2.500		95	40-140	0.2	25	
Total Petroleum Hydrocarbons (C9-C36)	33.3	10.0	mg/kg wet	35.00		95	40-140	1	25	
Triacontane (C30)	2.3	0.2	mg/kg wet	2.500		94	40-140	0.3	25	
Surrogate: O-Terphenyl	*5.09*		mg/kg wet	*5.000*		*102*	*40-140*			
8270D Semi-Volatile Organic Compounds										
Batch DJ21357 - 3546										
Blank										
1,1-Biphenyl	ND	0.025	mg/kg wet							
1,2,4-Trichlorobenzene	ND	0.250	mg/kg wet							
1,2-Dichlorobenzene	ND	0.250	mg/kg wet							
1,3-Dichlorobenzene	ND	0.250	mg/kg wet							
1,4-Dichlorobenzene	ND	0.250	mg/kg wet							
2,4,5-Trichlorophenol	ND	0.250	mg/kg wet							
2,4,6-Trichlorophenol	ND	0.250	mg/kg wet							
2,4-Dichlorophenol	ND	0.250	mg/kg wet							
2,4-Dimethylphenol	ND	0.250	mg/kg wet							
2,4-Dinitrophenol	ND	1.00	mg/kg wet							
2,4-Dinitrotoluene	ND	0.250	mg/kg wet							
2,6-Dinitrotoluene	ND	0.250	mg/kg wet							
2-Chloronaphthalene	ND	0.250	mg/kg wet							
2-Chlorophenol	ND	0.250	mg/kg wet							
2-Methylnaphthalene	ND	0.250	mg/kg wet							
2-Methylphenol	ND	0.250	mg/kg wet							
2-Nitrophenol	ND	0.500	mg/kg wet							
3,3´-Dichlorobenzidine	ND	0.250	mg/kg wet							
3+4-Methylphenol	ND	0.250	mg/kg wet							
4-Bromophenyl-phenylether	ND	0.250	mg/kg wet							
4-Chloroaniline	ND	0.250	mg/kg wet							

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St

ESS Laboratory Work Order: 22J0374

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8270D Semi-Volatile Organic Compounds										
Batch DJ21357 - 3546										
4-Nitrophenol	ND	1.00	mg/kg wet							
Acenaphthene	ND	0.250	mg/kg wet							
Acenaphthylene	ND	0.250	mg/kg wet							
Acetophenone	ND	0.250	mg/kg wet							
Aniline	ND	0.250	mg/kg wet							
Anthracene	ND	0.250	mg/kg wet							
Azobenzene	ND	0.250	mg/kg wet							
Benzo(a)anthracene	ND	0.250	mg/kg wet							
Benzo(a)pyrene	ND	0.250	mg/kg wet							
Benzo(b)fluoranthene	ND	0.250	mg/kg wet							
Benzo(g,h,i)perylene	ND	0.250	mg/kg wet							
Benzo(k)fluoranthene	ND	0.250	mg/kg wet							
bis(2-Chloroethoxy)methane	ND	0.250	mg/kg wet							
bis(2-Chloroethyl)ether	ND	0.250	mg/kg wet							
bis(2-chloroisopropyl)Ether	ND	0.250	mg/kg wet							
bis(2-Ethylhexyl)phthalate	ND	0.250	mg/kg wet							
Butylbenzylphthalate	ND	0.250	mg/kg wet							
Chrysene	ND	0.250	mg/kg wet							
Dibenzo(a,h)Anthracene	ND	0.250	mg/kg wet							
Dibenzofuran	ND	0.250	mg/kg wet							
Diethylphthalate	ND	0.250	mg/kg wet							
Dimethylphthalate	ND	0.250	mg/kg wet							
Di-n-butylphthalate	ND	0.250	mg/kg wet							
Di-n-octylphthalate	ND	0.500	mg/kg wet							
Fluoranthene	ND	0.250	mg/kg wet							
Fluorene	ND	0.250	mg/kg wet							
Hexachlorobenzene	ND	0.250	mg/kg wet							
Hexachlorobutadiene	ND	0.250	mg/kg wet							
Hexachloroethane	ND	0.250	mg/kg wet							
Indeno(1,2,3-cd)Pyrene	ND	0.250	mg/kg wet							
Isophorone	ND	0.250	mg/kg wet							
Naphthalene	ND	0.250	mg/kg wet							
Nitrobenzene	ND	0.250	mg/kg wet							
N-Nitrosodimethylamine	ND	0.250	mg/kg wet							
Pentachlorophenol	ND	1.00	mg/kg wet							
Phenanthrene	ND	0.250	mg/kg wet							
Phenol	ND	0.250	mg/kg wet							
Pyrene	ND	0.250	mg/kg wet							
Surrogate: 1,2-Dichlorobenzene-d4	*2.74*		mg/kg wet	*2.500*		*109*	*30-130*			
Surrogate: 2,4,6-Tribromophenol	*4.16*		mg/kg wet	*3.750*		*111*	*30-130*			
Surrogate: 2-Chlorophenol-d4	*4.18*		mg/kg wet	*3.750*		*111*	*30-130*			
Surrogate: 2-Fluorobiphenyl	*2.35*		mg/kg wet	*2.500*		*94*	*30-130*			
Surrogate: 2-Fluorophenol	*3.59*		mg/kg wet	*3.750*		*96*	*30-130*			
Surrogate: Nitrobenzene-d5	*2.04*		mg/kg wet	*2.500*		*82*	*30-130*			
Surrogate: Phenol-d6	*4.09*		mg/kg wet	*3.750*		*109*	*30-130*			
Surrogate: p-Terphenyl-d14	*2.86*		mg/kg wet	*2.500*		*114*	*30-130*			

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
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Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8270D Semi-Volatile Organic Compounds										
Batch DJ21357 - 3546										
LCS										
1,1-Biphenyl	2.04	0.025	mg/kg wet	2.500		82	40-140			
1,2,4-Trichlorobenzene	2.35	0.250	mg/kg wet	2.500		94	40-140			
1,2-Dichlorobenzene	2.20	0.250	mg/kg wet	2.500		88	40-140			
1,3-Dichlorobenzene	2.09	0.250	mg/kg wet	2.500		84	40-140			
1,4-Dichlorobenzene	2.25	0.250	mg/kg wet	2.500		90	40-140			
2,4,5-Trichlorophenol	2.78	0.250	mg/kg wet	2.500		111	30-130			
2,4,6-Trichlorophenol	2.45	0.250	mg/kg wet	2.500		98	30-130			
2,4-Dichlorophenol	2.48	0.250	mg/kg wet	2.500		99	30-130			
2,4-Dimethylphenol	2.37	0.250	mg/kg wet	2.500		95	30-130			
2,4-Dinitrophenol	1.23	1.00	mg/kg wet	2.500		49	30-130			
2,4-Dinitrotoluene	2.59	0.250	mg/kg wet	2.500		104	40-140			
2,6-Dinitrotoluene	2.46	0.250	mg/kg wet	2.500		98	40-140			
2-Chloronaphthalene	2.03	0.250	mg/kg wet	2.500		81	40-140			
2-Chlorophenol	2.46	0.250	mg/kg wet	2.500		98	30-130			
2-Methylnaphthalene	2.36	0.250	mg/kg wet	2.500		94	40-140			
2-Methylphenol	2.38	0.250	mg/kg wet	2.500		95	30-130			
2-Nitrophenol	2.40	0.500	mg/kg wet	2.500		96	30-130			
3,3´-Dichlorobenzidine	2.26	0.250	mg/kg wet	2.500		90	40-140			
3+4-Methylphenol	4.38	0.250	mg/kg wet	5.000		88	30-130			
4-Bromophenyl-phenylether	2.27	0.250	mg/kg wet	2.500		91	40-140			
4-Chloroaniline	1.63	0.250	mg/kg wet	2.500		65	40-140			
4-Nitrophenol	1.93	1.00	mg/kg wet	2.500		77	30-130			
Acenaphthene	2.09	0.250	mg/kg wet	2.500		84	40-140			
Acenaphthylene	2.06	0.250	mg/kg wet	2.500		83	40-140			
Acetophenone	2.42	0.250	mg/kg wet	2.500		97	40-140			
Aniline	0.994	0.250	mg/kg wet	2.500		40	40-140			
Anthracene	2.14	0.250	mg/kg wet	2.500		86	40-140			
Azobenzene	1.78	0.250	mg/kg wet	2.500		71	40-140			
Benzo(a)anthracene	2.26	0.250	mg/kg wet	2.500		90	40-140			
Benzo(a)pyrene	2.31	0.250	mg/kg wet	2.500		92	40-140			
Benzo(b)fluoranthene	2.23	0.250	mg/kg wet	2.500		89	40-140			
Benzo(g,h,i)perylene	2.24	0.250	mg/kg wet	2.500		90	40-140			
Benzo(k)fluoranthene	2.35	0.250	mg/kg wet	2.500		94	40-140			
bis(2-Chloroethoxy)methane	1.89	0.250	mg/kg wet	2.500		76	40-140			
bis(2-Chloroethyl)ether	2.23	0.250	mg/kg wet	2.500		89	40-140			
bis(2-chloroisopropyl)Ether	2.23	0.250	mg/kg wet	2.500		89	40-140			
bis(2-Ethylhexyl)phthalate	2.28	0.250	mg/kg wet	2.500		91	40-140			
Butylbenzylphthalate	2.37	0.250	mg/kg wet	2.500		95	40-140			
Chrysene	2.23	0.250	mg/kg wet	2.500		89	40-140			
Dibenzo(a,h)Anthracene	2.24	0.250	mg/kg wet	2.500		90	40-140			
Dibenzofuran	2.19	0.250	mg/kg wet	2.500		88	40-140			
Diethylphthalate	2.59	0.250	mg/kg wet	2.500		104	40-140			
Dimethylphthalate	2.45	0.250	mg/kg wet	2.500		98	40-140			
Di-n-butylphthalate	2.46	0.250	mg/kg wet	2.500		98	40-140			

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St

ESS Laboratory Work Order: 22J0374

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8270D Semi-Volatile Organic Compounds										
Batch DJ21357 - 3546										
Di-n-octylphthalate	2.35	0.500	mg/kg wet	2.500		94	40-140			
Fluoranthene	2.44	0.250	mg/kg wet	2.500		98	40-140			
Fluorene	2.39	0.250	mg/kg wet	2.500		96	40-140			
Hexachlorobenzene	2.38	0.250	mg/kg wet	2.500		95	40-140			
Hexachlorobutadiene	2.43	0.250	mg/kg wet	2.500		97	40-140			
Hexachloroethane	2.16	0.250	mg/kg wet	2.500		86	40-140			
Indeno(1,2,3-cd)Pyrene	2.15	0.250	mg/kg wet	2.500		86	40-140			
Isophorone	2.10	0.250	mg/kg wet	2.500		84	40-140			
Naphthalene	2.16	0.250	mg/kg wet	2.500		87	40-140			
Nitrobenzene	1.94	0.250	mg/kg wet	2.500		78	40-140			
N-Nitrosodimethylamine	2.10	0.250	mg/kg wet	2.500		84	40-140			
Pentachlorophenol	2.05	1.00	mg/kg wet	2.500		82	30-130			
Phenanthrene	2.10	0.250	mg/kg wet	2.500		84	40-140			
Phenol	2.10	0.250	mg/kg wet	2.500		84	30-130			
Pyrene	2.20	0.250	mg/kg wet	2.500		88	40-140			
Surrogate: 1,2-Dichlorobenzene-d4	*2.64*		mg/kg wet	*2.500*		*106*	*30-130*			
Surrogate: 2,4,6-Tribromophenol	*4.70*		mg/kg wet	*3.750*		*125*	*30-130*			
Surrogate: 2-Chlorophenol-d4	*4.18*		mg/kg wet	*3.750*		*111*	*30-130*			
Surrogate: 2-Fluorobiphenyl	*2.40*		mg/kg wet	*2.500*		*96*	*30-130*			
Surrogate: 2-Fluorophenol	*3.54*		mg/kg wet	*3.750*		*94*	*30-130*			
Surrogate: Nitrobenzene-d5	*2.33*		mg/kg wet	*2.500*		*93*	*30-130*			
Surrogate: Phenol-d6	*4.28*		mg/kg wet	*3.750*		*114*	*30-130*			
Surrogate: p-Terphenyl-d14	*2.68*		mg/kg wet	*2.500*		*107*	*30-130*			
LCS Dup										
1,1-Biphenyl	2.15	0.025	mg/kg wet	2.500		86	40-140	5	30	
1,2,4-Trichlorobenzene	2.52	0.250	mg/kg wet	2.500		101	40-140	7	30	
1,2-Dichlorobenzene	2.28	0.250	mg/kg wet	2.500		91	40-140	4	30	
1,3-Dichlorobenzene	2.22	0.250	mg/kg wet	2.500		89	40-140	6	30	
1,4-Dichlorobenzene	2.30	0.250	mg/kg wet	2.500		92	40-140	2	30	
2,4,5-Trichlorophenol	2.73	0.250	mg/kg wet	2.500		109	30-130	2	30	
2,4,6-Trichlorophenol	2.37	0.250	mg/kg wet	2.500		95	30-130	3	30	
2,4-Dichlorophenol	2.67	0.250	mg/kg wet	2.500		107	30-130	7	30	
2,4-Dimethylphenol	2.36	0.250	mg/kg wet	2.500		95	30-130	0.3	30	
2,4-Dinitrophenol	1.67	1.00	mg/kg wet	2.500		67	30-130	31	30	D+
2,4-Dinitrotoluene	2.72	0.250	mg/kg wet	2.500		109	40-140	5	30	
2,6-Dinitrotoluene	2.56	0.250	mg/kg wet	2.500		102	40-140	4	30	
2-Chloronaphthalene	2.12	0.250	mg/kg wet	2.500		85	40-140	4	30	
2-Chlorophenol	2.49	0.250	mg/kg wet	2.500		100	30-130	1	30	
2-Methylnaphthalene	2.45	0.250	mg/kg wet	2.500		98	40-140	4	30	
2-Methylphenol	2.32	0.250	mg/kg wet	2.500		93	30-130	3	30	
2-Nitrophenol	2.50	0.500	mg/kg wet	2.500		100	30-130	4	30	
3,3´-Dichlorobenzidine	2.43	0.250	mg/kg wet	2.500		97	40-140	7	30	
3+4-Methylphenol	4.35	0.250	mg/kg wet	5.000		87	30-130	0.6	30	
4-Bromophenyl-phenylether	2.44	0.250	mg/kg wet	2.500		98	40-140	7	30	
4-Chloroaniline	1.74	0.250	mg/kg wet	2.500		70	40-140	6	30	

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St

ESS Laboratory Work Order: 22J0374

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8270D Semi-Volatile Organic Compounds										
Batch DJ21357 - 3546										
4-Nitrophenol	2.28	1.00	mg/kg wet	2.500		91	30-130	17	30	
Acenaphthene	2.20	0.250	mg/kg wet	2.500		88	40-140	5	30	
Acenaphthylene	2.19	0.250	mg/kg wet	2.500		88	40-140	6	30	
Acetophenone	2.43	0.250	mg/kg wet	2.500		97	40-140	0.4	30	
Aniline	1.05	0.250	mg/kg wet	2.500		42	40-140	5	30	
Anthracene	2.29	0.250	mg/kg wet	2.500		92	40-140	7	30	
Azobenzene	1.91	0.250	mg/kg wet	2.500		77	40-140	7	30	
Benzo(a)anthracene	2.39	0.250	mg/kg wet	2.500		96	40-140	6	30	
Benzo(a)pyrene	2.52	0.250	mg/kg wet	2.500		101	40-140	9	30	
Benzo(b)fluoranthene	2.43	0.250	mg/kg wet	2.500		97	40-140	9	30	
Benzo(g,h,i)perylene	2.38	0.250	mg/kg wet	2.500		95	40-140	6	30	
Benzo(k)fluoranthene	2.53	0.250	mg/kg wet	2.500		101	40-140	8	30	
bis(2-Chloroethoxy)methane	2.01	0.250	mg/kg wet	2.500		80	40-140	6	30	
bis(2-Chloroethyl)ether	2.26	0.250	mg/kg wet	2.500		91	40-140	2	30	
bis(2-chloroisopropyl)Ether	2.23	0.250	mg/kg wet	2.500		89	40-140	0.2	30	
bis(2-Ethylhexyl)phthalate	2.39	0.250	mg/kg wet	2.500		96	40-140	5	30	
Butylbenzylphthalate	2.50	0.250	mg/kg wet	2.500		100	40-140	6	30	
Chrysene	2.40	0.250	mg/kg wet	2.500		96	40-140	8	30	
Dibenzo(a,h)Anthracene	2.34	0.250	mg/kg wet	2.500		94	40-140	4	30	
Dibenzofuran	2.33	0.250	mg/kg wet	2.500		93	40-140	6	30	
Diethylphthalate	2.66	0.250	mg/kg wet	2.500		106	40-140	2	30	
Dimethylphthalate	2.55	0.250	mg/kg wet	2.500		102	40-140	4	30	
Di-n-butylphthalate	2.60	0.250	mg/kg wet	2.500		104	40-140	6	30	
Di-n-octylphthalate	2.46	0.500	mg/kg wet	2.500		98	40-140	5	30	
Fluoranthene	2.59	0.250	mg/kg wet	2.500		104	40-140	6	30	
Fluorene	2.47	0.250	mg/kg wet	2.500		99	40-140	3	30	
Hexachlorobenzene	2.48	0.250	mg/kg wet	2.500		99	40-140	4	30	
Hexachlorobutadiene	2.50	0.250	mg/kg wet	2.500		100	40-140	3	30	
Hexachloroethane	2.15	0.250	mg/kg wet	2.500		86	40-140	0.4	30	
Indeno(1,2,3-cd)Pyrene	2.32	0.250	mg/kg wet	2.500		93	40-140	8	30	
Isophorone	2.20	0.250	mg/kg wet	2.500		88	40-140	4	30	
Naphthalene	2.28	0.250	mg/kg wet	2.500		91	40-140	5	30	
Nitrobenzene	2.04	0.250	mg/kg wet	2.500		82	40-140	5	30	
N-Nitrosodimethylamine	2.23	0.250	mg/kg wet	2.500		89	40-140	6	30	
Pentachlorophenol	2.37	1.00	mg/kg wet	2.500		95	30-130	15	30	
Phenanthrene	2.25	0.250	mg/kg wet	2.500		90	40-140	7	30	
Phenol	2.13	0.250	mg/kg wet	2.500		85	30-130	1	30	
Pyrene	2.32	0.250	mg/kg wet	2.500		93	40-140	5	30	
Surrogate: 1,2-Dichlorobenzene-d4	*2.58*		mg/kg wet	*2.500*		*103*	*30-130*			
Surrogate: 2,4,6-Tribromophenol	*4.85*		mg/kg wet	*3.750*		*129*	*30-130*			
Surrogate: 2-Chlorophenol-d4	*4.21*		mg/kg wet	*3.750*		*112*	*30-130*			
Surrogate: 2-Fluorobiphenyl	*2.50*		mg/kg wet	*2.500*		*100*	*30-130*			
Surrogate: 2-Fluorophenol	*3.54*		mg/kg wet	*3.750*		*94*	*30-130*			
Surrogate: Nitrobenzene-d5	*2.41*		mg/kg wet	*2.500*		*96*	*30-130*			
Surrogate: Phenol-d6	*4.17*		mg/kg wet	*3.750*		*111*	*30-130*			
Surrogate: p-Terphenyl-d14	*2.73*		mg/kg wet	*2.500*		*109*	*30-130*			

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St

ESS Laboratory Work Order: 22J0374

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Classical Chemistry										
Batch DJ21343 - General Preparation										
Reference										
Flashpoint	82		°F	81.00		101	97.9-102.1			
Batch DJ21352 - General Preparation										
Blank										
Conductivity	ND	5	umhos/cm							
LCS										
Conductivity	1400		umhos/cm	1409		99	90-110			
Batch DJ21442 - General Preparation										
Blank										
Reactive Cyanide	ND	2.0	mg/kg							
Reactive Sulfide	ND	2.0	mg/kg							
LCS										
Reactive Cyanide	4.1	2.0	mg/kg	100.3		4	0.68-5.41			
Reactive Sulfide	ND	2.0	mg/kg	10.00		0	0-44			

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St

ESS Laboratory Work Order: 22J0374

Notes and Definitions

Z-10	Soil pH measured in water at 21.2 ºC.
WL	Results obtained from a deionized water leach of the sample.
U	Analyte included in the analysis, but not detected
Q	Calibration required quadratic regression (Q).
D+	Relative percent difference for duplicate is outside of criteria (D+).
D	Diluted.
CD+	Continuing Calibration %Diff/Drift is above control limit (CD+).
CD-	Continuing Calibration %Diff/Drift is below control limit (CD-).
BT	Benzidine tailing factor >2.
B+	Blank Spike recovery is above upper control limit (B+).
>	Greater than.
ND	Analyte NOT DETECTED at or above the MRL (LOQ), LOD for DoD Reports, MDL for J-Flagged Analytes
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
MDL	Method Detection Limit
MRL	Method Reporting Limit
LOD	Limit of Detection
LOQ	Limit of Quantitation
DL	Detection Limit
I/V	Initial Volume
F/V	Final Volume
§	Subcontracted analysis; see attached report
1	Range result excludes concentrations of surrogates and/or internal standards eluting in that range.
2	Range result excludes concentrations of target analytes eluting in that range.
3	Range result excludes the concentration of the C9-C10 aromatic range.
Avg	Results reported as a mathematical average.
NR	No Recovery
[CALC]	Calculated Analyte
SUB	Subcontracted analysis; see attached report
RL	Reporting Limit
EDL	Estimated Detection Limit
MF	Membrane Filtration
MPN	Most Probable Number
TNTC	Too numerous to Count
CFU	Colony Forming Units

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St

ESS Laboratory Work Order: 22J0374

ESS LABORATORY CERTIFICATIONS AND ACCREDITATIONS

ENVIRONMENTAL

Rhode Island Potable and Non Potable Water: LAI00179
http://www.health.ri.gov/find/labs/analytical/ESS.pdf

Connecticut Potable and Non Potable Water, Solid and Hazardous Waste: PH-0750
http://www.ct.gov/dph/lib/dph/environmental_health/environmental_laboratories/pdf/OutofStateCommercialLaboratories.pdf

Maine Potable and Non Potable Water, and Solid and Hazardous Waste: RI00002
http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/partners/labCert.shtml

Massachusetts Potable and Non Potable Water: M-RI002
http://public.dep.state.ma.us/Labcert/Labcert.aspx

New Hampshire (NELAP accredited) Potable and Non Potable Water, Solid and Hazardous Waste: 2424
http://des.nh.gov/organization/divisions/water/dwgb/nhelap/index.htm

New York (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: 11313
http://www.wadsworth.org/labcert/elap/comm.html

New Jersey (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: RI006
http://datamine2.state.nj.us/DEP_OPRA/OpraMain/pi_main?mode=pi_by_site&sort_order=PI_NAMEA&Select+a+Site:=58715

Pennsylvania: 68-01752
http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx

ESS Laboratory Sample and Cooler Receipt Checklist

Client: Weston and Sampson Engineers, Inc - TB

Shipped/Delivered Via: ESS Courier

ESS Project ID: 22J0374
Date Received: 10/12/2022
Project Due Date: 10/19/2022
Days for Project: 5 Day

1. Air bill manifest present? No
   Air No.: NA
2. Were custody seals present? No
3. Is radiation count <100 CPM? Yes
4. Is a Cooler Present? Yes
   Temp: 2.3 Iced with: Ice
5. Was COC signed and dated by client? Yes
6. Does COC match bottles? Yes
7. Is COC complete and correct? Yes
8. Were samples received intact? Yes
9. **Were labs informed about short holds & rushes?** Yes / No / NA
10. Were any analyses received outside of hold time? Yes / No

11. Any Subcontracting needed? Yes / No
    ESS Sample IDs:
    Analysis:
    TAT:
12. Were VOAs received? Yes / No
    a. Air bubbles in aqueous VOAs? Yes / No
    b. Does methanol cover soil completely? Yes / No / NA
13. Are the samples properly preserved? Yes / No
    a. If metals preserved upon receipt: Date: Time: By/Acid Lot#:
    b. Low Level VOA vials frozen: Date: 10/12/22 Time: 2122 By:

Sample Receiving Notes:

14. Was there a need to contact Project Manager? Yes / No
    a. Was there a need to contact the client? Yes / No
    Who was contacted: Date: Time: By:

Resolution:

Sample Number	Container ID	Proper Container	Air Bubbles Present	Sufficient Volume	Container Type	Preservative	Record pH (Cyanide and 608 Pesticides)
1	351727	Yes	N/A	Yes	VOA Vial	DI Water	
1	351728	Yes	N/A	Yes	VOA Vial	DI Water	
1	351741	Yes	N/A	Yes	VOA Vial	MeOH	
1	352103	Yes	N/A	Yes	4 oz. Jar	NP	
2	351729	Yes	N/A	Yes	VOA Vial	DI Water	
2	351730	Yes	N/A	Yes	VOA Vial	DI Water	
2	351742	Yes	N/A	Yes	VOA Vial	MeOH	
2	352104	Yes	N/A	Yes	4 oz. Jar	NP	
3	351731	Yes	N/A	Yes	VOA Vial	DI Water	
3	351732	Yes	N/A	Yes	VOA Vial	DI Water	
3	351743	Yes	N/A	Yes	VOA Vial	MeOH	
3	352105	Yes	N/A	Yes	4 oz. Jar	NP	
4	351733	Yes	N/A	Yes	VOA Vial	DI Water	
4	351734	Yes	N/A	Yes	VOA Vial	DI Water	
4	351744	Yes	N/A	Yes	VOA Vial	MeOH	
4	352106	Yes	N/A	Yes	4 oz. Jar	NP	
5	351735	Yes	N/A	Yes	VOA Vial	DI Water	

