

# **RELEASE ABATEMENT MEASURE PLAN**

Proposed Riverwalk Park  
179 Bridge Street  
Lowell, Massachusetts

MassDEP RTN 3-32312

---

***Prepared for:***

City of Lowell  
375 Merrimack Street  
Lowell, Massachusetts 01852

***Prepared by:***

TRC  
Wannalancit Mills  
650 Suffolk Street  
Lowell, Massachusetts 01854

May 2015

## TABLE OF CONTENTS

<b>1.0</b>	<b>INTRODUCTION.....</b>	<b>1-1</b>
<b>2.0</b>	<b>BACKGROUND .....</b>	<b>2-1</b>
2.1	Site Description.....	2-1
2.2	Potential Receptors .....	2-1
<b>3.0</b>	<b>SUMMARY OF SITE ASSESSMENT ACTIVITIES .....</b>	<b>3-1</b>
3.1	Geophysical Investigation.....	3-1
3.2	Soil Boring Advancement.....	3-1
3.3	Soil Sampling.....	3-1
3.4	Subsurface Materials.....	3-2
3.5	Chemical Soil Quality.....	3-2
3.5.1	Volatile Organic Compounds .....	3-2
3.5.2	Semi-Volatile Organic Compounds .....	3-3
3