ESS Laboratory Sample and Cooler Receipt Checklist

Client: Weston and Sampson Engineers, Inc - TB

ESS Project ID: 22J0374
Date Received: 10/12/2022

5	351736	Yes	N/A	Yes	VOA Vial	DI Water
5	351745	Yes	N/A	Yes	VOA Vial	MeOH
5	352107	Yes	N/A	Yes	4 oz. Jar	NP
5	352109	Yes	N/A	Yes	8 oz jar	NP
5	352110	Yes	N/A	Yes	8 oz jar	NP
6	351737	Yes	N/A	Yes	VOA Vial	DI Water
6	351738	Yes	N/A	Yes	VOA Vial	DI Water
6	351746	Yes	N/A	Yes	VOA Vial	MeOH
6	352108	Yes	N/A	Yes	4 oz. Jar	NP
6	352111	Yes	N/A	Yes	8 oz jar	NP
6	352112	Yes	N/A	Yes	8 oz jar	NP
7	351740	Yes	N/A	Yes	VOA Vial	DI Water
7	351747	Yes	N/A	Yes	VOA Vial	MeOH

2nd Review

Were all containers scanned into storage/lab? Initials TB

Are barcode labels on correct containers? Yes / No

Are all Flashpoint stickers attached/container ID # circled? Yes / No / NA

Are all Hex Chrome stickers attached? Yes / No / NA

Are all QC stickers attached? Yes / No / NA

Are VOA stickers attached if bubbles noted? Yes / No / NA

Completed By: [signature] Date & Time: 10/12/22 2046

Reviewed By: [signature] Date & Time: 10/12/22 2122

CHAIN OF CUSTODY

ESS LABORATORY
185 Frances Avenue
Cranston, RI 02910
Phone: 401-461-7181
Fax: 401-461-4486
www.esslaboratory.com

ESS Lab # 22J0374 | Page 1 of 1

Turn Time (Days) ☒ > 5 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐ Same Day

Regulatory State: MA **Criteria:** RCS-1

Is this project for any of the following?: ☐ CT RCP ☒ MA MCP ☐ RGP ☐ Permit ☐ 401 WQ

ELECTRONIC DELIVERABLES (Final Reports are PDF)

☐ Limit Checker ☐ State Forms ☐ EQuIS
☒ Excel ☐ State Upload ☒ Enviro Data
☐ CLP-Like Package ☐ Other (Specify) →

CLIENT INFORMATION

Client: Weston & Sampson
Address: 55 Walkers Brook Dr, Reading MA 01867
Phone: (978) 548-4244
Email Distribution List: Scanlon.annika@wseinc.com

PROJECT INFORMATION

Project Name: Newton-Union St
Project Location: Newton, MA
Project Number: 2191018.A
Project Manager: Annika Scanlon
Bill to: W.S
PO#: N/A
Quote#: N/A

Client acknowledges that sampling is compliant with all EPA / State regulatory programs

REQUESTED ANALYSES

ESS Lab ID	Collection Date	Collection Time	Sample Type	Sample Matrix	Sample ID	Methanol VOC 8260	VOC 8260	SVOC 8270	PCB 8082	EPH [illegible]	MCP-14 metals*	[illegible]	[illegible]	reactive CN	reactive S	conductivity		Tetrahydrofuran	ML 12/16/22			Total Number of Bottles
1	10/11/22	0930	grab	S	SB-MW-4 (12-14')	X												X				4
2	10/11/22	1100	grab	S	SB-MW-3 (2-4')	X												X				4
3	10/11/22	1200	grab	S	SB-MW-2 (2-4')	X												X				4
4	10/11/22	1330	grab	S	SB-MW-1 (1-3')	X												X				4
5	10/11/22	1400	composite	S	SB-MW-1-2		X	X	X	X	X	X	X	X	X	X						6
6	10/11/22	1130	composite	S	SB/MW-3-4		X	X	X	X	X	X	X	X	X	X						6
7	10/11/22	—	—	—	Trip Blank		X															2

Container Type: AC-Air Cassette AG-Amber Glass B-BOD Bottle C-Cubitainer J-Jar O-Other P-Poly S-Sterile V-Vial — V V AG AG →

Container Volume: 1-100 mL 2-2.5 gal 3-250 mL 4-300 mL 5-500 mL 6-1L 7-VOA 8-2 oz 9-4 oz 10-8 oz 11-Other* — 7 7 6 1 →

Preservation Code: 1-Non Preserved 2-HCl 3-H2SO4 4-HNO3 5-NaOH 6-Methanol 7-Na2S2O3 8-ZnAce, NaOH 9-NH4Cl 10-DI H2O 11-Other* — 6 6 1 1 →

Sampled by: Meghan Simmons

Chain needs to be filled out neatly and completely for on time delivery.

Laboratory Use Only
Cooler Temperature (°C): 2.3 Ice

Comments: * Please specify "Other" preservative and containers types in this space
*run TCLP on RCRA 8 metals analytes if initial concs >20-times rule

All samples submitted are subject to ESS Laboratory's payment terms and conditions.

Dissolved Filtration ☐ Lab Filter

Relinquished by (Signature)	Date	Time	Received by (Signature)	Relinquished by (Signature)	Date	Time	Received by (Signature)
[signature]	10/11/22	1600	Sample room 1600	10/11/22	[illegible]	1100	[signature]

Relinquished by (Signature)	Date	Time	Received by (Signature)	Relinquished by (Signature)	Date	Time	Received by (Signature)
[signature]	10/12/22	1810	Taylor Davis				

CERTIFICATE OF ANALYSIS

Annika Willis-Scanlon
Weston and Sampson Engineers, Inc.
5 Centennial Drive
Peabody, MA 01960

RE: Newton - Union St (2191018.A)
ESS Laboratory Work Order Number: 22J0942

This signed Certificate of Analysis is our approved release of your analytical results. These results are only representative of sample aliquots received at the laboratory. ESS Laboratory expects its clients to follow all regulatory sampling guidelines. Beginning with this page, the entire report has been paginated. This report should not be copied except in full without the approval of the laboratory. Samples will be disposed of thirty days after the final report has been delivered. If you have any questions or concerns, please feel free to call our Customer Service Department.

Laurel Stoddard
Laboratory Director

REVIEWED
By ESS Laboratory at 5:09 pm, Nov 08, 2022

Analytical Summary
The project as described above has been analyzed in accordance with the ESS Quality Assurance Plan. This plan utilizes the following methodologies: US EPA SW-846, US EPA Methods for Chemical Analysis of Water and Wastes per 40 CFR Part 136, APHA Standard Methods for the Examination of Water and Wastewater, American Society for Testing and Materials (ASTM), and other recognized methodologies. The analyses with these noted observations are in conformance to the Quality Assurance Plan. In chromatographic analysis, manual integration is frequently used instead of automated integration because it produces more accurate results.

The test results present in this report are in compliance with TNI and relative state standards, and/or client Quality Assurance Project Plans (QAPP). The laboratory has reviewed the following: Sample Preservations, Hold Times, Initial Calibrations, Continuing Calibrations, Method Blanks, Blank Spikes, Blank Spike Duplicates, Duplicates, Matrix Spikes, Matrix Spike Duplicates, Surrogates and Internal Standards. Any results which were found to be outside of the recommended ranges stated in our SOPs will be noted in the Project Narrative.

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St

ESS Laboratory Work Order: 22J0942

SAMPLE RECEIPT

The following samples were received on October 26, 2022 for the analyses specified on the enclosed Chain of Custody Record.

To achieve CAM compliance for MCP data, ESS Laboratory has reviewed all QA/QC Requirements and Performance Standards listed in each method. Holding times and preservation have also been reviewed. All CAM requirements have been performed and achieved unless noted in the project narrative.

Each method has been set-up in the laboratory to reach required MCP standards. The methods for aqueous VOA and Soil Methanol VOA have known limitations for certain analytes. The regulatory standards may not be achieved due to these limitations. In addition, for all methods, matrix interferences, dilutions, and %Solids may elevate method reporting limits above regulatory standards. ESS Laboratory can provide, upon request, a Limit Checker (regulatory standard comparison spreadsheet) electronic deliverable which will highlight these exceedances.

Question I: All samples for metals were analyzed for a subset of the required MCP list per the client's request.

Lab Number	Sample Name	Matrix	Analysis
22J0942-01	MW-1	Ground Water	6010C, 6020A, 7010, 7470A, 8260B, EPH8270, EPH8270SIM, MADEP-EPH, MA-VPH-2.1
22J0942-02	MW-2	Ground Water	6010C, 6020A, 7010, 7470A, 8260B, EPH8270, EPH8270SIM, MADEP-EPH, MA-VPH-2.1
22J0942-03	MW-3	Ground Water	6010C, 6020A, 7010, 7470A, 8260B, EPH8270, EPH8270SIM, MADEP-EPH, MA-VPH-2.1

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St

ESS Laboratory Work Order: 22J0942

PROJECT NARRATIVE

8260B Volatile Organic Compounds

D2J0510-CCV1 **Calibration required quadratic regression (Q).**
Bromoform (94% @ 80-120%)

D2J0510-CCV1 **Continuing Calibration %Diff/Drift is below control limit (CD-).**
Tetrachloroethene (28% @ 20%)

MADEP-EPH Extractable Petroleum Hydrocarbons

D2K0142-TUN1 **Benzidine tailing factor >2.**

No other observations noted.

End of Project Narrative.

DATA USABILITY LINKS

To ensure you are viewing the most current version of the documents below, please clear your internet cookies for www.ESSLaboratory.com. Consult your IT Support personnel for information on how to clear your internet cookies.

Definitions of Quality Control Parameters

Semivolatile Organics Internal Standard Information

Semivolatile Organics Surrogate Information

Volatile Organics Internal Standard Information

Volatile Organics Surrogate Information

EPH and VPH Alkane Lists

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St

ESS Laboratory Work Order: 22J0942

CURRENT SW-846 METHODOLOGY VERSIONS

Analytical Methods

1010A - Flashpoint
6010C - ICP
6020A - ICP MS
7010 - Graphite Furnace
7196A - Hexavalent Chromium
7470A - Aqueous Mercury
7471B - Solid Mercury
8011 - EDB/DBCP/TCP
8015C - GRO/DRO
8081B - Pesticides
8082A - PCB
8100M - TPH
8151A - Herbicides
8260B - VOA
8270D - SVOA
8270D SIM - SVOA Low Level
9014 - Cyanide
9038 - Sulfate
9040C - Aqueous pH
9045D - Solid pH (Corrosivity)
9050A - Specific Conductance
9056A - Anions (IC)
9060A - TOC
9095B - Paint Filter
MADEP 04-1.1 - EPH
MADEP 18-2.1 - VPH

Prep Methods

3005A - Aqueous ICP Digestion
3020A - Aqueous Graphite Furnace / ICP MS Digestion
3050B - Solid ICP / Graphite Furnace / ICP MS Digestion
3060A - Solid Hexavalent Chromium Digestion
3510C - Separatory Funnel Extraction
3520C - Liquid / Liquid Extraction
3540C - Manual Soxhlet Extraction
3541 - Automated Soxhlet Extraction
3546 - Microwave Extraction
3580A - Waste Dilution
5030B - Aqueous Purge and Trap
5030C - Aqueous Purge and Trap
5035A - Solid Purge and Trap

SW846 Reactivity Methods 7.3.3.2 (Reactive Cyanide) and 7.3.4.1 (Reactive Sulfide) have been withdrawn by EPA. These methods are reported per client request and are not NELAP accredited.

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St

ESS Laboratory Work Order: 22J0942

MassDEP Analytical Protocol Certification Form

MADEP RTN: _____

This form provides certification for the following data set: **22J0942-01 through 22J0942-03**

Matrices: (X) Ground Water/Surface Water ( ) Soil/Sediment ( ) Drinking Water ( ) Air ( ) Other:_____

CAM Protocol (check all that apply below):

(X) 8260 VOC CAM II A	(X) 7470/7471 Hg CAM III B	(X) MassDEP VPH (GC/PID/FID) CAM IV A	( ) 8082 PCB CAM V A	( ) 9014 Total Cyanide/PAC CAM VI A	( ) 6860 Perchlorate CAM VIII B
( ) 8270 SVOC CAM II B	(X) 7010 Metals CAM III C	( ) MassDEP VPH (GC/MS) CAM IV C	( ) 8081 Pesticides CAM V B	( ) 7196 Hex Cr CAM VI B	( ) MassDEP APH CAM IX A
(X) 6010 Metals CAM III A	(X) 6020 Metals CAM III D	(X) MassDEP EPH CAM IV B	( ) 8151 Herbicides CAM V C	( ) Explosives CAM VIII A	( ) TO-15 VOC CAM IX B

Affirmative responses to questions A through F are required for "Presumptive Certainty" status

A	Were all samples received in a condition consistent with those described on the Chain-of-Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding times?	Yes (X) No ( )
B	Were the analytical method(s) and all associated QC requirements specified in the selected CAM protocol(s) followed?	Yes (X) No ( )
C	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?	Yes (X) No ( )
D	Does the laboratory report comply with all the reporting requirements specified in the CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data"?	Yes (X) No ( )
E	VPH, EPH, APH and TO-15 only: a. Was each method conducted without significant modification(s)? (Refer to the individual method(s) for a list of significant modifications).	Yes (X) No ( )
	b. APH and TO-15 Methods only: Was the complete analyte list reported for each method?	Yes ( ) No ( )
F	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all "No" responses to Questions A through E)?	Yes (X) No ( )

Responses to Questions G, H and I below are required for "'Presumptive Certainty" status

G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocols(s)?	Yes (X) No ( )*
	***Data User Note:* Data that achieve "Presumptive Certainty" status may not necessarily meet the data usability and representativeness requirements described in 310 CMR 40. 1056 (2)(k) and WSC-07-350.**	
H	Were **all** QC performance standards specified in the CAM protocol(s) achieved?	Yes ( ) No (X)*
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?	Yes ( ) No (X)*

All negative responses must be addressed in an attached laboratory narrative.

I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this analytical report is, to the best of my knowledge and belief, accurate and complete.

Signature: Laurel Stoddard Date: November 08, 2022

Printed Name: Laurel Stoddard Position: Laboratory Director

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St
Client Sample ID: MW-1
Date Sampled: 10/25/22 11:50
Percent Solids: N/A

ESS Laboratory Work Order: 22J0942
ESS Laboratory Sample ID: 22J0942-01
Sample Matrix: Ground Water
Units: ug/L

Extraction Method: 200.7/6010BNoDigest

Dissolved Metals

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	I/V	F/V	Batch
Arsenic	ND (5.0)		7010		1	CEV	10/28/22 12:28	10	10	DJ22614
Barium	**114** (50.0)		6010C		1	CEV	10/27/22 11:15	10	10	DJ22614
Cadmium	ND (1.0)		6020A		1	NAR	10/27/22 8:46	10	10	DJ22614
Chromium	ND (10.0)		6010C		1	CEV	10/27/22 11:15	10	10	DJ22614
Lead	ND (1.0)		6020A		1	NAR	10/27/22 8:46	10	10	DJ22614
Mercury	ND (0.20)		7470A		1	YIV	10/27/22 14:43	20	40	DJ22704
Selenium	ND (50.0)		6010C		1	CEV	10/27/22 11:15	10	10	DJ22614
Silver	ND (5.0)		6010C		1	CEV	10/27/22 11:15	10	10	DJ22614

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St
Client Sample ID: MW-1
Date Sampled: 10/25/22 11:50
Percent Solids: N/A
Initial Volume: 5ml
Final Volume: 5ml
Extraction Method: 5030B

ESS Laboratory Work Order: 22J0942
ESS Laboratory Sample ID: 22J0942-01
Sample Matrix: Ground Water
Units: ug/L
Analyst: MD

8260B Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,1,1,2-Tetrachloroethane	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
1,1,1-Trichloroethane	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
1,1,2,2-Tetrachloroethane	ND (0.5)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
1,1,2-Trichloroethane	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
1,1-Dichloroethane	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
1,1-Dichloroethene	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
1,1-Dichloropropene	ND (2.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
1,2,3-Trichlorobenzene	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
1,2,3-Trichloropropane	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
1,2,4-Trichlorobenzene	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
1,2,4-Trimethylbenzene	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
1,2-Dibromo-3-Chloropropane	ND (5.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
1,2-Dibromoethane	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
1,2-Dichlorobenzene	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
1,2-Dichloroethane	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
1,2-Dichloropropane	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
1,3,5-Trimethylbenzene	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
1,3-Dichlorobenzene	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
1,3-Dichloropropane	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
1,4-Dichlorobenzene	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
1,4-Dioxane - Screen	ND (500)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
2,2-Dichloropropane	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
2-Butanone	ND (10.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
2-Chlorotoluene	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
2-Hexanone	ND (10.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
4-Chlorotoluene	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
4-Isopropyltoluene	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
4-Methyl-2-Pentanone	ND (10.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
Acetone	ND (10.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
Benzene	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
Bromobenzene	ND (2.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
Bromochloromethane	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St
Client Sample ID: MW-1
Date Sampled: 10/25/22 11:50
Percent Solids: N/A
Initial Volume: 5ml
Final Volume: 5ml
Extraction Method: 5030B

ESS Laboratory Work Order: 22J0942
ESS Laboratory Sample ID: 22J0942-01
Sample Matrix: Ground Water
Units: ug/L
Analyst: MD

8260B Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Bromodichloromethane	ND (0.6)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
Bromoform	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
Bromomethane	ND (2.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
Carbon Disulfide	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
Carbon Tetrachloride	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
Chlorobenzene	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
Chloroethane	ND (2.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
Chloroform	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
Chloromethane	ND (2.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
cis-1,2-Dichloroethene	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
cis-1,3-Dichloropropene	ND (0.4)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
Dibromochloromethane	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
Dibromomethane	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
Dichlorodifluoromethane	ND (2.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
Diethyl Ether	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
Di-isopropyl ether	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
Ethyl tertiary-butyl ether	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
Ethylbenzene	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
Hexachlorobutadiene	ND (0.6)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
Hexachloroethane	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
Isopropylbenzene	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
Methyl tert-Butyl Ether	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
Methylene Chloride	ND (2.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
Naphthalene	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
n-Butylbenzene	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
n-Propylbenzene	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
sec-Butylbenzene	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
Styrene	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
tert-Butylbenzene	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
Tertiary-amyl methyl ether	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
Tetrachloroethene	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
Tetrahydrofuran	ND (5.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St
Client Sample ID: MW-1
Date Sampled: 10/25/22 11:50
Percent Solids: N/A
Initial Volume: 5ml
Final Volume: 5ml
Extraction Method: 5030B

ESS Laboratory Work Order: 22J0942
ESS Laboratory Sample ID: 22J0942-01
Sample Matrix: Ground Water
Units: ug/L
Analyst: MD

8260B Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Toluene	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
trans-1,2-Dichloroethene	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
trans-1,3-Dichloropropene	ND (0.4)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
Trichloroethene	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
Trichlorofluoromethane	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
Vinyl Chloride	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
Xylene O	ND (1.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
Xylene P,M	ND (2.0)		8260B		1	10/27/22 15:02	D2J0510	DJ22722
Xylenes (Total)	ND (2.00)		8260B		1	10/27/22 15:02		[CALC]

	%Recovery	Qualifier	Limits
Surrogate: 1,2-Dichloroethane-d4	*102 %*		*70-130*
Surrogate: 4-Bromofluorobenzene	*98 %*		*70-130*
Surrogate: Dibromofluoromethane	*99 %*		*70-130*
Surrogate: Toluene-d8	*101 %*		*70-130*

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St
Client Sample ID: MW-1
Date Sampled: 10/25/22 11:50
Percent Solids: N/A
Initial Volume: 1060ml
Final Volume: 1ml
Extraction Method: 3510C

ESS Laboratory Work Order: 22J0942
ESS Laboratory Sample ID: 22J0942-01
Sample Matrix: Ground Water
Units: ug/L

Prepared: 11/4/22 12:18

MADEP-EPH Extractable Petroleum Hydrocarbons

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Sequence	Batch
C9-C18 Aliphatics1	ND (94)		MADEP-EPH		1	MJV	11/07/22 20:01	D2K0136	DK20403
C19-C36 Aliphatics1	ND (94)		MADEP-EPH		1	MJV	11/07/22 20:01	D2K0136	DK20403
C11-C22 Unadjusted Aromatics1	ND (94.3)		EPH8270		1	MJV	11/08/22 4:26	D2K0125	DK20403
C11-C22 Aromatics1,2	ND (94.3)		EPH8270			TJ	11/08/22 4:26		[CALC]
2-Methylnaphthalene	ND (0.47)		EPH8270SIM		1	TJ	11/07/22 20:32	D2K0142	DK20403
Acenaphthene	ND (0.19)		EPH8270SIM		1	TJ	11/07/22 20:32	D2K0142	DK20403
Naphthalene	ND (0.47)		EPH8270SIM		1	TJ	11/07/22 20:32	D2K0142	DK20403
Phenanthrene	ND (0.47)		EPH8270SIM		1	TJ	11/07/22 20:32	D2K0142	DK20403
Acenaphthylene	ND (0.19)		EPH8270SIM		1	TJ	11/07/22 20:32	D2K0142	DK20403
Anthracene	ND (0.19)		EPH8270SIM		1	TJ	11/07/22 20:32	D2K0142	DK20403
Benzo(a)anthracene	ND (0.19)		EPH8270SIM		1	TJ	11/07/22 20:32	D2K0142	DK20403
Benzo(a)pyrene	ND (0.09)		EPH8270SIM		1	TJ	11/07/22 20:32	D2K0142	DK20403
Benzo(b)fluoranthene	ND (0.19)		EPH8270SIM		1	TJ	11/07/22 20:32	D2K0142	DK20403
Benzo(g,h,i)perylene	ND (0.19)		EPH8270SIM		1	TJ	11/07/22 20:32	D2K0142	DK20403
Benzo(k)fluoranthene	ND (0.19)		EPH8270SIM		1	TJ	11/07/22 20:32	D2K0142	DK20403
Chrysene	ND (0.19)		EPH8270SIM		1	TJ	11/07/22 20:32	D2K0142	DK20403
Dibenzo(a,h)Anthracene	ND (0.19)		EPH8270SIM		1	TJ	11/07/22 20:32	D2K0142	DK20403
Fluoranthene	ND (0.19)		EPH8270SIM		1	TJ	11/07/22 20:32	D2K0142	DK20403
Fluorene	ND (0.19)		EPH8270SIM		1	TJ	11/07/22 20:32	D2K0142	DK20403
Indeno(1,2,3-cd)Pyrene	ND (0.19)		EPH8270SIM		1	TJ	11/07/22 20:32	D2K0142	DK20403
Pyrene	ND (0.19)		EPH8270SIM		1	TJ	11/07/22 20:32	D2K0142	DK20403
Preservative:	**pH <= 2**		MADEP-EPH			MJV			DK20403

	%Recovery	Qualifier	Limits
Surrogate: 1-Chlorooctadecane	*49 %*		*40-140*
Surrogate: 2-Bromonaphthalene	*87 %*		*40-140*
Surrogate: 2-Fluorobiphenyl	*88 %*		*40-140*
Surrogate: O-Terphenyl	*90 %*		*40-140*

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St
Client Sample ID: MW-1
Date Sampled: 10/25/22 11:50
Percent Solids: N/A
Initial Volume: 5ml
Final Volume: 5ml
Extraction Method: 5030B
Column Type: Restek RTX-502.2 - 3µ film thickness 0.53mm X 105m

ESS Laboratory Work Order: 22J0942
ESS Laboratory Sample ID: 22J0942-01
Sample Matrix: Ground Water
Units: ug/L
Analyst: MEK
Trap Type: Supelco K Vocarb 3000 Trap

MADEP-VPH Volatile Petroleum Hydrocarbon

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
C9-C10 Aromatics	ND (100)		MA-VPH-2.1		1	10/27/22 17:28	D2J0520	DJ22729
C5-C8 Aliphatics1,2	ND (150)		MA-VPH-2.1		1	10/27/22 17:28		[CALC]
C9-C12 Aliphatics2,3	ND (150)		MA-VPH-2.1		1	10/27/22 17:28		[CALC]
Preservative:	**pH <= 2**		MA-VPH-2.1					DJ22729

	%Recovery	Qualifier	Limits
Surrogate: 2,5-Dibromotoluene - FID	*93 %*		*70-130*
Surrogate: 2,5-Dibromotoluene - PID	*87 %*		*70-130*

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St
Client Sample ID: MW-2
Date Sampled: 10/25/22 10:40
Percent Solids: N/A

ESS Laboratory Work Order: 22J0942
ESS Laboratory Sample ID: 22J0942-02
Sample Matrix: Ground Water
Units: ug/L

Extraction Method: 200.7/6010BNoDigest

Dissolved Metals

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	I/V	F/V	Batch
Arsenic	ND (5.0)		7010		1	CEV	10/28/22 12:34	10	10	DJ22614
Barium	**63.9** (50.0)		6010C		1	CEV	10/27/22 11:17	10	10	DJ22614
Cadmium	ND (1.0)		6020A		1	NAR	10/27/22 8:51	10	10	DJ22614
Chromium	ND (10.0)		6010C		1	CEV	10/27/22 11:17	10	10	DJ22614
Lead	ND (1.0)		6020A		1	NAR	10/27/22 8:51	10	10	DJ22614
Mercury	ND (0.20)		7470A		1	YIV	10/27/22 14:45	20	40	DJ22704
Selenium	ND (50.0)		6010C		1	CEV	10/27/22 11:17	10	10	DJ22614
Silver	ND (5.0)		6010C		1	CEV	10/27/22 11:17	10	10	DJ22614

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St
Client Sample ID: MW-2
Date Sampled: 10/25/22 10:40
Percent Solids: N/A
Initial Volume: 5ml
Final Volume: 5ml
Extraction Method: 5030B

ESS Laboratory Work Order: 22J0942
ESS Laboratory Sample ID: 22J0942-02
Sample Matrix: Ground Water
Units: ug/L
Analyst: MD

8260B Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,1,1,2-Tetrachloroethane	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
1,1,1-Trichloroethane	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
1,1,2,2-Tetrachloroethane	ND (0.5)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
1,1,2-Trichloroethane	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
1,1-Dichloroethane	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
1,1-Dichloroethene	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
1,1-Dichloropropene	ND (2.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
1,2,3-Trichlorobenzene	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
1,2,3-Trichloropropane	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
1,2,4-Trichlorobenzene	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
1,2,4-Trimethylbenzene	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
1,2-Dibromo-3-Chloropropane	ND (5.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
1,2-Dibromoethane	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
1,2-Dichlorobenzene	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
1,2-Dichloroethane	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
1,2-Dichloropropane	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
1,3,5-Trimethylbenzene	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
1,3-Dichlorobenzene	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
1,3-Dichloropropane	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
1,4-Dichlorobenzene	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
1,4-Dioxane - Screen	ND (500)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
2,2-Dichloropropane	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
2-Butanone	ND (10.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
2-Chlorotoluene	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
2-Hexanone	ND (10.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
4-Chlorotoluene	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
4-Isopropyltoluene	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
4-Methyl-2-Pentanone	ND (10.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
Acetone	ND (10.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
Benzene	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
Bromobenzene	ND (2.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
Bromochloromethane	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St
Client Sample ID: MW-2
Date Sampled: 10/25/22 10:40
Percent Solids: N/A
Initial Volume: 5ml
Final Volume: 5ml
Extraction Method: 5030B

ESS Laboratory Work Order: 22J0942
ESS Laboratory Sample ID: 22J0942-02
Sample Matrix: Ground Water
Units: ug/L
Analyst: MD

8260B Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Bromodichloromethane	ND (0.6)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
Bromoform	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
Bromomethane	ND (2.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
Carbon Disulfide	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
Carbon Tetrachloride	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
Chlorobenzene	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
Chloroethane	ND (2.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
Chloroform	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
Chloromethane	ND (2.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
cis-1,2-Dichloroethene	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
cis-1,3-Dichloropropene	ND (0.4)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
Dibromochloromethane	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
Dibromomethane	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
Dichlorodifluoromethane	ND (2.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
Diethyl Ether	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
Di-isopropyl ether	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
Ethyl tertiary-butyl ether	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
Ethylbenzene	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
Hexachlorobutadiene	ND (0.6)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
Hexachloroethane	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
Isopropylbenzene	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
Methyl tert-Butyl Ether	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
Methylene Chloride	ND (2.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
Naphthalene	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
n-Butylbenzene	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
n-Propylbenzene	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
sec-Butylbenzene	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
Styrene	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
tert-Butylbenzene	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
Tertiary-amyl methyl ether	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
Tetrachloroethene	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
Tetrahydrofuran	ND (5.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St
Client Sample ID: MW-2
Date Sampled: 10/25/22 10:40
Percent Solids: N/A
Initial Volume: 5ml
Final Volume: 5ml
Extraction Method: 5030B

ESS Laboratory Work Order: 22J0942
ESS Laboratory Sample ID: 22J0942-02
Sample Matrix: Ground Water
Units: ug/L
Analyst: MD

8260B Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Toluene	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
trans-1,2-Dichloroethene	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
trans-1,3-Dichloropropene	ND (0.4)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
Trichloroethene	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
Trichlorofluoromethane	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
Vinyl Chloride	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
Xylene O	ND (1.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
Xylene P,M	ND (2.0)		8260B		1	10/27/22 15:28	D2J0510	DJ22722
Xylenes (Total)	ND (2.00)		8260B		1	10/27/22 15:28		[CALC]

	%Recovery	Qualifier	Limits
Surrogate: 1,2-Dichloroethane-d4	*105 %*		*70-130*
Surrogate: 4-Bromofluorobenzene	*98 %*		*70-130*
Surrogate: Dibromofluoromethane	*100 %*		*70-130*
Surrogate: Toluene-d8	*100 %*		*70-130*

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St
Client Sample ID: MW-2
Date Sampled: 10/25/22 10:40
Percent Solids: N/A
Initial Volume: 1060ml
Final Volume: 1ml
Extraction Method: 3510C

ESS Laboratory Work Order: 22J0942
ESS Laboratory Sample ID: 22J0942-02
Sample Matrix: Ground Water
Units: ug/L

Prepared: 11/4/22 12:18

MADEP-EPH Extractable Petroleum Hydrocarbons

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Sequence	Batch
C9-C18 Aliphatics1	ND (94)		MADEP-EPH		1	MJV	11/07/22 20:35	D2K0136	DK20403
C19-C36 Aliphatics1	ND (94)		MADEP-EPH		1	MJV	11/07/22 20:35	D2K0136	DK20403
C11-C22 Unadjusted Aromatics1	ND (94.3)		EPH8270		1	MJV	11/08/22 5:04	D2K0125	DK20403
C11-C22 Aromatics1,2	ND (94.3)		EPH8270			TJ	11/08/22 5:04		[CALC]
2-Methylnaphthalene	ND (0.47)		EPH8270SIM		1	TJ	11/07/22 20:52	D2K0142	DK20403
Acenaphthene	ND (0.19)		EPH8270SIM		1	TJ	11/07/22 20:52	D2K0142	DK20403
Naphthalene	ND (0.47)		EPH8270SIM		1	TJ	11/07/22 20:52	D2K0142	DK20403
Phenanthrene	ND (0.47)		EPH8270SIM		1	TJ	11/07/22 20:52	D2K0142	DK20403
Acenaphthylene	ND (0.19)		EPH8270SIM		1	TJ	11/07/22 20:52	D2K0142	DK20403
Anthracene	ND (0.19)		EPH8270SIM		1	TJ	11/07/22 20:52	D2K0142	DK20403
Benzo(a)anthracene	ND (0.19)		EPH8270SIM		1	TJ	11/07/22 20:52	D2K0142	DK20403
Benzo(a)pyrene	ND (0.09)		EPH8270SIM		1	TJ	11/07/22 20:52	D2K0142	DK20403
Benzo(b)fluoranthene	ND (0.19)		EPH8270SIM		1	TJ	11/07/22 20:52	D2K0142	DK20403
Benzo(g,h,i)perylene	ND (0.19)		EPH8270SIM		1	TJ	11/07/22 20:52	D2K0142	DK20403
Benzo(k)fluoranthene	ND (0.19)		EPH8270SIM		1	TJ	11/07/22 20:52	D2K0142	DK20403
Chrysene	ND (0.19)		EPH8270SIM		1	TJ	11/07/22 20:52	D2K0142	DK20403
Dibenzo(a,h)Anthracene	ND (0.19)		EPH8270SIM		1	TJ	11/07/22 20:52	D2K0142	DK20403
Fluoranthene	ND (0.19)		EPH8270SIM		1	TJ	11/07/22 20:52	D2K0142	DK20403
Fluorene	ND (0.19)		EPH8270SIM		1	TJ	11/07/22 20:52	D2K0142	DK20403
Indeno(1,2,3-cd)Pyrene	ND (0.19)		EPH8270SIM		1	TJ	11/07/22 20:52	D2K0142	DK20403
Pyrene	ND (0.19)		EPH8270SIM		1	TJ	11/07/22 20:52	D2K0142	DK20403
Preservative:	**pH <= 2**		MADEP-EPH			MJV			DK20403

	%Recovery	Qualifier	Limits
Surrogate: 1-Chlorooctadecane	*52 %*		*40-140*
Surrogate: 2-Bromonaphthalene	*84 %*		*40-140*
Surrogate: 2-Fluorobiphenyl	*88 %*		*40-140*
Surrogate: O-Terphenyl	*76 %*		*40-140*

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St
Client Sample ID: MW-2
Date Sampled: 10/25/22 10:40
Percent Solids: N/A
Initial Volume: 5ml
Final Volume: 5ml
Extraction Method: 5030B
Column Type: Restek RTX-502.2 - 3µ film thickness 0.53mm X 105m

ESS Laboratory Work Order: 22J0942
ESS Laboratory Sample ID: 22J0942-02
Sample Matrix: Ground Water
Units: ug/L
Analyst: MEK
Trap Type: Supelco K Vocarb 3000 Trap

MADEP-VPH Volatile Petroleum Hydrocarbon

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
C9-C10 Aromatics	ND (100)		MA-VPH-2.1		1	10/27/22 18:03	D2J0520	DJ22729
C5-C8 Aliphatics1,2	ND (150)		MA-VPH-2.1		1	10/27/22 18:03		[CALC]
C9-C12 Aliphatics2,3	ND (150)		MA-VPH-2.1		1	10/27/22 18:03		[CALC]
Preservative:	**pH <= 2**		MA-VPH-2.1					DJ22729

	%Recovery	Qualifier	Limits
Surrogate: 2,5-Dibromotoluene - FID	*94 %*		*70-130*
Surrogate: 2,5-Dibromotoluene - PID	*89 %*		*70-130*

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St
Client Sample ID: MW-3
Date Sampled: 10/25/22 09:45
Percent Solids: N/A

ESS Laboratory Work Order: 22J0942
ESS Laboratory Sample ID: 22J0942-03
Sample Matrix: Ground Water
Units: ug/L

Extraction Method: 200.7/6010BNoDigest

Dissolved Metals

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	I/V	F/V	Batch
Arsenic	ND (5.0)		7010		1	CEV	10/28/22 12:39	10	10	DJ22614
Barium	**88.6** (50.0)		6010C		1	CEV	10/27/22 11:19	10	10	DJ22614
Cadmium	ND (1.0)		6020A		1	NAR	10/27/22 8:57	10	10	DJ22614
Chromium	ND (10.0)		6010C		1	CEV	10/27/22 11:19	10	10	DJ22614
Lead	ND (1.0)		6020A		1	NAR	10/27/22 8:57	10	10	DJ22614
Mercury	ND (0.20)		7470A		1	YIV	10/27/22 14:47	20	40	DJ22704
Selenium	ND (50.0)		6010C		1	CEV	10/27/22 11:19	10	10	DJ22614
Silver	ND (5.0)		6010C		1	CEV	10/27/22 11:19	10	10	DJ22614

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St
Client Sample ID: MW-3
Date Sampled: 10/25/22 09:45
Percent Solids: N/A
Initial Volume: 5ml
Final Volume: 5ml
Extraction Method: 5030B

ESS Laboratory Work Order: 22J0942
ESS Laboratory Sample ID: 22J0942-03
Sample Matrix: Ground Water
Units: ug/L
Analyst: MD

8260B Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
1,1,1,2-Tetrachloroethane	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
1,1,1-Trichloroethane	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
1,1,2,2-Tetrachloroethane	ND (0.5)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
1,1,2-Trichloroethane	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
1,1-Dichloroethane	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
1,1-Dichloroethene	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
1,1-Dichloropropene	ND (2.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
1,2,3-Trichlorobenzene	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
1,2,3-Trichloropropane	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
1,2,4-Trichlorobenzene	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
1,2,4-Trimethylbenzene	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
1,2-Dibromo-3-Chloropropane	ND (5.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
1,2-Dibromoethane	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
1,2-Dichlorobenzene	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
1,2-Dichloroethane	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
1,2-Dichloropropane	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
1,3,5-Trimethylbenzene	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
1,3-Dichlorobenzene	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
1,3-Dichloropropane	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
1,4-Dichlorobenzene	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
1,4-Dioxane - Screen	ND (500)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
2,2-Dichloropropane	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
2-Butanone	ND (10.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
2-Chlorotoluene	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
2-Hexanone	ND (10.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
4-Chlorotoluene	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
4-Isopropyltoluene	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
4-Methyl-2-Pentanone	ND (10.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
Acetone	ND (10.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
Benzene	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
Bromobenzene	ND (2.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
Bromochloromethane	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St
Client Sample ID: MW-3
Date Sampled: 10/25/22 09:45
Percent Solids: N/A
Initial Volume: 5ml
Final Volume: 5ml
Extraction Method: 5030B

ESS Laboratory Work Order: 22J0942
ESS Laboratory Sample ID: 22J0942-03
Sample Matrix: Ground Water
Units: ug/L
Analyst: MD

8260B Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Bromodichloromethane	ND (0.6)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
Bromoform	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
Bromomethane	ND (2.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
Carbon Disulfide	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
Carbon Tetrachloride	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
Chlorobenzene	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
Chloroethane	ND (2.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
Chloroform	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
Chloromethane	ND (2.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
cis-1,2-Dichloroethene	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
cis-1,3-Dichloropropene	ND (0.4)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
Dibromochloromethane	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
Dibromomethane	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
Dichlorodifluoromethane	ND (2.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
Diethyl Ether	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
Di-isopropyl ether	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
Ethyl tertiary-butyl ether	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
Ethylbenzene	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
Hexachlorobutadiene	ND (0.6)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
Hexachloroethane	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
Isopropylbenzene	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
Methyl tert-Butyl Ether	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
Methylene Chloride	ND (2.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
Naphthalene	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
n-Butylbenzene	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
n-Propylbenzene	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
sec-Butylbenzene	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
Styrene	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
tert-Butylbenzene	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
Tertiary-amyl methyl ether	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
Tetrachloroethene	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
Tetrahydrofuran	ND (5.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St
Client Sample ID: MW-3
Date Sampled: 10/25/22 09:45
Percent Solids: N/A
Initial Volume: 5ml
Final Volume: 5ml
Extraction Method: 5030B

ESS Laboratory Work Order: 22J0942
ESS Laboratory Sample ID: 22J0942-03
Sample Matrix: Ground Water
Units: ug/L
Analyst: MD

8260B Volatile Organic Compounds

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
Toluene	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
trans-1,2-Dichloroethene	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
trans-1,3-Dichloropropene	ND (0.4)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
Trichloroethene	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
Trichlorofluoromethane	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
Vinyl Chloride	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
Xylene O	ND (1.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
Xylene P,M	ND (2.0)		8260B		1	10/27/22 15:54	D2J0510	DJ22722
Xylenes (Total)	ND (2.00)		8260B		1	10/27/22 15:54		[CALC]

	%Recovery	Qualifier	Limits
Surrogate: 1,2-Dichloroethane-d4	*105 %*		*70-130*
Surrogate: 4-Bromofluorobenzene	*99 %*		*70-130*
Surrogate: Dibromofluoromethane	*98 %*		*70-130*
Surrogate: Toluene-d8	*100 %*		*70-130*

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St
Client Sample ID: MW-3
Date Sampled: 10/25/22 09:45
Percent Solids: N/A
Initial Volume: 1070ml
Final Volume: 1ml
Extraction Method: 3510C

ESS Laboratory Work Order: 22J0942
ESS Laboratory Sample ID: 22J0942-03
Sample Matrix: Ground Water
Units: ug/L

Prepared: 11/4/22 12:18

MADEP-EPH Extractable Petroleum Hydrocarbons

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Sequence	Batch
C9-C18 Aliphatics1	ND (93)		MADEP-EPH		1	MJV	11/07/22 21:10	D2K0136	DK20403
C19-C36 Aliphatics1	ND (93)		MADEP-EPH		1	MJV	11/07/22 21:10	D2K0136	DK20403
C11-C22 Unadjusted Aromatics1	ND (93.5)		EPH8270		1	MJV	11/08/22 5:42	D2K0125	DK20403
C11-C22 Aromatics1,2	ND (93.5)		EPH8270			TJ	11/08/22 5:42		[CALC]
2-Methylnaphthalene	ND (0.47)		EPH8270SIM		1	TJ	11/07/22 21:12	D2K0142	DK20403
Acenaphthene	ND (0.19)		EPH8270SIM		1	TJ	11/07/22 21:12	D2K0142	DK20403
Naphthalene	ND (0.47)		EPH8270SIM		1	TJ	11/07/22 21:12	D2K0142	DK20403
Phenanthrene	ND (0.47)		EPH8270SIM		1	TJ	11/07/22 21:12	D2K0142	DK20403
Acenaphthylene	ND (0.19)		EPH8270SIM		1	TJ	11/07/22 21:12	D2K0142	DK20403
Anthracene	ND (0.19)		EPH8270SIM		1	TJ	11/07/22 21:12	D2K0142	DK20403
Benzo(a)anthracene	ND (0.19)		EPH8270SIM		1	TJ	11/07/22 21:12	D2K0142	DK20403
Benzo(a)pyrene	ND (0.09)		EPH8270SIM		1	TJ	11/07/22 21:12	D2K0142	DK20403
Benzo(b)fluoranthene	ND (0.19)		EPH8270SIM		1	TJ	11/07/22 21:12	D2K0142	DK20403
Benzo(g,h,i)perylene	ND (0.19)		EPH8270SIM		1	TJ	11/07/22 21:12	D2K0142	DK20403
Benzo(k)fluoranthene	ND (0.19)		EPH8270SIM		1	TJ	11/07/22 21:12	D2K0142	DK20403
Chrysene	ND (0.19)		EPH8270SIM		1	TJ	11/07/22 21:12	D2K0142	DK20403
Dibenzo(a,h)Anthracene	ND (0.19)		EPH8270SIM		1	TJ	11/07/22 21:12	D2K0142	DK20403
Fluoranthene	**0.19** (0.19)		EPH8270SIM		1	TJ	11/07/22 21:12	D2K0142	DK20403
Fluorene	ND (0.19)		EPH8270SIM		1	TJ	11/07/22 21:12	D2K0142	DK20403
Indeno(1,2,3-cd)Pyrene	ND (0.19)		EPH8270SIM		1	TJ	11/07/22 21:12	D2K0142	DK20403
Pyrene	ND (0.19)		EPH8270SIM		1	TJ	11/07/22 21:12	D2K0142	DK20403
Preservative:	**pH <= 2**		MADEP-EPH			MJV			DK20403

	%Recovery	Qualifier	Limits
Surrogate: 1-Chlorooctadecane	*57 %*		*40-140*
Surrogate: 2-Bromonaphthalene	*82 %*		*40-140*
Surrogate: 2-Fluorobiphenyl	*86 %*		*40-140*
Surrogate: O-Terphenyl	*87 %*		*40-140*

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St
Client Sample ID: MW-3
Date Sampled: 10/25/22 09:45
Percent Solids: N/A
Initial Volume: 5ml
Final Volume: 5ml
Extraction Method: 5030B
Column Type: Restek RTX-502.2 - 3µ film thickness 0.53mm X 105m

ESS Laboratory Work Order: 22J0942
ESS Laboratory Sample ID: 22J0942-03
Sample Matrix: Ground Water
Units: ug/L
Analyst: MEK
Trap Type: Supelco K Vocarb 3000 Trap

MADEP-VPH Volatile Petroleum Hydrocarbon

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyzed	Sequence	Batch
C9-C10 Aromatics	ND (100)		MA-VPH-2.1		1	10/27/22 18:37	D2J0520	DJ22729
C5-C8 Aliphatics1,2	ND (150)		MA-VPH-2.1		1	10/27/22 18:37		[CALC]
C9-C12 Aliphatics2,3	ND (150)		MA-VPH-2.1		1	10/27/22 18:37		[CALC]
Preservative:	**pH <= 2**		MA-VPH-2.1					DJ22729

	%Recovery	Qualifier	Limits
Surrogate: 2,5-Dibromotoluene - FID	*97 %*		*70-130*
Surrogate: 2,5-Dibromotoluene - PID	*95 %*		*70-130*

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St

ESS Laboratory Work Order: 22J0942

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Dissolved Metals										
Batch DJ22614 - 200.7/6010BNoDigest										
Blank										
Barium	ND	50.0	ug/L							
Chromium	ND	10.0	ug/L							
Selenium	ND	50.0	ug/L							
Silver	ND	5.0	ug/L							
Blank										
Barium	ND	50.0	ug/L							
Cadmium	ND	1.0	ug/L							
Chromium	ND	10.0	ug/L							
Lead	ND	1.0	ug/L							
Selenium	ND	50.0	ug/L							
Silver	ND	5.0	ug/L							
Blank										
Arsenic	ND	5.0	ug/L							
LCS										
Barium	0.5		mg/L	0.5000		101	80-120			
Chromium	0.5		mg/L	0.5000		100	80-120			
Selenium	1.0		mg/L	1.000		99	80-120			
Silver	0.2		mg/L	0.2500		100	80-120			
LCS										
Cadmium	10.1		ug/L	10.05		100	80-120			
Lead	10.1		ug/L	9.990		101	80-120			
LCS										
Arsenic	24.8		ug/L	25.00		99	80-120			
Batch DJ22704 - 245.1/7470A										
Blank										
Mercury	ND	0.20	ug/L							
LCS										
Mercury	6.54	0.20	ug/L	6.000		109	80-120			
LCS Dup										
Mercury	6.35	0.20	ug/L	6.000		106	80-120	3	20	
8260B Volatile Organic Compounds										
Batch DJ22722 - 5030B										
Blank										
1,1,1,2-Tetrachloroethane	ND	1.0	ug/L							
1,1,1-Trichloroethane	ND	1.0	ug/L							
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L							
1,1,2-Trichloroethane	ND	1.0	ug/L							
1,1-Dichloroethane	ND	1.0	ug/L							
1,1-Dichloroethene	ND	1.0	ug/L							
1,1-Dichloropropene	ND	2.0	ug/L							

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St

ESS Laboratory Work Order: 22J0942

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8260B Volatile Organic Compounds										
Batch DJ22722 - 5030B										
1,2,3-Trichlorobenzene	ND	1.0	ug/L							
1,2,3-Trichloropropane	ND	1.0	ug/L							
1,2,4-Trichlorobenzene	ND	1.0	ug/L							
1,2,4-Trimethylbenzene	ND	1.0	ug/L							
1,2-Dibromo-3-Chloropropane	ND	5.0	ug/L							
1,2-Dibromoethane	ND	1.0	ug/L							
1,2-Dichlorobenzene	ND	1.0	ug/L							
1,2-Dichloroethane	ND	1.0	ug/L							
1,2-Dichloropropane	ND	1.0	ug/L							
1,3,5-Trimethylbenzene	ND	1.0	ug/L							
1,3-Dichlorobenzene	ND	1.0	ug/L							
1,3-Dichloropropane	ND	1.0	ug/L							
1,4-Dichlorobenzene	ND	1.0	ug/L							
1,4-Dioxane - Screen	ND	500	ug/L							
2,2-Dichloropropane	ND	1.0	ug/L							
2-Butanone	ND	10.0	ug/L							
2-Chlorotoluene	ND	1.0	ug/L							
2-Hexanone	ND	10.0	ug/L							
4-Chlorotoluene	ND	1.0	ug/L							
4-Isopropyltoluene	ND	1.0	ug/L							
4-Methyl-2-Pentanone	ND	10.0	ug/L							
Acetone	ND	10.0	ug/L							
Benzene	ND	1.0	ug/L							
Bromobenzene	ND	2.0	ug/L							
Bromochloromethane	ND	1.0	ug/L							
Bromodichloromethane	ND	0.6	ug/L							
Bromoform	ND	1.0	ug/L							
Bromomethane	ND	2.0	ug/L							
Carbon Disulfide	ND	1.0	ug/L							
Carbon Tetrachloride	ND	1.0	ug/L							
Chlorobenzene	ND	1.0	ug/L							
Chloroethane	ND	2.0	ug/L							
Chloroform	ND	1.0	ug/L							
Chloromethane	ND	2.0	ug/L							
cis-1,2-Dichloroethene	ND	1.0	ug/L							
cis-1,3-Dichloropropene	ND	0.4	ug/L							
Dibromochloromethane	ND	1.0	ug/L							
Dibromomethane	ND	1.0	ug/L							
Dichlorodifluoromethane	ND	2.0	ug/L							
Diethyl Ether	ND	1.0	ug/L							
Di-isopropyl ether	ND	1.0	ug/L							
Ethyl tertiary-butyl ether	ND	1.0	ug/L							
Ethylbenzene	ND	1.0	ug/L							
Hexachlorobutadiene	ND	0.6	ug/L							
Hexachloroethane	ND	1.0	ug/L							

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St

ESS Laboratory Work Order: 22J0942

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8260B Volatile Organic Compounds										
Batch DJ22722 - 5030B										
Isopropylbenzene	ND	1.0	ug/L							
Methyl tert-Butyl Ether	ND	1.0	ug/L							
Methylene Chloride	ND	2.0	ug/L							
Naphthalene	ND	1.0	ug/L							
n-Butylbenzene	ND	1.0	ug/L							
n-Propylbenzene	ND	1.0	ug/L							
sec-Butylbenzene	ND	1.0	ug/L							
Styrene	ND	1.0	ug/L							
tert-Butylbenzene	ND	1.0	ug/L							
Tertiary-amyl methyl ether	ND	1.0	ug/L							
Tetrachloroethene	ND	1.0	ug/L							
Tetrahydrofuran	ND	5.0	ug/L							
Toluene	ND	1.0	ug/L							
trans-1,2-Dichloroethene	ND	1.0	ug/L							
trans-1,3-Dichloropropene	ND	0.4	ug/L							
Trichloroethene	ND	1.0	ug/L							
Trichlorofluoromethane	ND	1.0	ug/L							
Vinyl Chloride	ND	1.0	ug/L							
Xylene O	ND	1.0	ug/L							
Xylene P,M	ND	2.0	ug/L							
Surrogate: 1,2-Dichloroethane-d4	*25.7*		ug/L	*25.00*		*103*	*70-130*			
Surrogate: 4-Bromofluorobenzene	*24.5*		ug/L	*25.00*		*98*	*70-130*			
Surrogate: Dibromofluoromethane	*24.6*		ug/L	*25.00*		*98*	*70-130*			
Surrogate: Toluene-d8	*25.2*		ug/L	*25.00*		*101*	*70-130*			
LCS										
1,1,1,2-Tetrachloroethane	9.5	1.0	ug/L	10.00		95	70-130			
1,1,1-Trichloroethane	9.9	1.0	ug/L	10.00		99	70-130			
1,1,2,2-Tetrachloroethane	9.6	0.5	ug/L	10.00		96	70-130			
1,1,2-Trichloroethane	8.9	1.0	ug/L	10.00		89	70-130			
1,1-Dichloroethane	9.4	1.0	ug/L	10.00		94	70-130			
1,1-Dichloroethene	10.6	1.0	ug/L	10.00		106	70-130			
1,1-Dichloropropene	9.0	2.0	ug/L	10.00		90	70-130			
1,2,3-Trichlorobenzene	9.6	1.0	ug/L	10.00		96	70-130			
1,2,3-Trichloropropane	9.1	1.0	ug/L	10.00		91	70-130			
1,2,4-Trichlorobenzene	9.4	1.0	ug/L	10.00		94	70-130			
1,2,4-Trimethylbenzene	9.4	1.0	ug/L	10.00		94	70-130			
1,2-Dibromo-3-Chloropropane	8.3	5.0	ug/L	10.00		83	70-130			
1,2-Dibromoethane	9.6	1.0	ug/L	10.00		96	70-130			
1,2-Dichlorobenzene	9.4	1.0	ug/L	10.00		94	70-130			
1,2-Dichloroethane	9.0	1.0	ug/L	10.00		90	70-130			
1,2-Dichloropropane	8.9	1.0	ug/L	10.00		89	70-130			
1,3,5-Trimethylbenzene	9.9	1.0	ug/L	10.00		99	70-130			
1,3-Dichlorobenzene	9.5	1.0	ug/L	10.00		95	70-130			
1,3-Dichloropropane	9.5	1.0	ug/L	10.00		95	70-130			
1,4-Dichlorobenzene	9.4	1.0	ug/L	10.00		94	70-130			

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St

ESS Laboratory Work Order: 22J0942

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8260B Volatile Organic Compounds										
Batch DJ22722 - 5030B										
1,4-Dioxane - Screen	ND	500	ug/L	200.0		0	0-332			
2,2-Dichloropropane	10.3	1.0	ug/L	10.00		103	70-130			
2-Butanone	47.8	10.0	ug/L	50.00		96	70-130			
2-Chlorotoluene	9.4	1.0	ug/L	10.00		94	70-130			
2-Hexanone	48.9	10.0	ug/L	50.00		98	70-130			
4-Chlorotoluene	9.5	1.0	ug/L	10.00		95	70-130			
4-Isopropyltoluene	9.5	1.0	ug/L	10.00		95	70-130			
4-Methyl-2-Pentanone	47.2	10.0	ug/L	50.00		94	70-130			
Acetone	50.2	10.0	ug/L	50.00		100	70-130			
Benzene	9.1	1.0	ug/L	10.00		91	70-130			
Bromobenzene	9.4	2.0	ug/L	10.00		94	70-130			
Bromochloromethane	9.3	1.0	ug/L	10.00		93	70-130			
Bromodichloromethane	9.4	0.6	ug/L	10.00		94	70-130			
Bromoform	8.9	1.0	ug/L	10.00		89	70-130			
Bromomethane	9.1	2.0	ug/L	10.00		91	70-130			
Carbon Disulfide	9.8	1.0	ug/L	10.00		98	70-130			
Carbon Tetrachloride	9.6	1.0	ug/L	10.00		96	70-130			
Chlorobenzene	9.2	1.0	ug/L	10.00		92	70-130			
Chloroethane	9.3	2.0	ug/L	10.00		93	70-130			
Chloroform	9.3	1.0	ug/L	10.00		93	70-130			
Chloromethane	8.3	2.0	ug/L	10.00		83	70-130			
cis-1,2-Dichloroethene	9.6	1.0	ug/L	10.00		96	70-130			
cis-1,3-Dichloropropene	9.3	0.4	ug/L	10.00		93	70-130			
Dibromochloromethane	8.7	1.0	ug/L	10.00		87	70-130			
Dibromomethane	9.3	1.0	ug/L	10.00		93	70-130			
Dichlorodifluoromethane	8.3	2.0	ug/L	10.00		83	70-130			
Diethyl Ether	9.4	1.0	ug/L	10.00		94	70-130			
Di-isopropyl ether	9.2	1.0	ug/L	10.00		92	70-130			
Ethyl tertiary-butyl ether	9.6	1.0	ug/L	10.00		96	70-130			
Ethylbenzene	9.3	1.0	ug/L	10.00		93	70-130			
Hexachlorobutadiene	10.1	0.6	ug/L	10.00		101	70-130			
Hexachloroethane	8.9	1.0	ug/L	10.00		89	70-130			
Isopropylbenzene	9.7	1.0	ug/L	10.00		97	70-130			
Methyl tert-Butyl Ether	9.2	1.0	ug/L	10.00		92	70-130			
Methylene Chloride	9.3	2.0	ug/L	10.00		93	70-130			
Naphthalene	8.5	1.0	ug/L	10.00		85	70-130			
n-Butylbenzene	9.6	1.0	ug/L	10.00		96	70-130			
n-Propylbenzene	9.4	1.0	ug/L	10.00		94	70-130			
sec-Butylbenzene	9.4	1.0	ug/L	10.00		94	70-130			
Styrene	9.2	1.0	ug/L	10.00		92	70-130			
tert-Butylbenzene	9.6	1.0	ug/L	10.00		96	70-130			
Tertiary-amyl methyl ether	9.1	1.0	ug/L	10.00		91	70-130			
Tetrachloroethene	8.2	1.0	ug/L	10.00		82	70-130			
Tetrahydrofuran	9.3	5.0	ug/L	10.00		93	70-130			
Toluene	9.2	1.0	ug/L	10.00		92	70-130			

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St

ESS Laboratory Work Order: 22J0942

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8260B Volatile Organic Compounds										
Batch DJ22722 - 5030B										
trans-1,2-Dichloroethene	9.8	1.0	ug/L	10.00		98	70-130			
trans-1,3-Dichloropropene	7.6	0.4	ug/L	10.00		76	70-130			
Trichloroethene	8.9	1.0	ug/L	10.00		89	70-130			
Trichlorofluoromethane	9.6	1.0	ug/L	10.00		96	70-130			
Vinyl Chloride	11.0	1.0	ug/L	10.00		110	70-130			
Xylene O	9.4	1.0	ug/L	10.00		94	70-130			
Xylene P,M	19.1	2.0	ug/L	20.00		96	70-130			
Surrogate: 1,2-Dichloroethane-d4	*25.2*		ug/L	*25.00*		*101*	*70-130*			
Surrogate: 4-Bromofluorobenzene	*25.4*		ug/L	*25.00*		*102*	*70-130*			
Surrogate: Dibromofluoromethane	*25.3*		ug/L	*25.00*		*101*	*70-130*			
Surrogate: Toluene-d8	*25.1*		ug/L	*25.00*		*100*	*70-130*			
LCS Dup										
1,1,1,2-Tetrachloroethane	9.6	1.0	ug/L	10.00		96	70-130	1	20	
1,1,1-Trichloroethane	9.9	1.0	ug/L	10.00		99	70-130	0.6	20	
1,1,2,2-Tetrachloroethane	9.2	0.5	ug/L	10.00		92	70-130	5	20	
1,1,2-Trichloroethane	9.0	1.0	ug/L	10.00		90	70-130	0.7	20	
1,1-Dichloroethane	9.4	1.0	ug/L	10.00		94	70-130	0.1	20	
1,1-Dichloroethene	10.2	1.0	ug/L	10.00		102	70-130	3	20	
1,1-Dichloropropene	9.3	2.0	ug/L	10.00		93	70-130	3	20	
1,2,3-Trichlorobenzene	8.9	1.0	ug/L	10.00		89	70-130	8	20	
1,2,3-Trichloropropane	8.6	1.0	ug/L	10.00		86	70-130	5	20	
1,2,4-Trichlorobenzene	9.0	1.0	ug/L	10.00		90	70-130	5	20	
1,2,4-Trimethylbenzene	9.3	1.0	ug/L	10.00		93	70-130	0.6	20	
1,2-Dibromo-3-Chloropropane	8.0	5.0	ug/L	10.00		80	70-130	4	20	
1,2-Dibromoethane	9.4	1.0	ug/L	10.00		94	70-130	2	20	
1,2-Dichlorobenzene	9.3	1.0	ug/L	10.00		93	70-130	0.4	20	
1,2-Dichloroethane	9.3	1.0	ug/L	10.00		93	70-130	3	20	
1,2-Dichloropropane	8.9	1.0	ug/L	10.00		89	70-130	0.3	20	
1,3,5-Trimethylbenzene	9.8	1.0	ug/L	10.00		98	70-130	1	20	
1,3-Dichlorobenzene	9.3	1.0	ug/L	10.00		93	70-130	2	20	
1,3-Dichloropropane	9.6	1.0	ug/L	10.00		96	70-130	0.5	20	
1,4-Dichlorobenzene	9.4	1.0	ug/L	10.00		94	70-130	0.6	20	
1,4-Dioxane - Screen	ND	500	ug/L	200.0		0	0-332	200	200	
2,2-Dichloropropane	10.2	1.0	ug/L	10.00		102	70-130	0.5	20	
2-Butanone	45.9	10.0	ug/L	50.00		92	70-130	4	20	
2-Chlorotoluene	9.4	1.0	ug/L	10.00		94	70-130	0.7	20	
2-Hexanone	46.2	10.0	ug/L	50.00		92	70-130	6	20	
4-Chlorotoluene	9.4	1.0	ug/L	10.00		94	70-130	0.7	20	
4-Isopropyltoluene	9.3	1.0	ug/L	10.00		93	70-130	2	20	
4-Methyl-2-Pentanone	44.5	10.0	ug/L	50.00		89	70-130	6	20	
Acetone	48.8	10.0	ug/L	50.00		98	70-130	3	20	
Benzene	9.1	1.0	ug/L	10.00		91	70-130	0.3	20	
Bromobenzene	9.5	2.0	ug/L	10.00		95	70-130	0.7	20	
Bromochloromethane	9.8	1.0	ug/L	10.00		98	70-130	5	20	
Bromodichloromethane	9.8	0.6	ug/L	10.00		98	70-130	3	20	

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St

ESS Laboratory Work Order: 22J0942

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
8260B Volatile Organic Compounds										
Batch DJ22722 - 5030B										
Bromoform	8.6	1.0	ug/L	10.00		86	70-130	4	20	
Bromomethane	8.9	2.0	ug/L	10.00		89	70-130	3	20	
Carbon Disulfide	10.0	1.0	ug/L	10.00		100	70-130	1	20	
Carbon Tetrachloride	9.7	1.0	ug/L	10.00		97	70-130	0.9	20	
Chlorobenzene	9.1	1.0	ug/L	10.00		91	70-130	1	20	
Chloroethane	9.5	2.0	ug/L	10.00		95	70-130	2	20	
Chloroform	9.5	1.0	ug/L	10.00		95	70-130	2	20	
Chloromethane	8.7	2.0	ug/L	10.00		87	70-130	4	20	
cis-1,2-Dichloroethene	9.6	1.0	ug/L	10.00		96	70-130	0.9	20	
cis-1,3-Dichloropropene	9.2	0.4	ug/L	10.00		92	70-130	0.1	20	
Dibromochloromethane	8.6	1.0	ug/L	10.00		86	70-130	0.1	20	
Dibromomethane	9.2	1.0	ug/L	10.00		92	70-130	1	20	
Dichlorodifluoromethane	8.6	2.0	ug/L	10.00		86	70-130	3	20	
Diethyl Ether	8.5	1.0	ug/L	10.00		85	70-130	10	20	
Di-isopropyl ether	9.2	1.0	ug/L	10.00		92	70-130	0.4	20	
Ethyl tertiary-butyl ether	9.5	1.0	ug/L	10.00		95	70-130	0.3	20	
Ethylbenzene	9.3	1.0	ug/L	10.00		93	70-130	0.1	20	
Hexachlorobutadiene	9.4	0.6	ug/L	10.00		94	70-130	7	20	
Hexachloroethane	8.8	1.0	ug/L	10.00		88	70-130	2	20	
Isopropylbenzene	9.6	1.0	ug/L	10.00		96	70-130	0.4	20	
Methyl tert-Butyl Ether	8.9	1.0	ug/L	10.00		89	70-130	3	20	
Methylene Chloride	9.3	2.0	ug/L	10.00		93	70-130	0.1	20	
Naphthalene	8.0	1.0	ug/L	10.00		80	70-130	5	20	
n-Butylbenzene	9.3	1.0	ug/L	10.00		93	70-130	3	20	
n-Propylbenzene	9.4	1.0	ug/L	10.00		94	70-130	0.1	20	
sec-Butylbenzene	9.2	1.0	ug/L	10.00		92	70-130	2	20	
Styrene	9.1	1.0	ug/L	10.00		91	70-130	1	20	
tert-Butylbenzene	9.4	1.0	ug/L	10.00		94	70-130	2	20	
Tertiary-amyl methyl ether	9.0	1.0	ug/L	10.00		90	70-130	2	20	
Tetrachloroethene	8.4	1.0	ug/L	10.00		84	70-130	3	20	
Tetrahydrofuran	8.1	5.0	ug/L	10.00		81	70-130	13	20	
Toluene	9.3	1.0	ug/L	10.00		93	70-130	0.6	20	
trans-1,2-Dichloroethene	10.0	1.0	ug/L	10.00		100	70-130	1	20	
trans-1,3-Dichloropropene	7.5	0.4	ug/L	10.00		75	70-130	2	20	
Trichloroethene	8.9	1.0	ug/L	10.00		89	70-130	0.4	20	
Trichlorofluoromethane	9.6	1.0	ug/L	10.00		96	70-130	0.4	20	
Vinyl Chloride	10.9	1.0	ug/L	10.00		109	70-130	1	20	
Xylene O	9.5	1.0	ug/L	10.00		95	70-130	0.6	20	
Xylene P,M	19.0	2.0	ug/L	20.00		95	70-130	0.6	20	
Surrogate: 1,2-Dichloroethane-d4	*25.4*		ug/L	*25.00*		*102*	*70-130*			
Surrogate: 4-Bromofluorobenzene	*25.4*		ug/L	*25.00*		*102*	*70-130*			
Surrogate: Dibromofluoromethane	*25.2*		ug/L	*25.00*		*101*	*70-130*			
Surrogate: Toluene-d8	*24.8*		ug/L	*25.00*		*99*	*70-130*			
MADEP-EPH Extractable Petroleum Hydrocarbons										

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St

ESS Laboratory Work Order: 22J0942

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
MADEP-EPH Extractable Petroleum Hydrocarbons										
Batch DK20403 - 3510C										
Blank										
C19-C36 Aliphatics1	ND	100	ug/L							
C9-C18 Aliphatics1	ND	100	ug/L							
Surrogate: 1-Chlorooctadecane	*28.3*		ug/L	*50.00*		*57*	*40-140*			
Blank										
C11-C22 Unadjusted Aromatics1	ND	100	ug/L							
Surrogate: 2-Bromonaphthalene	*43.0*		ug/L	*50.00*		*86*	*40-140*			
Surrogate: 2-Fluorobiphenyl	*45.1*		ug/L	*50.00*		*90*	*40-140*			
Surrogate: O-Terphenyl	*45.5*		ug/L	*50.00*		*91*	*40-140*			
Blank										
2-Methylnaphthalene	ND	0.50	ug/L							
Acenaphthene	ND	0.20	ug/L							
Acenaphthylene	ND	0.20	ug/L							
Anthracene	ND	0.20	ug/L							
Benzo(a)anthracene	ND	0.20	ug/L							
Benzo(a)pyrene	ND	0.10	ug/L							
Benzo(b)fluoranthene	ND	0.20	ug/L							
Benzo(g,h,i)perylene	ND	0.20	ug/L							
Benzo(k)fluoranthene	ND	0.20	ug/L							
Chrysene	ND	0.20	ug/L							
Dibenzo(a,h)Anthracene	ND	0.20	ug/L							
Fluoranthene	ND	0.20	ug/L							
Fluorene	ND	0.20	ug/L							
Indeno(1,2,3-cd)Pyrene	ND	0.20	ug/L							
Naphthalene	ND	0.50	ug/L							
Phenanthrene	ND	0.50	ug/L							
Pyrene	ND	0.20	ug/L							
LCS										
C19-C36 Aliphatics1	364	100	ug/L	400.0		91	40-140			
C9-C18 Aliphatics1	213	100	ug/L	300.0		71	40-140			
Surrogate: 1-Chlorooctadecane	*33.0*		ug/L	*50.00*		*66*	*40-140*			
LCS										
C11-C22 Unadjusted Aromatics1	835	100	ug/L	850.0		98	40-140			
Surrogate: 2-Bromonaphthalene	*49.2*		ug/L	*50.00*		*98*	*40-140*			
Surrogate: 2-Fluorobiphenyl	*48.8*		ug/L	*50.00*		*98*	*40-140*			
Surrogate: O-Terphenyl	*47.4*		ug/L	*50.00*		*95*	*40-140*			
LCS										
2-Methylnaphthalene Breakthrough	0.0		%				0-5			
Naphthalene Breakthrough	0.0		%				0-5			
LCS										
2-Methylnaphthalene	3.76	0.50	ug/L	5.000		75	40-140			
Acenaphthene	4.12	0.20	ug/L	5.000		82	40-140			
Acenaphthylene	4.76	0.20	ug/L	5.000		95	40-140			

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
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ESS Laboratory Work Order: 22J0942

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
MADEP-EPH Extractable Petroleum Hydrocarbons										
Batch DK20403 - 3510C										
Anthracene	4.67	0.20	ug/L	5.000		93	40-140			
Benzo(a)anthracene	4.57	0.20	ug/L	5.000		91	40-140			
Benzo(a)pyrene	4.96	0.10	ug/L	5.000		99	40-140			
Benzo(b)fluoranthene	4.58	0.20	ug/L	5.000		92	40-140			
Benzo(g,h,i)perylene	5.12	0.20	ug/L	5.000		102	40-140			
Benzo(k)fluoranthene	4.76	0.20	ug/L	5.000		95	40-140			
Chrysene	4.62	0.20	ug/L	5.000		92	40-140			
Dibenzo(a,h)Anthracene	5.00	0.20	ug/L	5.000		100	40-140			
Fluoranthene	4.79	0.20	ug/L	5.000		96	40-140			
Fluorene	4.45	0.20	ug/L	5.000		89	40-140			
Indeno(1,2,3-cd)Pyrene	4.92	0.20	ug/L	5.000		98	40-140			
Naphthalene	3.91	0.50	ug/L	5.000		78	40-140			
Phenanthrene	4.56	0.50	ug/L	5.000		91	40-140			
Pyrene	4.69	0.20	ug/L	5.000		94	40-140			
LCS Dup										
C19-C36 Aliphatics1	362	100	ug/L	400.0		91	40-140	0.4	25	
C9-C18 Aliphatics1	208	100	ug/L	300.0		69	40-140	2	25	
Surrogate: 1-Chlorooctadecane	*33.6*		ug/L	*50.00*		*67*	*40-140*			
LCS Dup										
C11-C22 Unadjusted Aromatics1	794	100	ug/L	850.0		93	40-140	5	25	
Surrogate: 2-Bromonaphthalene	*45.0*		ug/L	*50.00*		*90*	*40-140*			
Surrogate: 2-Fluorobiphenyl	*45.3*		ug/L	*50.00*		*91*	*40-140*			
Surrogate: O-Terphenyl	*47.3*		ug/L	*50.00*		*95*	*40-140*			
LCS Dup										
2-Methylnaphthalene Breakthrough	0.0		%				0-5		200	
Naphthalene Breakthrough	0.0		%				0-5		200	
LCS Dup										
2-Methylnaphthalene	3.75	0.50	ug/L	5.000		75	40-140	0.2	20	
Acenaphthene	4.10	0.20	ug/L	5.000		82	40-140	0.3	20	
Acenaphthylene	4.76	0.20	ug/L	5.000		95	40-140	0.1	20	
Anthracene	4.71	0.20	ug/L	5.000		94	40-140	0.9	20	
Benzo(a)anthracene	4.63	0.20	ug/L	5.000		93	40-140	1	20	
Benzo(a)pyrene	5.05	0.10	ug/L	5.000		101	40-140	2	20	
Benzo(b)fluoranthene	4.80	0.20	ug/L	5.000		96	40-140	5	20	
Benzo(g,h,i)perylene	5.13	0.20	ug/L	5.000		103	40-140	0.1	20	
Benzo(k)fluoranthene	4.75	0.20	ug/L	5.000		95	40-140	0.2	20	
Chrysene	4.63	0.20	ug/L	5.000		93	40-140	0.04	20	
Dibenzo(a,h)Anthracene	5.04	0.20	ug/L	5.000		101	40-140	0.9	20	
Fluoranthene	4.92	0.20	ug/L	5.000		98	40-140	3	20	
Fluorene	4.52	0.20	ug/L	5.000		90	40-140	2	20	
Indeno(1,2,3-cd)Pyrene	4.94	0.20	ug/L	5.000		99	40-140	0.6	20	
Naphthalene	3.94	0.50	ug/L	5.000		79	40-140	0.6	20	
Phenanthrene	4.57	0.50	ug/L	5.000		91	40-140	0.2	20	
Pyrene	4.73	0.20	ug/L	5.000		95	40-140	0.8	20	

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St

ESS Laboratory Work Order: 22J0942

Quality Control Data

MADEP-VPH Volatile Petroleum Hydrocarbon

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch DJ22729 - 5030B										
Blank										
1,2,4-Trimethylbenzene	ND	5.0	ug/L							
2,2,4-Trimethylpentane	ND	5.0	ug/L							
2-Methylpentane	ND	5.0	ug/L							
Benzene	ND	1.5	ug/L							
C5-C8 Unadjusted Aliphatics	ND	150	ug/L							
C9-C10 Aromatics	ND	100	ug/L							
C9-C12 Unadjusted Aliphatics	ND	150	ug/L							
Ethylbenzene	ND	5.0	ug/L							
Methyl tert-Butyl Ether	ND	1.5	ug/L							
Naphthalene	ND	5.0	ug/L							
n-Butylcyclohexane	ND	5.0	ug/L							
n-Decane	8.4	5.0	ug/L							
Nonane (C9)	ND	5.0	ug/L							
Pentane	ND	5.0	ug/L							
Toluene	ND	5.0	ug/L							
Xylene O	ND	5.0	ug/L							
Xylene P,M	ND	10.0	ug/L							
Surrogate: 2,5-Dibromotoluene - FID	*46.9*		ug/L	*50.00*		*94*	*70-130*			
Surrogate: 2,5-Dibromotoluene - PID	*44.3*		ug/L	*50.00*		*89*	*70-130*			
LCS										
1,2,4-Trimethylbenzene	95.2	5.0	ug/L	100.0		95	70-130			
2,2,4-Trimethylpentane	177	5.0	ug/L	150.0		118	70-130			
2-Methylpentane	188	5.0	ug/L	150.0		125	70-130			
Benzene	52.4	1.5	ug/L	50.00		105	70-130			
C5-C8 Unadjusted Aliphatics	500	150	ug/L	400.0		125	70-130			
C9-C10 Aromatics	95.2	100	ug/L	100.0		95	70-130			
C9-C12 Unadjusted Aliphatics	288	150	ug/L	300.0		96	70-130			
Ethylbenzene	50.1	5.0	ug/L	50.00		100	70-130			
Methyl tert-Butyl Ether	147	1.5	ug/L	150.0		98	70-130			
Naphthalene	95.4	5.0	ug/L	100.0		95	70-130			
n-Butylcyclohexane	109	5.0	ug/L	100.0		109	70-130			
n-Decane	109	5.0	ug/L	100.0		109	70-130			
Nonane (C9)	110	5.0	ug/L	100.0		110	30-130			
Pentane	136	5.0	ug/L	100.0		136	70-130			
Toluene	146	5.0	ug/L	150.0		98	70-130			
Xylene O	97.6	5.0	ug/L	100.0		98	70-130			
Xylene P,M	200	10.0	ug/L	200.0		100	70-130			
Surrogate: 2,5-Dibromotoluene - FID	*49.5*		ug/L	*50.00*		*99*	*70-130*			
Surrogate: 2,5-Dibromotoluene - PID	*45.9*		ug/L	*50.00*		*92*	*70-130*			
LCS Dup										
1,2,4-Trimethylbenzene	96.8	5.0	ug/L	100.0		97	70-130	2	25	
2,2,4-Trimethylpentane	181	5.0	ug/L	150.0		121	70-130	3	25	

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
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Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
MADEP-VPH Volatile Petroleum Hydrocarbon										
Batch DJ22729 - 5030B										
2-Methylpentane	186	5.0	ug/L	150.0		124	70-130	1	25	
Benzene	52.9	1.5	ug/L	50.00		106	70-130	1	25	
C5-C8 Unadjusted Aliphatics	501	150	ug/L	400.0		125	70-130	0.3	25	
C9-C10 Aromatics	96.8	100	ug/L	100.0		97	70-130	2	25	
C9-C12 Unadjusted Aliphatics	321	150	ug/L	300.0		107	70-130	11	25	
Ethylbenzene	50.5	5.0	ug/L	50.00		101	70-130	0.9	25	
Methyl tert-Butyl Ether	150	1.5	ug/L	150.0		100	70-130	2	25	
Naphthalene	97.2	5.0	ug/L	100.0		97	70-130	2	25	
n-Butylcyclohexane	119	5.0	ug/L	100.0		119	70-130	9	25	
n-Decane	120	5.0	ug/L	100.0		120	70-130	10	25	
Nonane (C9)	123	5.0	ug/L	100.0		123	30-130	11	25	
Pentane	135	5.0	ug/L	100.0		135	70-130	0.4	25	
Toluene	148	5.0	ug/L	150.0		99	70-130	1	25	
Xylene O	99.3	5.0	ug/L	100.0		99	70-130	2	25	
Xylene P,M	202	10.0	ug/L	200.0		101	70-130	1	25	
Surrogate: 2,5-Dibromotoluene - FID	*48.6*		ug/L	*50.00*		*97*	*70-130*			
Surrogate: 2,5-Dibromotoluene - PID	*46.0*		ug/L	*50.00*		*92*	*70-130*			

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St

ESS Laboratory Work Order: 22J0942

Notes and Definitions

Z-06	pH <= 2
U	Analyte included in the analysis, but not detected
Q	Calibration required quadratic regression (Q).
CD-	Continuing Calibration %Diff/Drift is below control limit (CD-).
BT	Benzidine tailing factor >2.
ND	Analyte NOT DETECTED at or above the MRL (LOQ), LOD for DoD Reports, MDL for J-Flagged Analytes
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
MDL	Method Detection Limit
MRL	Method Reporting Limit
LOD	Limit of Detection
LOQ	Limit of Quantitation
DL	Detection Limit
I/V	Initial Volume
F/V	Final Volume
§	Subcontracted analysis; see attached report
1	Range result excludes concentrations of surrogates and/or internal standards eluting in that range.
2	Range result excludes concentrations of target analytes eluting in that range.
3	Range result excludes the concentration of the C9-C10 aromatic range.
Avg	Results reported as a mathematical average.
NR	No Recovery
[CALC]	Calculated Analyte
SUB	Subcontracted analysis; see attached report
RL	Reporting Limit
EDL	Estimated Detection Limit
MF	Membrane Filtration
MPN	Most Probable Number
TNTC	Too numerous to Count
CFU	Colony Forming Units

CERTIFICATE OF ANALYSIS

Client Name: Weston and Sampson Engineers, Inc.
Client Project ID: Newton - Union St

ESS Laboratory Work Order: 22J0942

ESS LABORATORY CERTIFICATIONS AND ACCREDITATIONS

ENVIRONMENTAL

Rhode Island Potable and Non Potable Water: LAI00179
http://www.health.ri.gov/find/labs/analytical/ESS.pdf

Connecticut Potable and Non Potable Water, Solid and Hazardous Waste: PH-0750
http://www.ct.gov/dph/lib/dph/environmental_health/environmental_laboratories/pdf/OutofStateCommercialLaboratories.pdf

Maine Potable and Non Potable Water, and Solid and Hazardous Waste: RI00002
http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/partners/labCert.shtml

Massachusetts Potable and Non Potable Water: M-RI002
http://public.dep.state.ma.us/Labcert/Labcert.aspx

New Hampshire (NELAP accredited) Potable and Non Potable Water, Solid and Hazardous Waste: 2424
http://des.nh.gov/organization/divisions/water/dwgb/nhelap/index.htm

New York (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: 11313
http://www.wadsworth.org/labcert/elap/comm.html

New Jersey (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: RI006
http://datamine2.state.nj.us/DEP_OPRA/OpraMain/pi_main?mode=pi_by_site&sort_order=PI_NAMEA&Select+a+Site:=58715

Pennsylvania: 68-01752
http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx

ESS Laboratory Sample and Cooler Receipt Checklist

Client: Weston and Sampson Engineers, Inc - TB

Shipped/Delivered Via: ESS Courier

ESS Project ID: 22J0942
Date Received: 10/26/2022
Project Due Date: 11/2/2022
Days for Project: 5 Day

1. Air bill manifest present? No
   Air No.: NA
2. Were custody seals present? No
3. Is radiation count <100 CPM? Yes
4. Is a Cooler Present? Yes
   Temp: 2.9 Iced with: Ice
5. Was COC signed and dated by client? Yes
6. Does COC match bottles? Yes
7. Is COC complete and correct? Yes
8. Were samples received intact? Yes
9. **Were labs informed about short holds & rushes?** Yes / No / (NA)
10. Were any analyses received outside of hold time? Yes / (No)

11. Any Subcontracting needed? Yes / (No)
    ESS Sample IDs:
    Analysis:
    TAT:
12. Were VOAs received? (Yes) / No
    a. Air bubbles in aqueous VOAs? Yes / (No)
    b. Does methanol cover soil completely? Yes / No / NA

13. Are the samples properly preserved? (Yes) / No
    a. If metals preserved upon receipt: Date: Time: By/Acid Lot#:
    b. Low Level VOA vials frozen: Date: Time: By:

Sample Receiving Notes:

14. Was there a need to contact Project Manager? Yes / (No)
    a. Was there a need to contact the client? Yes / No
    Who was contacted? Date: Time: By:

Resolution:

Sample Number	Container ID	Proper Container	Air Bubbles Present	Sufficient Volume	Container Type	Preservative	Record pH (Cyanide and 608 Pesticides)
1	357167	Yes	No	Yes	VOA Vial	HCl	
1	357168	Yes	No	Yes	VOA Vial	HCl	
1	357169	Yes	No	Yes	VOA Vial	HCl	
1	357170	Yes	No	Yes	VOA Vial	HCl	
1	357171	Yes	No	Yes	VOA Vial	HCl	
1	357172	Yes	No	Yes	VOA Vial	HCl	
1	357185	Yes	N/A	Yes	1L Amber	HCl	
1	357186	Yes	N/A	Yes	1L Amber	HCl	
1	357191	Yes	N/A	Yes	250 mL Poly	HNO3	
2	357173	Yes	No	Yes	VOA Vial	HCl	
2	357174	Yes	No	Yes	VOA Vial	HCl	
2	357175	Yes	No	Yes	VOA Vial	HCl	
2	357176	Yes	No	Yes	VOA Vial	HCl	
2	357177	Yes	No	Yes	VOA Vial	HCl	
2	357178	Yes	No	Yes	VOA Vial	HCl	
2	357187	Yes	N/A	Yes	1L Amber	HCl	
2	357188	Yes	N/A	Yes	1L Amber	HCl	

ESS Laboratory Sample and Cooler Receipt Checklist

Client: Weston and Sampson Engineers, Inc - TB

ESS Project ID: 22J0942
Date Received: 10/26/2022

2	357192	Yes	N/A	Yes	250 mL Poly	HNO3
3	357179	Yes	No	Yes	VOA Vial	HCl
3	357180	Yes	No	Yes	VOA Vial	HCl
3	357181	Yes	No	Yes	VOA Vial	HCl
3	357182	Yes	No	Yes	VOA Vial	HCl
3	357183	Yes	No	Yes	VOA Vial	HCl
3	357184	Yes	No	Yes	VOA Vial	HCl
3	357189	Yes	N/A	Yes	1L Amber	HCl
3	357190	Yes	N/A	Yes	1L Amber	HCl
3	357193	Yes	N/A	Yes	250 mL Poly	HNO3

2nd Review

Were all containers scanned into storage/lab? Initials TD

Are barcode labels on correct containers? Yes / No

Are all Flashpoint stickers attached/container ID # circled? Yes / No / NA

Are all Hex Chrome stickers attached? Yes / No / NA

Are all QC stickers attached? Yes / No / NA

Are VOA stickers attached if bubbles noted? Yes / No / NA

Completed By: [signature] Date & Time: 10/26/22 1052.

Reviewed By: [signature] Date & Time: 10/26/22 1819

CHAIN OF CUSTODY

185 Frances Avenue
Cranston, RI 02910
Phone: 401-461-7181
Fax: 401-461-4486
www.esslaboratory.com

ESS Lab # 22J0942 | Page 1 of 1

Turn Time (Days) ☒ >5 ☐ 5 ☐ 4 ☐ 3 ☐ 2 ☐ 1 ☐ Same Day

Regulatory State: MA Criteria: RCGW-1

Is this project for any of the following?: ☐ CT RCP ☒ MA MCP ☐ RGP ☐ Permit ☐ 401 WQ

ELECTRONIC DELIVERABLES (Final Reports are PDF)

☐ Limit Checker ☐ State Forms ☐ EQuIS
☒ Excel ☐ State Upload ☒ Enviro Data — W&S envirodata
☐ CLP-Like Package ☐ Other (Specify) →

CLIENT INFORMATION

Client: Weston+Sampson
Address: 55 Walkers Brook dr Reading, MA
Phone: 1800SAMPSON
Email Distribution List: scanlon.annika@wseinc.com

PROJECT INFORMATION

Project Name: Union St
Project Location: Newton MA
Project Number: 2191018
Project Manager: Annika Scanlon
Bill to: Weston+Sampson
PO#: —
Quote#: —

Client acknowledges that sampling is compliant with all EPA / State regulatory programs

REQUESTED ANALYSES: VOCs 8260; EPH w/ targeted PAH; VPH carbon ranges; RCRA 8 metals (dissolved)

ESS Lab ID	Collection Date	Collection Time	Sample Type	Sample Matrix	Sample ID	VOCs 8260	EPH w/ targeted PAH	VPH carbon ranges	RCRA 8 metals (dissolved)	Total Number of Bottles
1	10/25/22	1150	grab	GW	MW-1	X	X	X	X	9
2	↓	1040	↓	↓	MW-2	X	X	X	X	9
3	↓	0945	↓	↓	MW-3	X	X	X	X	9
Container Type						V	AG	AG	P	
Container Volume						7	6	6	5	
Preservation Code						8/2	2	2	4	

Container Type: AC-Air Cassette AG-Amber Glass B-BOD Bottle C-Cubitainer J-Jar O-Other P-Poly S-Sterile V-Vial

Container Volume: 1-100 mL 2-2.5 gal 3-250 mL 4-300 mL 5-500 mL 6-1L 7-VOA 8-2 oz 9-4 oz 10-8 oz 11-Other*

Preservation Code: 1-Non Preserved 2-HCl 3-H2SO4 4-HNO3 5-NaOH 6-Methanol 7-Na2S2O3 8-ZnAce, NaOH 9-NH4Cl 10-DI H2O 11-Other*

Chain needs to be filled out neatly and completely for on time delivery.

Sampled by :

Laboratory Use Only

Comments: * Please specify "Other" preservative and containers types in this space

All samples submitted are subject to ESS Laboratory's payment terms and conditions.

Dissolved Filtration ☐ Lab Filter

Cooler Temperature (°C): 2.9 Ice

Relinquished by (Signature)	Date	Time	Received by (Signature)	Relinquished by (Signature)	Date	Time	Received by (Signature)
[signature]	10/25/22	1300	sample room	Sample Room	10/27/22	11:20	[signature]
[signature]	10/26/22	16:07	Taylor Dauer [signature]				

SECTION 02300

EARTHWORK

PART 1 - GENERAL

1.01 WORK INCLUDED:

The Contractor shall make excavations of normal depth in earth for trenches and structures, shall backfill and compact such excavations to the extent necessary, shall furnish the necessary material and construct embankments and fills, and shall make miscellaneous earth excavations and do miscellaneous grading.

1.02 RELATED WORK:

A. Section 00890, PERMITS

B. Section 01110, CONTROL OF WORK AND MATERIALS

C. Section 01570, ENVIRONMENTAL PROTECTION

D. Section 02071, GEOTEXTILE FABRICS

E. Section 02240, DEWATERING

F. Section 02252, SUPPORT OF EXCAVATION

G. Section 02324, ROCK EXCAVATION AND DISPOSAL

H. Section 02745, PAVING

1.03 REFERENCES:

ASTM International (ASTM)

ASTM	C131	Test Method for Resistance to Degradation of Small Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
ASTM	C136	Method for Sieve Analysis of Fine and Coarse Aggregates.
ASTM	C330	Specification for Lightweight Aggregate for Structural Concrete.
ASTM	D1556	Test Method for Density of Soil in Place by the Sand Cone Method.

ASTM D1557 Test Methods for Moisture-density Relations of Soils and Soil Aggregate Mixtures Using Ten-pound (10 Lb.) Hammer and Eighteen-inch (18") Drop.

ASTM D2922 Test Methods for Density of Soil and Soil-aggregate in Place by Nuclear Methods (Shallow Depth).

Massachusetts Department of Transportation (MassDOT) Standard Specifications for Highways and Bridges.

Code of Massachusetts Regulations (CMR) 310.40.0032 Contaminated Media and Contaminated Debris

Code of Massachusetts Regulations (CMR) 520 CMR 14.00 Excavation & Trench Safety Regulation

1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

Samples of all materials proposed for the project shall be submitted to the Engineer for review. Size of the samples shall be as approved by the Engineer.

1.05 PROTECTION OF EXISTING PROPERTY:

A. The work shall be executed in such manner as to prevent any damage to facilities at the site and adjacent property and existing improvements, such as but not limited to streets, curbs, paving, service utility lines, structures, monuments, bench marks, observation wells, and other public or private property. Protect existing improvements from damage caused by settlement, lateral movements, undermining, washout and other hazards created by earthwork operations.

B. In case of any damage or injury caused in the performance of the work, the Contractor shall, at its own expense, make good such damage or injury to the satisfaction of, and without cost to, the Owner. Existing roads, sidewalks, and curbs damaged during the project work shall be repaired or replaced to at least the condition that existed at the start of operations. The Contractor shall replace, at his own cost, existing benchmarks, observation wells, monuments, and other reference points, which are disturbed or destroyed.

C. Buried drainage structures and pipes, observation wells and piezometers, including those which project less than eighteen inches (18") above grade, which are subject to damage from construction equipment shall be clearly marked to indicate the hazard. Markers shall indicate limits of danger areas, by means which will be clearly visible to operators of trucks and other construction equipment, and shall be maintained at all times until completion of project.

1.06 DRAINAGE:

A. The Contractor shall provide, at its own expense, adequate drainage facilities to complete all work items in an acceptable manner. Drainage shall be done in a manner so that runoff will not adversely affect construction procedures or cause excessive disturbance of underlying natural ground or abutting properties.

1.07 FROST PROTECTION AND SNOW REMOVAL:

A. The Contractor shall, at its own expense, keep earthwork operations clear and free of accumulations of snow as required to carry out the work.

B. The Contractor shall protect the subgrade beneath new structures and pipes from frost penetration when freezing temperatures are expected.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. GRAVEL BORROW:

Gravel Borrow shall satisfy the requirements listed in MassDOT Specification Section M1.03.0, Type b.

B. CRUSHED STONE:

Crushed stone shall satisfy the requirements listed in MassDOT Specification SectionM2.01.

C. SAND BORROW:

Sand Borrow shall satisfy the requirements listed in MassDOT Specification Section M1.04.0.

D. PEASTONE:

Peastone shall be smooth, hard, naturally occurring, rounded stone meeting the following gradation requirements:

Passing 5/8 inch square sieve opening	-	100%
Passing No. 8 sieve opening	-	0%

E. BACKFILL MATERIALS:

1. Class B Backfill:

   Class B backfill shall be granular, well graded friable soil; free of rubbish, ice, snow, tree stumps, roots, clay and organic matter; with 30 percent or less passing the No. 200 sieve; no stone greater than two-third (2/3) loose lift thickness, or six inches, whichever is smaller.

2. Select Backfill:

   Select backfill shall be granular, well graded friable soil, free of rubbish, ice, snow, tree stumps, roots, clay and organic matter, and other deleterious or organic material; graded within the following limits:

Sieve Size	Percent Finer by Weight
3-inch	100
No. 10	30-95
No. 40	10-70
No. 200	0-10

F. PROCESSED GRAVEL:

1. Processed gravel shall satisfy the requirements listed in MassDOT Specification Section M1.03.1.

2. Processed gravel shall consist of inert material that is hard, durable stone and coarse sand, free from loam and clay, surface coatings and deleterious materials. The coarse aggregate shall have a percentage of wear, by the Los Angeles Abrasion Test, of not more than 50.

3. The gradation shall meet the following requirements:

Sieve Designation	Percentage Passing
3-in.	100
1 ½-in.	70-100
¾-in.	50-85
No. 4	30-60
No. 200	0-10

4. The approved source of bank-run gravel material shall be processed by mechanical means. The equipment for producing crushed gravel shall be of adequate size with sufficient adjustments to produce the desired materials. The processed material shall be stockpiled in such a manner to minimize segregation of particle sizes. All processed gravel shall come from approved stockpiles.

PART 3 - EXECUTION

3.01 DISTURBANCE OF EXCAVATED AND FILLED AREAS DURING CONSTRUCTION:

A. Contractor shall take the necessary steps to avoid disturbance of subgrade during excavation and filling operations, including restricting the use of certain types of construction equipment and their movement over sensitive or unstable materials, dewatering and other acceptable control measures.

B. All excavated or filled areas disturbed during construction, all loose or saturated soil, and other areas that will not meet compaction requirements as specified herein shall be removed and replaced with a minimum 12-inch layer of compacted crushed stone wrapped all around in non-woven filter fabric. Costs of removal and replacement shall be borne by the Contractor.

C. The Contractor shall place a minimum of 12-inch layer of special bedding materials and crushed stone wrapped in filter fabric over the natural underlying soil to stabilize areas which may become disturbed as a result of rain, surface water runoff or groundwater seepage pressures, all at no additional cost to the Owner. The Contractor also has the option of drying materials in-place and compacting to specified densities.

3.02 EXCAVATION:

A. GENERAL:

1. The Contractor shall perform all work of any nature and description required to accomplish the work as shown on the Drawings and as specified.

2. Excavations, unless otherwise required by the Engineer, shall be carried only to the depths and limits shown on the Drawings. If unauthorized excavation is carried out below required subgrade and/or beyond minimum lateral limits shown on Drawings, it shall be backfilled with gravel borrow and compacted at the Contractor's expense as specified below, except as otherwise indicated. Excavations shall be kept in dry and good conditions at all times, and all voids shall be filled to the satisfaction of the Engineer.

3. In all excavation areas, the Contractor shall strip the surficial topsoil layer and underlying subsoil layer separate from underlying soils. In paved areas, the Contractor shall first cut pavement as specified in paragraph 3.02 B.1 of this specification, strip pavement and pavement subbase separately from underlying soils. All excavated materials shall be stockpiled separately from each other within the limits of work.

4. The Contractor shall follow a construction procedure, which permits visual identification of stable natural ground. Where groundwater is encountered, the size of the open excavation shall be limited to that which can be handled by the

Contractor's chosen method of dewatering and which will allow visual observation of the bottom and backfill in the dry.

5. The Contractor shall excavate unsuitable materials to stable natural ground where encountered at proposed excavation subgrade, as required by the Engineer. Unsuitable material includes topsoil, loam, peat, other organic materials, snow, ice, and trash. Unless specified elsewhere or otherwise required by the Engineer, areas where unsuitable materials have been excavated to stable ground shall be backfilled with compacted special bedding materials or crushed stone wrapped all around in non-woven filter fabric.

B. TRENCHES:

1. Prior to excavation, trenches in pavement shall have the traveled way surface cut in a straight line by a concrete saw or equivalent method, to the full depth of pavement. Excavation shall only be between these cuts. Excavation support shall be provided as required to avoid undermining of pavement. Cutting operations shall not be done by ripping equipment.

2. The Contractor shall satisfy all dewatering requirements specified in Section 02240 DEWATERING, before performing trench excavations.

3. Trenches shall be excavated to such depths as will permit the pipe to be laid at the elevations, slopes, and depths of cover indicated on the Drawings. Trench widths shall be as shown on the Drawings or as specified.

4. Where pipe is to be laid in bedding material, the trench may be excavated by machinery to, or just below, the designated subgrade provided that the material remaining in the bottom of the trench is not disturbed.

5. If pipe is to be laid in embankments or other recently filled areas, the fill material shall first be placed to a height of at least 12-inches above the top of the pipe before excavation.

6. Pipe trenches shall be made as narrow as practicable and shall not be widened by scraping or loosening materials from the sides. Every effort shall be made to keep the sides of the trenches firm and undisturbed until backfilling has been completed.

7. If, in the opinion of the Engineer, the subgrade, during trench excavation, has been disturbed as a result of rain, surface water runoff or groundwater seepage pressures, the Contractor shall remove such disturbed subgrade to a minimum of 12-inches and replace with crushed stone wrapped in filter fabric. Cost of removal and replacement shall be borne by the Contractor.

8. The Contractor shall obtain a trench permit from the municipality where the trench is located prior to making any excavations of trenches (any subsurface excavation

greater than three (3) feet in depth and fifteen (15) feet or less between soil walls as measured from the bottom).

9. All trenches required to be permitted must be attended, covered, barricaded, or backfilled. Covers must be road plates at least ¾-inch thick or equivalent, barricades must be fences at least 6-feet high with no openings greater than 4-inches between vertical supports and all horizontal supports required to be located on the trench-side of the fencing.

C. EXCAVATION NEAR EXISTING STRUCTURES:

1. Attention is directed to the fact that there are pipes, manholes, drains, and other utilities in certain locations. An attempt has been made to locate all utilities on the drawings, but the completeness or accuracy of the given information is not guaranteed.

2. As the excavation approaches pipes, conduits, or other underground structures, digging by machinery shall be discontinued and excavation shall be done by means of hand tools, as required. Such manual excavation, when incidental to normal excavation, shall be included in the work to be done under items involving normal excavation.

3. Where determination of the exact location of a pipe or other underground structure is necessary for properly performing the work, the Contractor shall excavate test pits to determine the locations.

3.03 BACKFILL PLACEMENT AND COMPACTION:

A. GENERAL:

1. Prior to backfilling, the Contractor shall compact the exposed natural subgrade to the densities as specified herein.

2. After approval of subgrade by the Engineer, the Contractor shall backfill areas to required contours and elevations with specified materials.

3. The Contractor shall place and compact materials to the specified density in continuous horizontal layers, not to exceed nine (9) inches in uncompacted lifts. The degree of compaction shall be based on maximum dry density as determined by ASTM Test D1557, Method C. The minimum degree of compaction for fill placed shall be as follows:

Location	Percent of Maximum Density
Below pipe centerline	95
Above pipe centerline	92

Below pavement (upper 3 ft.)	95
Embankments	95
Below pipe in embankments	95
Adjacent to structures	92
Below structures	95

4. The Engineer reserves the right to test backfill for conformance to the specifications and Contractor shall assist as required to obtain the information. Compaction testing will be performed by the Engineer or by an inspection laboratory designated by the Engineer, engaged and paid for by the Owner. If test results indicate work does not conform to specification requirements, the Contractor shall remove or correct the defective Work by recompacting where appropriate or replacing as necessary and approved by the Engineer, to bring the work into compliance, at no additional cost to the Owner. All backfilled materials under structures and buildings shall be field tested for compliance with the requirements of this specification.

5. Where horizontal layers meet a rising slope, the Contractor shall key each layer by benching into the slope.

6. If the material removed from the excavation is suitable for backfill with the exception that it contains stones larger than permitted, the Contractor has the option to remove the oversized stones and use the material for backfill or to provide replacement backfill at no additional cost to the Owner.

7. The Contractor shall remove loam and topsoil, loose vegetation, stumps, large roots, etc., from areas upon which embankments will be built or areas where material will be placed for grading. The subgrade shall be shaped as indicated on the Drawings and shall be prepared by forking, furrowing, or plowing so that the first layer of the fill material placed on the subgrade will be well bonded to the subgrade.

8. Where called for on the Drawings, Lightweight Fill shall be placed and compacted as recommended by the manufacturer. The exact number of passes shall be approved by the Engineer to insure stability of the layer. As soon as the compaction of each layer has been completed, the next layer shall then be placed. The Contractor shall take all necessary precautions during construction activities in operations on or adjacent to the Lightweight Fill to insure that the material is not over-compacted. Construction equipment, other than for compaction, shall not operate on the exposed Lightweight Fill. The top surface of the Lightweight Fill lying directly below the gravel course shall be chinked by additional rolling of the Lightweight Fill to prevent infiltration of fines.

B. TRENCHES:

1. Bedding as detailed and specified shall be furnished and installed beneath the pipeline prior to placement of the pipeline. A minimum bedding thickness shall be maintained between the pipe and undisturbed material, as shown on the Drawings.

2. As soon as practicable after pipes have been laid, backfilling shall be started.

3. Unless otherwise indicated on the Drawings, select backfill shall be placed by hand shovel in 6-inch thick lifts up to a minimum level of 12-inches above the top of pipe. This area of backfill is considered the zone around the pipe and shall be thoroughly compacted before the remainder of the trench is backfilled. Compaction of each lift in the zone around the pipe shall be done by use of power-driven tampers weighing at least 20 pounds or by vibratory compactors. Care shall be taken that material close to the bank, as well as in all other portions of the trench, is thoroughly compacted to densities required.

4. Class B backfill shall be placed from the top of the select backfill to the specified material at grade (loam, pavement subbase, etc.). Fill compaction shall meet the density requirements of this specification.

5. Water Jetting:

   a. Water jetting may be used when the backfill material contains less than 10 percent passing the number 200 sieve, but shall be used only if approved by the Engineer.

   b. Contractor shall submit a detailed plan describing the procedures he intends to use for water jetting to the Engineer for approval prior to any water jetting taking place.

   c. Compaction of backfill placed by water jetting shall conform to the requirements of this specification.

6. If the materials above the trench bottom are unsuitable for backfill, the Contractor shall furnish and place backfill materials meeting the requirements for trench backfill, as shown on the drawings or specified herein.

7. Should the Engineer order crushed stone for utility supports or for other purposes, the Contractor shall furnish and install the crushed stone as directed.

8. In shoulders of streets and road, the top 12-inch layer of trench backfill shall consist of processed gravel for sub-base, satisfying the requirements listed in MassDOT standard specification M1.03.1.

C. BACKFILLING ADJACENT TO STRUCTURES:

1. The Contractor shall not place backfill against or on structures until they have attained sufficient strength to support the loads to which they will be subjected. Excavated material approved by the Engineer may be used in backfilling around structures. Backfill material shall be thoroughly compacted to meet the requirements of this specification.

2. Contractor shall use extra care when compacting adjacent to pipes and drainage structures. Backfill and compaction shall proceed along sides of drainage structures so that the difference in top of fill level on any side of the structure shall not exceed two feet (2') at any stage of construction.

3. Where backfill is to be placed on only one side of a structural wall, only hand-operated roller or plate compactors shall be used within a lateral distance of five feet (5') of the wall for walls less than fifteen feet (15') high and within ten feet (10') of the wall for walls more than fifteen feet (15') high.

3.04 DISPOSAL OF SURPLUS MATERIALS:

A. Surplus excavated materials, which are acceptable to the Engineer, shall be used to backfill normal excavations in rock or to replace other materials unacceptable for use as backfill. Upon written approval of the Engineer, surplus excavated materials shall be neatly deposited and graded so as to make or widen fills, flatten side slopes, or fill depressions; or shall be neatly deposited for other purposes as indicated by the Owner, within its jurisdictional limits; all at no additional cost to the Owner.

B. Surplus excavated material not needed as specified above shall be hauled away and disposed of by the Contractor at no additional cost to the Owner, at appropriate locations, and in accordance with arrangements made by him. Disposal of all rubble shall be in accordance with all applicable local, state and federal regulations.

C. No excavated material shall be removed from the site of the work or disposed of by the Contractor unless approved by the Engineer.

D. The Contractor shall comply with Massachusetts regulations (310 CMR 40.0032) that govern the removal and disposal of surplus excavated materials. Materials, including contaminated soils, having concentrations of oil or hazardous materials less than an otherwise Reportable Concentration and that are not a hazardous waste, may not be disposed of at locations where concentrations of oil and/or hazardous material at the receiving site are significantly lower than the levels of those oil and /or hazardous materials present in the soil being disposed or reused.

END OF SECTION

SECTION 02324

ROCK EXCAVATION AND DISPOSAL

PART 1 - GENERAL

1.01 WORK INCLUDED:

The Contractor shall excavate rock, if encountered, to the lines and grades indicated on the drawings or as required, shall dispose of the excavated material, and shall furnish the required material as specified in Section 02300 EARTHWORK for backfill in place of the excavated rock.

1.02 RELATED WORK:

A. Section 02252, SUPPORT OF EXCAVATION

B. Section 02300, EARTHWORK

C. Section 03302, FIELD CONCRETE

1.03 DEFINITIONS:

A. The word "rock," wherever used as the name of the excavated material or material to be excavated, shall mean only boulders and pieces of concrete or masonry exceeding one (1) cubic yard 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 by normal earth excavation methods, 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."

B. 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.

1.04 QUALITY ASSURANCE:

A. The Contractor shall conform to all municipal ordinances and state and federal laws relating to the transportation, storage, handling, and use of explosives. In the event that any of the above mentioned laws, ordinances, or regulations require a licensed blaster to perform or supervise the work of blasting, said licensed blaster shall, at all times, have his license on the work site and shall permit examination thereof by the Engineer or other officials having jurisdiction.

B. The Contractor shall procure all permits required for blasting.

1.05 SUBMITTALS:

A. At least two weeks before beginning blasting operations, the Contractor shall submit to the Engineer for record the following data:

1. Name of Contractor or Subcontractor responsible for blasting and monitoring operations and license number.

2. Name, affiliation, and license number of the person or persons who will be directly responsible for designing each blast, supervising the loading of the shot, and firing it.

B. Copies of all permits required for blasting.

C. Results of pre-blast survey.

D. When blasting is in progress, daily reports on blasting operations and blast monitoring results.

1.06 DELIVERY/STORAGE AND HANDLING:

Delivery, storage and handling of explosives shall conform to all federal, state and local regulations and permits.

PART 2 - PRODUCTS - NOT APPLICABLE

PART 3 - EXECUTION

3.01 PREPARATION/PRE-BLAST SURVEY

If required, the pre-blast survey shall be conducted in accordance with state regulations and/or local permit requirements.

3.02 EXCAVATION:

A. The Contractor shall excavate rock to the lines and grades indicated on the drawings or as required by the Engineer. The excavated rock shall be removed and disposed of by the Contractor as specified for surplus excavated materials under Section 02300, EARTHWORK.

B. Work damaged by blasting shall be repaired or replaced at the Contractor's expense.

C. If rock is excavated beyond the limits of payment indicated on the drawings, specified, or authorized in writing by the Engineer, the excess excavation, whether resulting from overbreakage or other causes, shall be backfilled, by and at the expense of the Contractor, as specified below:

1. In pipe trenches, excess excavation shall be filled with the required material and compacted in the same manner as specified for the material in the zone around the pipe under Section 02300 EARTHWORK.

2. In excavations for structures, excess excavation in the rock beneath foundations shall be filled with concrete which shall have a minimum 28-day compressive strength of 3000 psi. Other excess excavation shall be filled with Class B backfill compacted to a minimum of 92 percent density (ASTM D1557 Method C) as specified under Section 02300, EARTHWORK.

3. If the rock below normal depth is shattered due to drilling or blasting operations of the Contractor, and the Engineer considers such shattered rock to be unfit for foundations, the shattered rock shall be removed and the excavation shall be backfilled with concrete as required, except that in pipe trenches crushed stone may be used for backfill, if approved. All such removal and backfilling shall be done by and at the expense of the Contractor.

D. When required by the Engineer, the Contractor shall remove all dirt and loose rock from designated areas and shall clean the surface of the rock thoroughly to determine whether seams or other defects exist.

E. When concrete is to be placed on rock, the rock shall be free of all vegetation, dirt, sand, clay, boulders, scale, excessively cracked rock, loose fragments, water, ice, snow, and other objectionable substances.

3.03 VIBRATION AND AIR BLAST MONITORING:

A. The Contractor shall measure air blast and vibration levels of blasting operations to assure compliance with all applicable regulations and local permits.

B. Records of each day's air blast and vibration measurements shall be submitted to the Engineer in writing no later than the start of the next day's work. Records shall include, as a minimum:

- Identification of instrument

- Name of observer

- Name of interpreter

- Distance and direction of recording station from the area of detonation

- Date and exact time of reading

- Type of ground at recording station

- Peak particle velocity for all components as well as resultant for all frequencies of vibrations

- Duration of motion with a velocity in excess of one thousandth of an inch per second

- A copy of the photographic record of seismograph readings

- Peak air blast level.

3.04 BLASTING RECORDS:

The Contractor shall prepare and submit to the Engineer daily blast reports, including logs of each blast. Reports shall be submitted to the Engineer no later than the start of the next day's work. However, during each day of blasting, the Contractor shall review and shall provide access for the Engineer to review the data from that day's blasting. Reports after each blast shall include at least the following information for each blast:

- Date, time, and location of blast

- Permit number and expiration date

- Amount and type of explosives used by weight and number of cartridges

- Total number of delays used and number of holes used for each delay

- On a diagram of the blast pattern, indicate total number and depth of holes, maximum charge per delay, maximum charge per hole, and corresponding delay number

- An evaluation of the blast indicating areas of significant overbreak, unusual results, and any recommended adjustments for the next blast.

3.05 POST BLASTING INSPECTIONS:

The Contractor shall examine any properties, structures, and conditions where complaints of damage have been received or damage claims have been filed. Advance notice shall be given to all interested parties so that the parties may be present during the final examination. Records of the final examination shall be signed and distributed to the owner of the property, the head of the local fire department, and the Engineer.

END OF SECTION

SECTION 02440

CLEANING AND INSPECTION OF PIPELINES

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. This section covers cleaning and inspection of pipelines as called for herein and on the drawings. The work includes furnishing all equipment, material and labor required to perform the services described herein.

1.02 RELATED WORK:

A. Section 01014, SCOPE AND SEQUENCE OF WORK

B. Section 01330, SUBMITTALS

D. Section 01331, DOCUMENTATION

E. Section 01575, HANDLING EXISTING FLOWS

1.03 QUALITY ASSURANCE:

A. The work described herein shall be performed by a company with not less than five (5) years of experience in providing the required services, employing experienced workers and experienced supervisory personnel. Supervisory personnel shall have not less than three (3) years of experience in providing the required services and shall be present at the jobsite during all work related to the required services.

1.04 REFERENCES:

A. The following standards form a part of this specification as referenced:

The National Association of Sewer Service Companies (NASSCO)

Suggested Standard Specification for Pressure Testing and Grouting of Sewer Joints, Laterals and Lateral Connections (Using the Packer Method with Solution Grouts)

ASTM International (ASTM)

ASTM F2304 Standard Practice for Rehabilitation of Sewers Using Chemical Grouting

1.05 SYSTEM DESCRIPTION:

A. Unless otherwise indicated herein, the pipe cleaning and inspection of the specified length of pipe shall be carried out in accordance with Section 3, Execution, of the latest edition of NASSCO Suggested Standard Specification for Pressure Testing and Grouting of Sewer Joints, Laterals and Lateral Connections (Using the Packer Method with Solution Grouts). Sewer flow control shall comply with Section 01575, HANDLING OF EXISTING FLOWS.

B. The Contractor may propose alternative processes and/or products for review and approval by the Engineer.

1.06 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF SECTION 01330 SUBMITTALS, SUBMIT THE FOLLOWING:

A. Prior to beginning work, submit the following:

1. Qualifications of the firm/personnel who will perform the work.

2. Description of system proposed for handling existing flows during the various procedures to be carried out.

3. Description of the system and equipment proposed for cleaning the pipe.

4. Description of the equipment and system proposed for inspecting the pipe after cleaning.

PART 2 - PRODUCTS

Not Applicable

PART 3 - EXECUTION

3.01 PIPE CLEANING:

A. The Contractor may elect to use either high velocity jet, or mechanically powered equipment, as described in the NASSCO Suggested Standard Specification for Pressure Testing and Grouting of Sewer Joints, Laterals and Lateral Connections (Using the Packer Method with Solution Grouts). Selection of equipment shall be based upon field conditions such as access to manholes, quantity of debris, size of pipeline, depth of flow, etc.

C. All sludge, dirt, sand, rocks, grease, and other solid or semisolid material resulting from the cleaning operation shall be disposed of in accordance with all applicable regulations and in a method acceptable to the Owner. Pipe cleaning shall be performed in advance of pipe television inspection.

D. The Contractor shall be responsible for the legal disposal of all debris removed from the pipelines during the cleaning operation including any costs incurred. The Contractor shall not expect the Owner to provide a dump site.

E. Acceptance by the Engineer of the cleaning results will be based on the results of television inspection. If the results are unsatisfactory, the Contractor shall repeat the cleaning until accepted by the Engineer at no additional cost to the Owner.

3.02 PIPE INSPECTION:

A. Pipe shall be visually inspected by means of closed-circuit television. The television camera used for the inspection shall be one specifically designed and constructed for such inspection. Lighting for the camera shall be suitable to allow a clear picture, with minimal reflective glare, for the entire periphery of the pipe. The camera shall be operative in 100% humidity conditions. The camera, television monitor and other components of the video system shall be capable of producing a minimum 400 line resolution color video picture. Picture quality and definition shall be to the satisfaction of the Engineer.

1. Refer to Section 01331, DOCUMENTATION, in regard to external hard drives to be given to the Owner upon completion of project and before the project is accepted by the Owner.

B. The camera shall have a remote controlled, pan and tilt type lens and lighting system capable of turning perpendicular to the direction of flow and rotating 360 degrees while inside the pipe. The camera shall be able to view a minimum service connection length of 4 feet in order to determine whether the connection is active or inactive.

C. Electronic video equipment shall be capable of displaying and recording during the entire inspection, as a minimum, the following data for each sewer reach videotaped:

1. Project identification
2. Date recorded
3. Sewer reach identification (street location, MH to MH)
4. Footage counter

D. The camera shall be moved through the line in either direction at a uniform rate, stopping when necessary to ensure proper identification of the sewer's condition. Manual winches, power winches, television cable and powered rewinds or other devices that do not obstruct the camera view or interfere with proper documentation of the sewer conditions shall be used to move the camera through the sewer line. If, during the inspection operation the television camera will not pass through the entire sewer section, the Contractor shall re-set his equipment in a manner so that the inspection can be performed from the opposite manhole.

E. Flow control shall be in accordance with Section 01575, HANDLING OF EXISTING FLOWS.

F. Standing water within a sagging pipe shall be removed so that the pipe can be adequately television inspected. A minimum of 80% of the pipe shall be visible before television inspection.

END OF SECTION

\\Wse03.local\WSE\Projects\MA\Newton\2191018 - UNION STREET AND HERRICK ROAD DRAIN EXTENSION\Specifications\DIVISION 2 SITE CONSTRUCTION\02440 Cleaning and Inspection of Pipelines.docx

SECTION 02518

TRACER TAPE

PART 1 - GENERAL

1.01 WORK INCLUDED:

This section covers the furnishing, handling and installation of tracer tape, as called for on the drawings.

1.02 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF SECTION 01330 SUBMITTALS, SUBMIT THE FOLLOWING:

A. Manufacturer's literature on the materials, colors and printing specified herein, shall be submitted to the Engineer for review.

B. Tape samples shall also be submitted to the Engineer for review.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

Tracer tape shall be by Reef Industries, Houston, TX; Empire Level, Mukwonago, WI; Pro-Line Safety Products Co., W. Chicago, IL; or approved equal.

2.02 TRACER TAPE:

A. Tracer tape shall be at least 3-inches wide.

B. Tracer tape for non-ferrous pipe or conduit shall be constructed of a metallic core bonded to plastic layers. The metallic tracer tape shall be a minimum 5-mil thick and must be locatable at a depth of 18-inches with ordinary pipe locaters.

C. Tracer tape for ferrous pipe or conduit shall consist of multiple bonded plastic layers. The non-metallic tracer tape shall elongate at least 500% before breaking.

D. The tape shall bear the wording: "BURIED DRAIN LINE BELOW" (with "DRAIN" replaced by "WATER, "SEWER", "ELECTRICAL", "GAS", "TELEPHONE", or "CHEMICAL" as appropriate), continuously repeated every 30-inches to identify the pipe.

E. Tape colors shall be as follows, as recommended by the American Public Works Association (APWA):

Electric	Red

Gas & Oil	Yellow
Communications	Orange
Water	Blue
Sewer & Drain	Green
Chemical	Red (not APWA)

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Tracer tape shall be installed directly above the pipe or conduit it is to identify, approximately 12-inches below the proposed ground surface.

B. The Contractor shall follow the manufacturer's recommendations for installation of the tape, as approved by the Engineer.

END OF SECTION

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SECTION 02530

BUILDING CONNECTIONS

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. This Section covers furnishing of all materials and labor to construct building drain connections as indicated on the Drawings, and as herein specified.

B. Final location of building connections shall be determined in the field by the Engineer.

1.02 RELATED WORK:

A. Section 01575, HANDLING EXISTING FLOWS

B. Section 02085, POLYVINYL CHLORIDE GRAVITY PIPE AND FITTINGS

C. Section 02300, EARTHWORK

D. Section 02324, ROCK EXCAVATION AND DISPOSAL

E. Section 02518, TRACER TAPE

F. Section 02631, PRECAST MANHOLES AND CATCH BASINS

G. Section 03302, FIELD CONCRETE

1.03 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF SECTION 01330 SUBMITTALS, SUBMIT THE FOLLOWING:

A. Shop drawings and manufacturers literature of the materials of this section shall be submitted to the Engineer for review.

B. Shop drawings of any special connections, including the proposed adapters for service connections, shall be submitted to the Engineer.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Pipe and fittings for gravity building connections shall be as specified under Section 02085 POLYVINYL CHLORIDE GRAVITY PIPE AND FITTINGS. Adaptors shall be as recommended by the pipe manufacturer.

B. Concrete for encasement shall be as specified in Section 03302 FIELD CONCRETE.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Building Connections

1. Building connections shall be installed using the same construction and pipe joining techniques as specified in Section 02085 POLYVINYL CHLORIDE GRAVITY PIPE AND FITTINGS.

2. In general, connections shall be carried only to curb. The end of the pipes shall be closed with PVC stoppers jointed in place to ensure against infiltration into the drain line.

END OF SECTION

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SECTION 02624

HIGH DENSITY POLYETHYLENE PIPE

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. This Section covers furnishing, handling, laying, joining and installation of HDPE piping, fittings and appurtenances.

B. The Contractor shall furnish and install the various pipelines and appurtenant work as indicated on the Contract Drawings, as specified in Section 02225, PIPE BURSTING CONSTRUCTION, and as specified herein, or as reasonably required to produce a complete, proper, and functional installation in accordance with the intent of these Contract Documents.

1.02 RELATED WORK:

A. Section 02300, EARTHWORK

B. Section 02631, PRECAST MANHOLES AND CATCH BASINS

1.03 REFERENCES:

A. The following standards form a part of this specification as referenced:

American Water Works Association (AWWA)

AWWA C906 Polyethylene PE Pressure Pipe and fittings, 4 in. through 63 in., for Water Distribution

ASTM International

ASTM D1248 Specifications for Polyethylene Plastics Molding and Extrusion Materials.

ASTM D2837 Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials.

ASTM D3350 Standard Specification for Polyethylene Plastics Pipe and Fittings Materials

ASTM F714 Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter.

Plastic Pipe Institute (PPI)

PPI TR-3 Policies and Procedures for Developing Hydrostatic Design Stresses for Thermoplastic Pipe Materials.

1.04 QUALITY ASSURANCE:

A. All pipe and fittings shall be inspected and tested at the factory as required by the standard specifications to which the material is manufactured. The Contractor shall furnish in duplicate to the Engineer sworn certificates providing evidence of such tests.

B. The Owner reserves the right to have any or all pipe, fittings, and special castings inspected and/or tested by an independent service at either the manufacturer's plant or elsewhere. Such inspection and/or tests shall be at the Owner's expense.

C. Deflections in horizontal alignment will not be permitted at joints without written consent of the Engineer. If approved, deflections shall not exceed one-half the manufacturer's recommendation.

D. When requested by the Engineer, the Contractor shall ensure that a qualified representative of the manufacturer shall be present at the jobsite for the first day of pipe laying, to assure that proper procedures are followed.

E. The Engineer shall be notified in advance when the location of an existing pipeline conflicts with the proposed location of the Work.

F. Pipe and fittings of the same type shall be products of a single manufacturer.

G. All piping shall be of the type and size shown on the drawings and described in this section of the Specifications.

1.05 DELIVERY, STORAGE, AND HANDLING:

A. Pipes and fittings shall be carefully handled when loading and unloading. Pipes shall be lifted by hoists or lowered on skidways in such a manner as to avoid shock.

B. HDPE pipe shall be protected from exposure to sunlight (unless restrained in racks) to prevent bowing of the pipe due to expansion and contraction. Such protection shall consist of canvas covering, or other material, as recommended by the manufacturer. Plastic sheets, which may allow excessive temperatures to develop where the pipe is stored, shall not be used.

1.06 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF GENERAL SPECIFICATIONS, SUBMIT THE FOLLOWING:

A. Shop drawings shall consist of manufacturer's scale drawings or catalog cuts including descriptive literature and complete characteristics, specifications, and code requirements.

Shop drawings shall be submitted for the HDPE pressure pipe, type of joints, fittings, and couplings, in accordance with the specifications.

PART 2 - PRODUCTS

2.01 HIGH-DENSITY POLYETHYLENE (HDPE) PIPE AND FITTINGS:

A. All HDPE pipe and fittings shall be manufactured from virgin polyethylene resin, PE 4710, and shall conform to ASTM F714.

B. All polyethylene fittings shall have a pressure rating equal to or higher than the pressure rating of the pipe.

C. All HDPE fittings at the manholes shall have ANSI Class 150 316 stainless steel backing rings.

D. All pipe and fittings shall be minimum SDR 17. See Specification Section 02225, 1.07 for design calculation requirements.

E. All piping and valves shall be supported by the size and style supports shown in the drawings, or an approved equal.

F. Pipe shall be homogeneous throughout; free from voids, cracks, and other defects; as uniform as commercially practicable in color, density, and other physical properties.

G. Pipe surfaces shall be free from nicks, scratches, and other blemishes. The joining surfaces of pipe shall be free from gouges and other imperfections that could cause leakage at joints.

PART 3 - EXECUTION

3.01 INSPECTION BEFORE INSTALLATION:

A. Each length of pipe and each fitting shall be carefully inspected prior to being lowered into the trench. All materials not meeting the requirements of these specifications, or otherwise found defective or unsatisfactory by the Engineer, shall be rejected and immediately marked and removed from the jobsite by the Contractor.

B. Bedding, sub-bedding, and other trench conditions shall be carefully inspected prior to laying pipe. All conditions shall be made available to the Engineer for inspection.

3.02 PIPE INSTALLATION:

A. Pipe interiors, fitting interiors, and joint surfaces shall be thoroughly cleaned prior to installation. Pipes and fittings shall be maintained clean. For HDPE pipe, a clean cotton cloth shall be employed for cleaning; polyester-type materials shall not be used as they may melt during fusion procedures.

B. Pipes shall be installed in the locations and to the required lines and grades shown on the drawings and provided in these Specifications, using an approved method of control.

C. Excavations shall be maintained free of water during the progress of the Work. No pipes shall be laid in water, nor shall there by any joints made up in water.

D. If any defective pipe is discovered after being placed, removal and replacement with sound pipe will be required at no additional cost to the Owner.

3.03 HDPE PIPE JOINING:

A. HDPE pipe should be joined by butt-fusion methods, having a completely uniform and monolithic pipe interior according to the fusion joining procedures as instructed by the manufacturer.

B. Each individual performing fusion joining shall have had at least one year of experience in the use of the fusion procedure.

C. Inspection of joints shall be performed by a person qualified by training or experience to evaluate the acceptability of HDPE joints made under the applicable joining procedures.

D. The pipe sections shall be joined at ground level to a length recommended by the manufacturer, such that when pulling the pipe into position alongside the trench, maximum allowable stress is not exceeded. Use appropriate materials and equipment, as recommended by the HDPE pipe manufacturer, when pulling butt-fused pipe sections alongside the trench, to prevent pipe damage.

END OF SECTION

SECTION 02631

PRECAST MANHOLES AND CATCH BASINS

PART 1 - GENERAL

1.01 WORK INCLUDED:

This Section covers all precast manholes and catch basins complete, including, but not limited to, bases, walls, cones, mortar, inverts, frames and covers.

1.02 RELATED WORK:

A. Section 02300, EARTHWORK

B. Section 02745, PAVING

C. Section 03302, FIELD CONCRETE

1.03 SYSTEM DESCRIPTION:

A. Precast sections shall conform in shape, size, dimensions, materials, and other respects to the details indicated on the drawings or as required by the Engineer.

B. All manholes and catch basins shall have concrete bases. Concrete bases shall be precast unless otherwise specified. Invert channels shall be formed of brick and mortar upon the base.

C. Catch basins shall have a 4-foot deep sump unless otherwise specified. Leaching basins shall have a bottom opening as shown on the drawings.

D. Riser and cone sections shall be precast concrete.

1.04 REFERENCES:

A. The following standards form a part of this specification as referenced:

ASTM International (ASTM)

ASTM A48	Gray Iron Castings
ASTM C32	Sewer and Manhole Brick
ASTM C144	Aggregate for Masonry Mortar
ASTM C207	Hydrated Lime for Masonry Purposes

ASTM C478 Precast Reinforced Concrete Manhole Sections

ASTM C923 Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures and Pipes

ASTM C1244 Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test.

American Association of State Highway and Transportation Officials (AASHTO)

AASHTO M198 Joints for Circular Concrete Sewer and Culvert Pipe Using Flexible Watertight Gaskets

Occupational Safety and Health Administration

OSHA 29 CFR 1910.27 Fall Prevention Protection

1.05 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF SECTION 01330 SUBMITTALS, SUBMIT THE FOLLOWING:

A. Manufacturer's literature of the materials of this section.

B. Test reports as required by the Engineer.

PART 2 - PRODUCTS

2.01 PRECAST CONCRETE SECTIONS:

A. All precast concrete sections shall conform to ASTM C478 with the following exceptions and additional requirements:

1. The wall thickness of precast sections shall be as designated on the drawings, meeting the following minimum requirements:

Section Diameter (Inches)	Minimum Wall Thickness (Inches)
48	5
60	6
72	7
84	8

2. Type II cement shall be used except as otherwise approved.

3. Sections shall be steam cured and shall not be shipped until at least five days after having been cast.

4. Minimum compressive strength of concrete shall be 4000 psi at 28 days.

5. No more than two lift holes may be cast or drilled in each section.

6. The date of manufacture and the name or trademark of the manufacturer shall be clearly marked on the inside of each precast section.

7. Acceptance of the sections will be on the basis of material tests and inspection of the completed product.

8. Circumferential steel reinforcement in walls and bases shall be a minimum of 0.12 sq. in./lin. ft. for 4-foot diameter sections and 0.15 sq. in./lin. ft. for 5- and 6-foot diameter sections. Reinforcing shall extend into tongue and groove.

B. Conical reducing sections shall have a wall thickness not less than 5-inches at the bottom and wall thickness of 8-inches at the top. Conical sections shall taper from a minimum of 48-inches diameter to 24 or 30-inches diameter at the top, as shown on the drawings.

C. Except where insufficient depth of cover dictates the use of a shorter base, bases shall be a minimum of 4 feet in height.

D. Slab top sections and flat riser sections (Grade Rings) shall conform to the contract drawings, with particular attention focused upon the reinforcing steel and be designed to meet or exceed an HS-20 Loading requirement.

E. The tops of the bases shall be suitably shaped by means of accurate ring forms to receive the riser sections.

F. Precast sections shall be manufactured to contain wall openings of the minimum size to receive the ends of the pipes, such openings being accurately set to conform with line and grade of the drain. Subsequent cutting or tampering in the field, for the purpose of creating new openings or altering existing openings, will not be permitted except as required by the Engineer.

G. "Drop-over" manholes shall be placed where indicated on the drawings. The Contractor shall accurately measure the diameter of the existing outlet pipe and inform the manufacturer of its size, so that the "Drop-over" type opening can be cut into the precast manhole base. The bottom shall be cast in place by the Contractor in accordance with Section 03302, FIELD CONCRETE. The invert channel shall be formed of brick and mortar, as specified in this specifications section. The sub-base shall be a compacted, level foundation of crushed stone, at least 6-inches thick, as specified in Section 02300 EARTHWORK, but shall vary to the depth necessary to reach sound undisturbed earth.

H. The exterior surfaces of all precast manhole bases, walls, and cones shall be given a minimum of one shop coat of bituminous dampproofing.

I. The Engineer reserves the right to reject any unsatisfactory precast section and the rejected unit shall be tagged and removed from the job site immediately.

J. The Engineer may also require the testing of concrete sections as outlined under Physical Requirements in ASTM C478 with the Contractor bearing all testing costs.

2.02 BRICK MATERIALS:

A. Brick shall be sound, hard, and uniformly burned brick, regular and uniform in shape and size, of compact texture, and satisfactory to the Engineer. Bricks shall comply with ASTM C32, for Grade SS, hard brick, except that the mean of five tests for absorption shall not exceed 8 percent by weight.

B. Rejected brick shall be immediately removed from the work and brick satisfactory to the Engineer substituted.

C. Mortar shall be composed of Portland cement, hydrated lime, and sand in which the volume of sand shall not exceed three times the sum of the volumes of cement and lime. The proportions of cement and lime shall be as required by the Engineer and may vary from l:l/4 for dense hard-burned brick to l:3/4 for softer brick. In general, mortar for Grade SS Brick shall be mixed in the volume proportions of 1:1/2:4-1/2; Portland cement to hydrated lime to sand.

D. Cement shall be Type II Portland cement as specified for concrete masonry.

E. Hydrated lime shall be Type S conforming to ASTM C207.

F. The sand shall comply with ASTM C144 specifications for "Fine Aggregate," except that all of the sand shall pass a No. 8 sieve.

2.03 FRAMES, GRATES, COVERS AND STEPS:

A. Castings shall be of good quality, strong, tough, even-grained cast iron, smooth, free from scale, lumps, blisters, sandholes, and defects of every nature which would render them unfit for the service for which they are intended. Contact surfaces of covers and frame seats shall be machined to prevent rocking of covers.

B. All castings shall be thoroughly cleaned and may be subject to a careful hammer inspection at the Engineer's discretion.

C. Castings shall be ASTM A48 Class 30B or better.

D. The surface of the manhole covers shall have a diamond pattern with the cast words "DRAIN".

E. Manhole frames with 26-inch covers for 24-inch openings shall be 475 pounds minimum by EJ No. 2110 (formerly LK110A); Neenah Foundry Co. R1720; Quality Water Products, Style 40; or approved equal.

F. Catch basin frames and 23-7/8-inch square grates with 2-inch square openings shall be 8-inches in height minimum. They shall be Neenah Foundry Co. No. R3588-A; Quality Water Products No. 45-600; EJ 5548Z 5520M; or approved equal.

G. Catch basin frames set against curbing shall have three flanges only.

H. Manhole steps shall conform to ASTM C478 requirements and shall be fabricated of either extruded aluminum or steel reinforced plastic. Steps shall be uniformly spaced at a maximum of 12-inches unless otherwise shown on the drawings.

2.04 MANHOLE ACCESSORIES:

A. Gasket materials shall be top grade (100% solids, vulcanized) butyl rubber and shall meet or exceed AASHTO M-198.

B. Couplings at the manhole-pipe interface shall be made with a rubber seal system (with or without stainless steel straps) meeting the requirements of ASTM C923 and recommended for this type of connection.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. PRECAST SECTIONS:

1. Precast bases shall be supported on a compacted level foundation of crushed stone, as specified in Section 02300 EARTHWORK, at least 6-inches thick, but shall vary to the depth necessary to reach sound undisturbed earth.

2. Precast reinforced concrete sections shall be set vertical and with sections in true alignment.

3. Butyl rubber joint sealant shall be installed between each concrete section. Catch basin sections do not require joint sealant if so indicated on the drawings.

4. All holes in sections used for handling the sections shall be thoroughly plugged with mortar. Mortar shall be one part cement to 1-1/2 parts sand, mixed slightly damp to the touch (just short of "balling"), hammered into the holes until it is dense and an excess of paste appears on the surface, and then finished smooth and flush with the adjoining surfaces.

B. BRICK WORK:

1. Bricks shall be moistened by suitable means, as required, until they are neither so dry as to absorb water from the mortar nor so wet as to be slippery when laid.

2. Each brick shall be laid as a header in a full bed and joint of mortar without requiring subsequent grouting, flushing or filling, and shall be thoroughly bonded as directed.

3. The brick inverts shall conform accurately to the size of the adjoining pipes. Side inverts shall be curved and main inverts (where direction changes) shall be laid out in smooth curves of the longest possible radius which is tangent to the centerlines of adjoining pipe.

C. CASTINGS:

1. Cast iron frames, grates and covers shall be as specified. The frames and covers shall be set by the Contractor to conform accurately to the grade of the finished pavement, existing ground surface, or as indicated on the drawings. Frames shall be adjusted to meet the street surface.

2. Cast iron manhole frames and covers not located in paved areas shall be set 6-inches above finished grade, at a height as required by the Engineer, or as indicated on the drawings. The top of the cone shall be built up with a minimum of 1 course and a maximum of 5 courses of brick and mortar used as headers for adjustment to final grade.

3. Frames shall be set concentric with the top of the concrete section and in a full bed of mortar so that the space between the top of the concrete section or brick headers and the bottom flange of the frame shall be completely filled and made watertight. A thick ring of mortar extending to the outer edge of the concrete shall be placed all around the bottom flange. The mortar shall be smoothly finished to be flush with the top of the flange and have a slight slope to shed water away from the frame.

4. Covers and/or grates shall be left in place in the frames, for safety reasons, except while work is being performed.

D. ACCESSORIES:

1. Accessories shall be installed in accordance with manufacturer's instructions.

2. Stubs shall be set accurately to the dimensions indicated on the drawings. Stubs shall be sealed with suitable watertight plugs.

3.02 LEAKAGE TESTS:

A. Leakage tests shall be made by the Contractor and observed by the Engineer on each manhole. The test shall be by vacuum or by water exfiltration as described below:

B. VACUUM TEST:

1. The vacuum test shall be conducted in accordance with ASTM C1244. Test results will be judged by the length of time it takes for the applied vacuum to drop from 10 inches of mercury to 9 inches. If the time is less than that listed in Table 1 of ASTM C1244, the manhole will have failed the test. Test times from Table 1 are excerpted below.

TABLE 1

Minimum Test Times for Various Manhole Diameters

	Diameter (Inches)		
Depth (Feet)	48	60	72
		Times (Seconds)	
0-12	30	39	49
12-16	40	52	67
16-20	50	65	81
20-24	59	78	97
26-30	74	98	121

2. If the manhole fails the initial test, the Contractor shall locate the leaks and make proper repairs. Leaks may be filled with a wet slurry of accepted quick setting material. If the manhole should again fail the vacuum test, additional repairs shall be made, and the manhole water tested as specified below.

C. WATER EXFILTRATION TEST:

1. After the manhole has been assembled in place, all lifting holes shall be filled and pointed with an approved non-shrinking mortar. All pipes and other openings into the manhole shall be suitably plugged and the plugs braced to prevent blow out. The test shall be made prior to placing the shelf and invert. If the groundwater table has been allowed to rise above the bottom of the manhole, it shall be lowered for the duration of the test.

2. The manhole shall be filled with water to the top of the cone section. If the excavation has not been backfilled and observation indicates no visible leakage, that is, no water visibly moving down the surface of the manhole, the manhole may be considered to be satisfactorily water-tight. If the test, as described above, is unsatisfactory as determined by the Engineer or if the manhole excavation has been backfilled, the test shall be continued. A period of time may be permitted if the

Contractor so wishes, to allow for absorption by the manhole. At the end of this period, the manhole shall be refilled to the top of the cone, if necessary, and a measuring time of at least 8 hours begun. At the end of the test period, the manhole shall be refilled to the top of the cone, measuring the volume of water added. This amount shall be extrapolated to a 24-hour loss rate and the leakage determined on the basis of depth. The leakage for each manhole shall not exceed one gallon per vertical foot for a 24-hour period. If the manhole fails this requirement, but the leakage does not exceed 3 gallons per vertical foot per day, repairs by approved methods may be made as required by the Engineer to bring the leakage within the allowable rate of one gallon per foot per day. Leakage due to a defective section or joint or exceeding the 3 gallon per vertical foot per day, shall be cause for rejection of the manhole. It shall be the Contractor's responsibility to uncover the rejected manhole as necessary and to disassemble, reconstruct or replace it as required by the Engineer. The manhole shall then be retested and, if satisfactory, interior joints shall be filled and pointed.

3. No adjustment in the leakage allowance will be made for unknown causes such as leaking plugs, absorption, etc. It shall be assumed that all loss of water during the test is a result of leaks through joints or through the concrete. Furthermore, the Contractor shall take any steps necessary to assure the Engineer that the water table is below the bottom of the manhole throughout the test.

4. If the groundwater table is above the highest joint in the manhole, and there is no leakage into the manhole, as determined by the Engineer, such a test can serve to evaluate water-tightness of the manhole. However, if the Engineer is not satisfied with the results, the Contractor shall lower the water table and carry out the test as described hereinbefore.

3.03 CLEANING:

All new manholes shall be thoroughly cleaned of all silt, debris and foreign matter of any kind, prior to final inspection.

END OF SECTION

SECTION 02745

PAVING

PART 1 - GENERAL

1.01 WORK INCLUDED:

The Contractor shall furnish all labor, materials and equipment and shall replace the pavements as indicated on the drawings and as herein specified.

1.02 RELATED WORK:

A. Section 00890, PERMITS

B. Section 02300, EARTHWORK

C. Section 02631, PRECAST MANHOLES AND CATCH BASINS

1.03 SYSTEM DESCRIPTION:

A. GENERAL

The type of pavement system to be utilized on this project is as follows:

TYPE 1. PERMANENT TRENCH PAVEMENT

B. TYPE 1. PERMANENT TRENCH PAVEMENT

Areas shall be paved with a minimum of 6-inches pavement thickness, to match existing pavement thickness. As soon as practical, after the installation of individual pipeline segments, the contractor shall install permanent binder course trench pavement, minimum 6-inches thick. Maximum pavement thickness per course shall not exceed 2-inches. The permanent binder course trench pavement shall be maintained a minimum of 90 days prior to cold planing. The trench (plus 12-inch cutback on all sides) is to be cold planed to remove 2-inches of the pavement. The areas shall then be overlayed with a permanent top course pavement, 2-inches thick. Cold planing and permanent pavement shall be performed only with the approval of the Engineer.

1.04 REFERENCES

The following standards form a part of these specifications and indicate the minimum standards required:

American Society for Testing and Materials (ASTM)

ASTM D1557 Test for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 Pound Rammer and 18-Inch Drop

Massachusetts Department of Transportation (MassDOT)
Standard Specifications for Highways and Bridges

MassDOT 403 Reclaimed Base Course

MassDOT 405 Gravel Base Course

MassDOT 420 Hot Mix Asphalt Base Course

MassDOT 460 Hot Mix Asphalt Pavement

MassDOT 476 Cement Concrete Pavement

MassDOT 860 Reflectorized Pavement Markings

Federal Specifications

SS-S-1401 Sealants, Joint, Non-Jet-Fuel-Resistant, Hot Applied, for Portland Cement and Asphalt Concrete Pavement

AASHTO Standard Specifications for Materials and Methods of Sampling and Testing

1.05 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF SECTION 01330 SUBMITTALS, SUBMIT THE FOLLOWING:

Complete job mix formula shall be submitted to the Engineer at least two weeks before any of the work of this section is to begin.

PART 2 - PRODUCTS

2.01 GRAVEL SUBBASE:

A. Gravel subbase shall consist of inert material that is hard durable stone and coarse sand, free from loam and clay, surface coatings and deleterious materials.

B. Gradation requirements for gravel subbase shall be as specified in Section 02300, EARTHWORK for Gravel Borrow.

2.02 RECLAIMED SUBBASE:

A. Reclaimed subbase shall consist of crushed asphalt pavement, crushed cement concrete, and gravel borrow (as specified in paragraph 2.02) uniformly pre-mixed.

B. Reclaimed subbase mixtures shall be within the composition limits in accordance with MassDOT M1.11.0, with constituents that conform to Table A, below.

C. The approved source of reclaimed pavement borrow material shall be processed by mechanical means. The equipment for producing crushed material shall be of adequate size and with sufficient adjustments to produce the desired materials. The processed material shall be stockpiled in such a manner as to minimize segregation of particle sizes. All reclaimed pavement borrow material shall come from approved stockpiles.

2.03 HOT MIX ASPHALT PAVEMENT:

A. Pavements shall consist of hot mix asphalt.

B. Pavement mixtures shall be within the composition limits of base courses, binder courses, top courses and surface treatment, in accordance with MassDOT M3.11.03, with constituents that conform to Table A, below.

TABLE A

PERCENT BY MASS PASSING SIEVE DESIGNATION

Standard Sieves (in.)	Reclaimed Subbase	Base Course	Binder Course	Top Course	Mod. Top Course	Surface Treat.	Low Permeability Dense Binder Course	Low Permeability Dense Top Course
3 in	100							
2 in		100						
1-1/2 in	70-100							
1 in		57-87	100		100		100	
¾ in	50-85		80-100		95-100		80-100	
5/8 in				100				
½ in		40-65	55-75	95-100	79-100		65-80	100
3/8 in				80-100	68-88	100		80-100
No.4	30-60	20-45	28-50	50-76	48-68	80-100	48-65	55-80
No.8		15-33	20-38	37-49	33-46	64-85	37-49	48-59
No.16				26-40	20-40	46-68		36-49
No.30		8-17	8-22	17-29	14-30	26-50	17-30	24-38

Standard Sieves (in.)	Reclaimed Subbase	Base Course	Binder Course	Top Course	Mod. Top Course	Surface Treat.	Low Permeability Dense Binder Course	Low Permeability Dense Top Course
No.50	8-24	4-12	5-15	10-21	9-21	13-31	10-22	14-27
No.100				5-16	6-16	7-17		6-18
No.200	0-10	0-4	0-5	2-7	2-6	3-8	0-6	4-8
Binder		4-5	4.5-5.5	5.6-7.0	5.1-6	7-8	5.1-6	7-8

Percentages shown for aggregate sizes are stated as proportional percentages of total aggregate for the mix.

Unless authorized by the Engineer, no Job-Mix Formula will be approved which specifies:

More than 45% passing No. 8 for Top and Dense Binder Courses
More than 38% passing No. 8 for Modified Top Course
More than 55% passing No. 8 for Dense Mix
Less than 4% passing No. 200 for Top Course.
Less than 6% bitumen for Top Course.

C. The joint sealant shall be a hot poured rubberized emulsified asphalt sealant meeting the requirements of FS SS-S-1401.

D. The tack coat shall be an asphalt emulsion, RS-1 if required, conforming to MassDOT Section M3.03.0.

2.04 SEAL COAT:

A. Seal coats shall be within the composition limits for protective seal coat emulsion in accordance with MassDOT M3.03.3.

B. Silica sand when blended with seal coat emulsion shall be No. 30 silica sand.

2.05 PAVEMENT MARKINGS:

A. Pavement markings shall conform to the requirements of MassDOT 860.

B. The mixture of the marking material shall be within the composition limits for reflectorized pavement markings as described in the MassDOT Specifications as follows:

1. Fast drying traffic paint - M7.01.10/11.

2. Fast drying white and yellow water-borne traffic paints - M7.01.23/24.

C. Application of the glass beads to be used as reflector material on the striping shall conform to Sections 860.62 and M7.03.07 of the MassDOT Specifications.

2.06 PAINT FOR PARKING LOTS

A. Paint for parking lot lines shall conform to Federal Specification TT-P-115-E Type 1. Paint shall be 11-3 PPG Industries, Pittsburgh, PA or approved equal.

PART 3 - EXECUTION

3.01 GENERAL:

Paving courses required for the project shall be as shown on the drawings and as specified herein. Pavement thicknesses specified are measured in compacted inches. If a pavement course thickness exceeds 2-1/2 compacted inches, the course shall be installed in multiple lifts with each lift not exceeding 2-1/2 compacted inches in thickness.

3.02 GRAVEL SUBBASE:

A. The gravel subbase to be placed under pavement shall consist of 12-inches of gravel evenly spread and thoroughly compacted.

B. The gravel shall be spread in layers not more than 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.

3.03 RECLAIMED SUBBASE:

A. The reclaimed borrow material to be placed under the pavement shall consist of 12-inches of reclaimed borrow material evenly spread and thoroughly compacted.

B. The reclaimed borrow material shall be spread and compacted in layers not exceeding 4-inches thick, compacted measure, except the last layer of reclaimed pavement borrow material shall be 2-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.

3.04 TEMPORARY BITUMINOUS PAVEMENT:

A. Where specified and required by the Engineer and after placement of the gravel subbase, the Contractor shall place temporary bituminous pavement above the trench, between the edges of the existing pavement. It shall consist of hot mix asphalt, 2-inches thick, in accordance with MassDOT 460.

B. The temporary pavement shall be repaired as necessary to maintain the surface of the pavement until replaced by permanent pavement. When so required by the Engineer, the Contractor shall remove the temporary pavement and install or regrade the subbase for installation of permanent pavement.

3.05 PERMANENT BITUMINOUS PAVEMENT:

A. The bituminous paving mixture, equipment, methods of mixing and placing, and the precautions to be observed as to weather, condition of base, etc., shall be in accordance with MassDOT 460.

B. BASE COURSE AND BINDER COURSE PAVEMENT:

1. Immediately prior to installing the base and/or binder course, the trimmed edges shall be made stable and unyielding, free of loose or broken pieces and all edges shall be thoroughly broomed clean. Contact surfaces of trench sides, curbings, manholes, catch basins, or other appurtenant structures in the pavement shall be painted thoroughly with a uniform coating of asphalt emulsion (tack coat), just before any mixture is placed against them.

2. The binder course shall be repaired as necessary to maintain the surface of the pavement until placement of the permanent overlay. If required, the Contractor shall place a leveling course before placing the permanent overlay.

C. TOP COURSE OR SURFACE TREATMENT PAVEMENT (PERMANENT OVERLAY):

1. Top course or surface treatment shall be placed over the trench or full width as shown on the drawings or as specified.

2. Prior to placement of the top course or surface treatment, the entire surface over which the top course or surface treatment is to be placed shall be broom cleaned and tack coated.

3. Top course or surface treatment pavement placed over trenches may be feathered to meet existing paved surfaces, if approved by the Engineer.

4. Prior to placing full width top course or surface treatment pavements, keyways shall be cut in all intersecting streets.

3.06 COLD PLANING

A. The Contractor shall remove bituminous concrete pavement by use of an approved "cold planer" equipment to a depth as described on the plans.

B. The equipment shall be capable of accurately and automatically establishing profile grades along each edge of the machine by referencing from the existing pavement by means of a ski or matching shoe from an independent grade control and shall have an automatic system for controlling cross slope at a given rate.

C. The machine shall be equipped with an integral loading means to immediately remove material being cut from the surface of the roadway and discharge cuttings into a truck, all in one operation. All planing machinery shall be equipped with dust-control devices to prevent any dust produced in the cutting operation from escaping into the air.

D. The bituminous surfaces being planed and profiled shall be removed to a depth, width, grade and cross section required by the Engineer. Loose material resulting from the operation shall be the property of the Owner unless otherwise required by the Engineer.

E. The planed surface shall provide a smooth riding surface free from severe gouges, continuous grooves, ridges, oil film and other imperfections of workmanship and shall have a uniform surface appearance exclusive of broken or cracked underlying pavement.

E. All existing pavement around castings shall be removed with hand cold planing equipment or by the use of hand tools if necessary. Any castings damaged or disturbed shall be removed and replaced as required by the Engineer, at the Contractor's expense.

3.07 PAVEMENT PLACEMENT:

A. Unless otherwise permitted by the Engineer for particular conditions, only machine methods of placing the pavement shall be used. The equipment for spreading and finishing shall be mechanical, self-powered pavers, capable of spreading and finishing the mixture true to line, grade, width and crown. The mixtures shall be placed and compacted only at such times as to permit proper inspection and checking by the Engineer.

B. After the paving mixtures have been properly spread, initial and intermediate compaction shall be obtained by the use of steel wheel rollers having a weight of not less than 240 pounds per inch width of tread.

C. Final rolling of the top course or surface treatment pavement shall be performed by a steel wheel roller weighing not less than 285 pounds per inch width of tread at a mix temperature and time sufficient to allow for final smoothing of the surface and thorough compaction.

D. Immediately after placement of top course or surface treatment pavement, all joints between the existing and new top course or surface treatment pavements shall be sealed with hot poured rubberized asphalt joint sealant.

E. Where there is no backing for the edges of the curb-to-curb pavement, the Contractor shall provide a gravel transition. The gravel transition shall be installed immediately after the pavement is placed, shall be feathered and extend a minimum of 18-inches, and shall

be compacted using the same equipment as for pavement compaction. The gravel shall be uniformly graded material with a maximum size of 3/8- to ½-inch.

F. When required by the Engineer, the Contractor shall furnish and install additional paving to provide satisfactory transition for driveways and walkways impacted by a new curb-to-curb pavement installation. The transition installation will be considered incidental to the curb-to-curb pavement installation.

3.08 ADDITIONAL PAVING:

A. If the Engineer determines that the existing bituminous concrete pavement on local streets is thicker than the permanent pavement specified herein, the Contractor may be required to install hot mix asphalt to obtain the depth of the existing pavement.

B. If for the installation of full width paving, the Engineer determines that the existing road surface requires additional leveling pavement, then the Contractor shall install additional hot mix asphalt to bring the section to proper line and cross section. Additional paving required to restore the proper line and cross section of binder course installed by the Contractor which has become rough and uneven shall be furnished and installed at the expense of the Contractor.

3.09 PARKING LOTS AND DRIVEWAYS:

A. Pavement shall consist of a 2-inch binder course and a 1-1/2-inch top course on a 12-inch gravel sub-base. All thicknesses are compacted thicknesses.

B. Adjacent concrete work, slate work, sidewalks, structures, etc., shall be protected from stain and damage during the entire operation. Damaged or stained areas shall be replaced or repaired to equal their original condition.

C. All joints between binder and top course shall be staggered a minimum of 6-inches.

D. After final rolling, no vehicular traffic of any kind shall be permitted on the pavement until it has cooled and hardened sufficiently to prevent distortion and loss of fines, and in no case in less than 6 hours.

E. Smoothness of all areas of the finished surface shall not vary more than 1/4-inch when tested with a 16 foot straight-edge, applied both parallel to and at right angles to the centerline of the paved area. At building entrances, curbs, and other locations where an essentially flush transition is required, pavement elevation tolerance shall not exceed plus or minus 1/8-inch. Irregularities exceeding these amounts, or which retain water on the surface, shall be corrected by removing the defective work and replacing or repairing it to the satisfaction of the Engineer.

F. The surface area to be seal coated, as shown on the drawings, shall be swept and air cleaned. The first coat shall be applied with eight (8) pounds of #30 silica sand blended

with each gallon of emulsion applied at a rate of 0.15 gallons per square yard. The second coat shall be a straight sealer applied at the rate of 0.1 gallons per square yard.

G. The Contractor shall prepare the pavement surface for painting lines according to the recommendations of the paint manufacturer. Applied markings shall have clean-cut edges, true and smooth alignment and uniform film thickness of 15 mils, +/- 1.0. The Contractor shall be responsible for removing, to the satisfaction of the Engineer, tracing marks, and spilled paint applied in an unauthorized area.

3.10 RAISING AND ADJUSTING CASTINGS:

A. In areas of permanent top course paving, existing municipally-owned catch basin and manhole castings and valve boxes shall be raised to the proper grade where required by the Engineer.

B. Castings owned by private utilities shall be raised by their own forces. The Contractor shall be responsible for coordinating this work.

C. The method of adjusting these castings shall be as follows: Cut around catch basin or manhole castings a minimum of 8-inches from casting. Excavate and if required rebuild up to 12-inches of masonry below the bottom of the casting. Backfill with suitable material and compact to bottom of casting. Place high, early strength cement or bituminous concrete collar, as directed, to approximately 1½-inches below the raised casting grade. Masonry work shall conform to Section 02631, PRECAST MANHOLES AND CATCH BASINS.

D. In some areas, raising of castings may not be required. Where required by the Engineer, castings not to be raised shall have at least 12-inches of bituminous concrete pavement chipped and removed around the casting. New bituminous concrete pavement shall be placed and compacted around such castings to approximately 1-1/2-inches below the top of the casting. The overlay course shall then be sloped down to the level of the casting.

E. The method of raising valve boxes shall be as follows: Cut around valve box a minimum of 8-inches from valve box. Excavate as required and raise the valve box. Pour high early strength cement or bituminous concrete collar, as directed, to approximately 1-1/2-inches below the top of the valve box.

F. Castings which need to be raised or adjusted to complete permanent curb to curb paving shall be done immediately prior to paving.

3.11 PAVEMENT MARKINGS:

A. The Contractor shall replace all pavement markings removed or covered-over in carrying out the work, and as required by the Engineer, no sooner than 48 hours after completion of permanent pavement. The markings shall be 4-inches wide, white or yellow, single or double lines as required.

B. When required by the Engineer, the Contractor shall provide temporary markings at no additional cost to the Owner.

3.12 PAVEMENT REPAIR:

A. If required in the contract or if permanent pavement becomes rough or uneven, permanent pavement patches and trenches shall be repaired and brought to grade utilizing "infrared" paving methods following completion of the construction.

B. The Contractor performing the work shall use care to avoid overheating the pavement being repaired.

C. Pavement repair shall extend a minimum of 6-inches beyond all edges of the pavement patch to assure adequate bonding at the pavement joints.

END OF SECTION

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SECTION 02771

CURBING

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. This section covers furnishing and installation of granite curb, hot mix asphalt curb and precast parking curb, where required, as shown on the Drawings and herein specified.

B. This section also covers replacement of curbing removed during construction.

1.02 RELATED WORK:

A. Required earthwork is specified under Section 02300 EARTHWORK.

B. Section 02745, PAVING.

C. Section 02775, SIDEWALK CONSTRUCTION AND REPLACEMENT

1.03 REFERENCES:

The following standards form a part of these specifications, as referenced:

Massachusetts Department of Transportation (MassDOT) Standard Specifications for Highways and Bridges

1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF SECTION 01330 SUBMITTALS, SUBMIT THE FOLLOWING:

Shop drawings, showing dimensions of typical curb sections.

PART 2 - PRODUCTS

2.01 GRANITE CURBING:

A. Granite curbing shall be Type VAI conforming to Subsection M9.04.1 of the latest edition of the MassDOT Standard Specifications for Highways and Bridges.

B. Special shapes and corners shall be supplied as required.

2.02 GRANITE EDGING:

A. Granite edging shall be Type SB conforming to Subsection M9.04.2 of the latest edition of the MassDOT Standard Specifications for Highways and Bridges.

B. Special shapes and corners shall be supplied as required.

2.03 HOT MIX ASPHALT CURB

Curb shall conform to Subsection M3.11.6 of the latest edition of the MassDOT Standard Specifications for Highways and Bridges.

2.04 PRECAST PARKING LOT CURB:

A. Precast parking lot curb shall be formed with concrete rated at 3500 psi at 28 days.

B. The manufacturer shall maintain at the manufacturing site a record of material used and their sources, and a copy of concrete mix designs.

C. Precast parking lot curb shall be the Standard Precast Bumper Curb as manufactured by Durastone Co., Lincoln, RI, or approved equal.

PART 3 - EXECUTION

3.01 GRANITE CURBING:

A. Removal and resetting and/or removal and replacing of granite curbing shall be in accordance with Subsection 580 of the latest edition of the MassDOT Standard Specifications for Highways and Bridges. The curbing shall have a 7-inch reveal unless otherwise required by the Engineer.

B. Except as modified herein or on the drawings, installation of curbing shall conform to Section 500 of the MassDOT Standard Specifications for Highways and Bridges.

C. Excavation shall be made to the bottom of the 6-inch gravel base below the curbing, the trench being sufficiently wide to permit thorough tamping. The base shall be compacted to a firm, even surface and shall be approved by the Engineer.

D. The curbing shall be set on edge and settled into place with a heavy wooden hand-rammer, to the line and grade required, straight and true for the full depth. The joints of the stone curbing shall be pointed with mortar for the full depth of the curbing. At approximately 50-foot intervals, a 1/2-inch joint shall not be filled with mortar but left free for expansion. The ends of the stone curbing at driveways and intersections shall be cut at a bevel or rounded as required by the Engineer.

E. The trench for the stone curbing shall be backfilled with approved material; the first layer to be 4-inches in depth, thoroughly rammed; the other layers to be more than 6-inches in depth and thoroughly rammed until the trench is filled.

F. Where indicated on the plans, or as required, drainage openings shall be made through the curbing at the elevations and of the size required.

3.02 GRANITE EDGING:

A. Except as modified herein and on the drawings, installation of granite edging shall conform to Section 500 of MassDOT Standard Specifications for Highways and Bridges.

B. The cement concrete base shall be placed on a well-tamped sub-base acceptable to the Engineer, and shall be constructed of 3000 psi concrete, minimum, as shown on the drawings.

C. The edging shall be set to the proper lines and grades on the concrete base and on a well-tamped sloping gravel surface.

3.03 HOT MIX ASPHALT CURB:

A. Replacement of hot mix asphalt curbs shall be in accordance with Section 500 of the latest edition of the MassDOT Standard Specification for Highways and Bridges and all amendments thereto. The curbing shall have a 6-inch reveal unless otherwise required by the Engineer.

B. Unless modified herein, installation shall conform to Section 501.64 of the MassDOT Standard Specifications for Highways and Bridges.

C. When indicated on the plans, or as directed, drainage openings shall be made through the curb at the elevations and of the size required.

3.04 PRECAST PARKING LOT CURBING:

A. Precast parking lot curbing shall be furnished and installed as indicated on the drawings.

B. Any units, which are cracked, chipped, spalled, or otherwise damaged, shall be removed and replaced with units meeting the specified requirements.

END OF SECTION

SECTION 02775

SIDEWALK CONSTRUCTION AND REPLACEMENT

PART 1 - GENERAL

1.01 WORK INCLUDED:

The Contractor shall furnish all labor, materials, equipment, and incidentals required to construct new or replace hot mix asphalt, cement concrete sidewalks, stamped cement concrete sidewalks, or brick sidewalks where required or where existing sidewalks are disturbed by the Contractor, as shown on the drawings and described herein. The Contractor shall also furnish all materials and install pedestrian curb ramps where shown on the drawings or as required by the Engineer.

1.02 RELATED WORK:

A. Section 02300, EARTHWORK

B. Section 02771, CURBING

1.03 REFERENCES:

The following standards form a part of these specifications, as referenced:

Massachusetts Department of Transportation (MassDOT)
Standard Specifications for Highways and Bridges

Section 701	Cement Concrete Sidewalks, Pedestrian Curb Ramps and Driveways
Section 702	Hot Mix Asphalt Sidewalks and Driveways

Code of Massachusetts Regulations (CMR)

521 CMR 24	Ramps

1.04 SUBMITTALS:

A. In accordance with Section 01330 SUBMITTALS, the Contractor shall submit shop drawings and/or materials specifications for each component of the work to be performed under this section of the Specifications.

1.05 SYSTEM DESCRIPTION:

A. HOT MIX ASPHALT, CEMENT CONCRETE SIDEWALKS, STAMPED CEMENT CONCRETE SIDEWALKS, BRICK SIDEWALKS, AND PEDESTRIAN CURB RAMPS:

1. Except as otherwise indicated, hot mix asphalt, cement concrete sidewalks, stamped cement concrete sidewalks, brick sidewalks, and pedestrian curb ramps shall be constructed in accordance with the requirements of Sections 701 and 702 of the latest edition of the MassDOT Standard Specifications for Highways and Bridges, and all amendments thereto.

2. Pedestrian curb ramps shall be installed in new sidewalks at intersections in accordance with 521 CMR 24 and Mass DOT Section 701. When curbs or sidewalks are constructed or reconstructed on one side of the street, curb cuts shall also be installed on the opposite sides of the street, where there is a pedestrian path of travel. Curb cuts shall be located within the crosswalk and/or the pedestrian path of travel.

B. Water boxes, manhole frames, and all other castings shall be carefully set to the proposed finished grade.

C. Sidewalks shall not be less than 48-inches in width, excluding curbing. An unobstructed path of travel shall be provided which is at least 36-inches clear, excluding curbing.

PART 2 - PRODUCTS

2.01 CEMENT CONCRETE SIDEWALKS, STAMPED CEMENT CONCRETE SIDEWALKS, AND PEDESTRIAN CURB RAMPS:

A. Cement concrete sidewalks shall be constructed with air entrained Cement Concrete with a minimum compressive strength of 4000 psi at 28 days.

B. Cement concrete shall conform to the requirements of MassDOT M4.02.

2.02 BRICK SIDEWALKS:

A. The Contractor shall remove and reuse existing brick pavers for replacement of brick sidewalks.

B. BEDDING AND JOINT SAND:

1. Bedding and joint sand shall be clean, non-plastic, and free from deleterious or foreign matter. The sand shall be natural or manufactured from crushed rock. Limestone screenings or stone dust that do not conform to the grading requirements in Table 1 shall not be used.

2. The bedding sand shall conform to the grading requirements of ASTM C 33 as shown in Table 1.

TABLE 1
BEDDING SAND GRADING REQUIREMENTS

ASTM C 33	
Sieve Size	Percent Passing
No. 4	95 to 100
No. 8	85 to 100
No. 16	50 to 85
No. 30	25 to 60
No. 50	10 to 30
No. 100	2 to 10

3. The joint sand shall conform to the grading requirements of ASTM C 144 as shown in Table 2 below:

TABLE 2
JOINT SAND GRADING REQUIREMENTS

ASTM C 144		
	Natural Sand	Manufactured Sand
Sieve Size	Percent Passing	Percent Passing
No. 4	100	100
No. 8	95 - 100	95 to 100
No. 16	70 - 100	70 to 100
No. 30	40 - 75	40 to 75
No. 50	10 - 35	20 to 40
No. 100	2 - 15	10 to 25
No. 200	0	0 to 10

PART 3 - EXECUTION:

3.01. CEMENT CONCRETE SIDEWALKS, STAMPED CEMENT CONTRETE SIDEWALKS, AND PEDESTRIAN CURB RAMPS:

A. Concrete for sidewalks and pedestrian curb ramps shall be a minimum of 4-inches thick. At driveways, the sidewalks shall be 6-inches thick.

B. 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.

C. After the subgrade has been prepared as hereinbefore specified, a subbase of gravel borrow at optimum moisture content shall be placed, thoroughly rolled by a power roller, and tamped. The gravel borrow shall be a minimum of 8-inches in thickness.

D. The forms for sidewalks 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. 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. The finished walk shall have sufficient pitch from the outside to the edge of the walk to provide for surface drainage. This pitch shall be ¼-inch per foot unless otherwise required by the Engineer. Before the concrete is placed, the subbase for sidewalks shall be thoroughly dampened until it is moist throughout but without puddles of water.

E. Concrete shall be conveyed from the place of mixing to the place of deposit in such a manner that no mortar will be lost, and the composition of the mix shall be uniform, showing neither excess nor lack of mortar in any one place. The consistency shall be such that water will float to the surface under heavy tamping. The concrete shall be placed as close to its final position as practicable and thoroughly consolidated, with precautions taken not to overwork it while it is still plastic. The concrete shall be thoroughly spaded along the forms or screeds to eliminate voids and honeycombs at the edges. Retempering of concrete will not be permitted.

F. Concrete shall be placed in alternate slabs not exceeding 30 feet in length. Slabs shall be separated by transverse preformed expansion joint filler ½-inch thick. The surface of all concrete sidewalks shall be uniformly scored into block units of not more than 40 square feet. The depth of the scoring shall be at least one quarter of the thickness of the sidewalk.

G. When concrete sidewalks are constructed adjacent to curbing, building foundations, retaining walls, light pole bases or fixed structures, ½-inch thick premolded joint filler shall be used between the newly constructed sidewalk and the structure.

H. Finishing of the concrete surface shall be done by experienced and competent cement finishers as soon as is practicable. Finishing shall be delayed until all bled water and water sheen has left the surface and the concrete has begun to stiffen. The concrete surface shall be finished as directed with a steel trowel or wood float to give a smooth, uniform, and attractive surface finish and uniformly scored into block units or areas of not more than 36 square feet. Following this, the Contractor shall draw a nylon push broom lightly over the surface to produce a non-slip surface. Application of neat cement to the surface to hasten hardening is prohibited.

I. The Contractor shall protect the newly placed concrete surface against vandalism and marking or defacing and must stand ready to replace any blocks which, in the opinion of the Engineer, are excessively marked or defaced, at no additional cost to the Owner. When completed the walks shall be kept moist and protected from traffic and weather for at least 3 days.

J. Adequate protection shall be provided where temperatures of 40ºF or lower occur during placing of concrete and during the early curing period. The minimum temperature of fresh concrete after placing and for the first 3 days shall be maintained above 55ºF. In addition to the above requirements, an additional 3 days of protection from freezing shall be maintained.

3.02 BRICK SIDEWALKS:

A. SITE PREPARATION:

1. Complete all underground utility work, curbing, foundations, and wall construction prior to commencement of subbase construction.

2. Compact the existing subgrade prior to placement of subbase material to at least 95% Standard Proctor Density per ASTM D 698.

B. SUBBASE AND BASE INSTALLATION:

1. Place subbase materials in uniform lifts not exceeding 4-inch, loose thickness and compacted to at least 100 percent Standard Proctor Maximum Dry Density as per ASTM 698.

2. The upper surface of the subbase shall be sufficiently well graded and compacted to prevent infiltration of the bedding sand into the base both during construction and throughout its service life. Segregated areas of the granular base shall be blended by the application of crushed fines that have been watered and compacted into the surface.

C. PAVER INSTALLATION:

1. The sand shall be spread evenly over the base course and screeded to a nominal 1-inch (25 mm) thickness, not exceeding 1-½-inch thickness. The screeded sand should not be disturbed. Sufficient sand shall be placed to stay ahead of the laid pavers. Bedding sand shall not be used to fill depressions in the base surface.

2. The pavers shall be laid in the existing layout pattern.

3. The paver surface shall be swept clean of all debris before compacting, in order to avoid damage from point loads.

4. A low amplitude, high frequency plate compactor shall be used to compact the pavers into the sand.

5. The pavers shall be compacted, and polymeric jointing sand shall be swept into the joints until the joints are full. This will require at least two or three passes with the compactor. Excess sand shall be swept off. Remaining sand or residue shall be blown off prior to activating polymeric sand with water.

END OF SECTION

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SECTION 03302

FIELD CONCRETE

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. This Section covers concrete and all related items necessary to place and finish the concrete work.

B. Concrete thrust, and anchor blocks, to be provided at all water main bends, tees, plugs and wyes and at other locations required by the Engineer shall be installed in accordance with the details shown on the drawings and as specified in this section.

C. Concrete encasement for piping with shallow cover and for encasement of telephone, and electrical duct bank when specified shall be installed in accordance with the details shown on the drawings and as specified in this section.

1.02 RELATED WORK:

A. Section 02300, EARTHWORK

1.03 REFERENCES:

A. The following standards form a part of this specification:

American Concrete Institute (ACI)

ACI 304	Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete.
ACI 305	Recommended Practice for Hot Weather Concreting
ACI 306	Recommended Practice for Cold Weather Concreting
ACI SP-66 ACI	Detailing Manual
ACI 318	Building Code Requirements for Reinforced Concrete

ASTM International (ASTM)

ASTM A615	Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM C33	Concrete Aggregates

ASTM C94 Ready-Mixed Concrete

ASTM C143 Test for Slump of Portland Cement Concrete

ASTM C150 Portland Cement

ASTM C260 Air Entraining Admixtures for Concrete

ASTM C494 Chemical Admixtures for Concrete

1.04 SUBMITTALS: IN ACCORDANCE WITH REQUIREMENTS OF SECTION 01330 SUBMITTALS, SUBMIT THE FOLLOWING:

Statement of materials constituting the design of mixes for each size aggregate as required by ASTM C94 shall be submitted to the Engineer within one week following award of the Contract.

PART 2 - PRODUCTS

2.01 CONCRETE:

A. All concrete, reinforced or non-reinforced shall have a 28 day compressive strength of 3000 psi unless otherwise noted on the design drawings. A minimum of 5.5 sacks of cement per cubic yard and a maximum water cement ratio of 6.9 gallons per sack shall be used.

B. Concrete shall conform to ASTM C94. The Contractor shall be responsible for the design of the concrete mixtures. Slump shall be a maximum of 4-inches and a minimum of 2-inches, determined in accordance with ASTM C143.

C. Admixtures shall be as specified in subsection 2.05. No additional admixtures shall be used unless approved by the Engineer.

D. No additional water, except for the amount indicated by the design mix shall be added to the concrete without the prior permission of the Engineer.

2.02 CEMENT:

The cement shall be an approved brand of American manufactured Portland Cement, Type II conforming to the applicable requirements of ASTM C150.

2.03 AGGREGATES

A. Except as otherwise noted, aggregate shall conform to the requirements of ASTM C33.

B. Maximum size aggregate shall be 3/4-inch.

2.04 ADMIXTURES:

A. All concrete (unless otherwise directed) shall contain an air entraining agent. Air entrained concrete shall have air content by volume of 4 to 8 percent for 3/4-inch aggregate.

B. Air entraining agent shall be in accordance with ASTM C260 and shall be Darex AEA, as manufactured by W.R. Grace & Company; Placewel (air entraining Type), as manufactured by Johns Manville; Sika AER as manufactured by Sika Chemical Company; or an approved equal product.

C. Water reducing agent shall be WRDA, as manufactured by W.R Grace & Company; Placewel (non-air entraining Type), as manufactured by Johns Manville; Sika Plastiment as manufactured by Sika Chemical Company; or an approved equal product.

D. Water reducing agent-retarder shall be "Daratard," as manufactured by W.R. Grace & Company; Sika Plastiment as manufactured by Sika Chemical Company; or an approved equal product.

2.05 WATER:

A. Water for concrete shall be potable, free of deleterious amounts of oil, acid, alkali, organic matter and other deleterious substances.

PART 3 - EXECUTION

3.01 PREPARATION:

A. Before placing concrete, forms and the space to be occupied by the concrete shall be thoroughly cleaned, and reinforcing steel and embedded metal shall be free from dirt, oil, mill scale, loose rust, paint or the material which would tend to reduce the bond.

B. Earth, concrete, masonry, or other water permeable material against which concrete is to be placed shall be thoroughly saturated with water immediately before concrete is placed.

C. No concrete shall be placed until the consolidation of the ground and the arrangement and details of forms and reinforcing have been inspected and approved by the Engineer.

3.02 THRUST AND ANCHOR BLOCKS:

A. Minimum bearing areas for thrust blocks and dimensions of anchor blocks shall be as shown on the drawings.

B. Concrete for thrust and anchor blocks shall be placed against undisturbed earth, and wooden side forms shall be used to provide satisfactory lines and dimensions. Felt roofing paper shall be placed to protect joints. No concrete shall be placed so as to cover joints, bolts or nuts, or to interfere with the removal of the joints.

3.03 FILL CONCRETE:

A. Fill concrete shall be placed in those locations as indicated on the design drawings. Fill concrete shall consist of materials as previously specified, with a minimum 28-day compressive strength of 3000 psi.

B. Before fill concrete is placed, the following procedures shall be used to prepare surfaces; all dirt, scum and laitance shall be removed by chipping and washing. The clean, roughened base surface shall be saturated with water, but shall have no free water on the surface. A coat of 1:2 cement-sand grout, approximately 1/8-inch thick, shall be well scrubbed into the thoroughly dampened concrete base. The concrete fill shall be placed immediately, before grout has dried or set.

C. Fill concrete shall be brought to lines and grades as shown on the design drawings.

3.04 CONCRETE PLACING DURING COLD WEATHER:

A. Concrete shall not be placed on frozen ground, and no frozen material or material containing ice shall be used. Materials for concrete shall be heated when temperature is below 40°F, or is expected to fall to below 40°F, within 73 hours, and the concrete after placing shall be protected by covering, heat, or both.

B. All details of Contractor's handling and protecting of concrete during freezing weather shall be subject to the approval of the Engineer. All procedures shall be in accordance with provisions of ACI 306.

3.05 CONCRETE PLACING DURING HOT WEATHER:

A. Concrete just placed shall be protected from the direct rays of the sun and the forms and reinforcement just prior to placing, shall be sprinkled with cold water. The Contractor shall make every effort to minimize delays, which will result in excessive mixing of the concrete after arrival on the job.

B. During periods of excessively hot weather (90°F or above), ingredients in the concrete shall be cooled insofar as possible and cold mixing water shall be used to maintain the temperature of the concrete at permissible levels all in accordance with the provisions of ACI 305. Any concrete with a temperature above 90°F, when ready for placement, will not be acceptable, and will be rejected.

3.06 FIELD QUALITY CONTROL:

A. Concrete inspection and testing shall be performed by the Engineer or by an inspection laboratory, designated by the Engineer, engaged and paid for by the Owner. Testing equipment shall be supplied by the laboratory, and the preparation of samples and all testing shall be performed by the laboratory personnel. Full assistance and cooperation, concrete for samples, and such auxiliary personnel and equipment as needed shall be provided by the Contractor.

B. At least 4 standard compression test cylinders shall be made and tested and 1 slump test from each day's placement of concrete. A minimum of four compression test cylinders shall be made and tested for each 100 cubic yards of each type and design strength of concrete placed. One cylinder shall be tested at 7 days, and two at 28 days. The fourth cylinder from each set shall be kept until the 28 day test report on the second and third cylinders in the same set has been received. If the average compressive strength of the two 28 day cylinders do not achieve the required level, the Engineer may elect to test the fourth cylinder immediately or test it after 56 days. If job experience indicates additional cylinder tests or other tests are required for proper control or determination of concrete quality, such tests shall be made.

C. The Engineer shall have the right to reject concrete represented by low strength tests. Rejected concrete shall be promptly removed and replaced with concrete conforming to the specification. The decision of the Engineer as to whether substandard concrete is to be accepted or rejected shall be final.

END OF SECTION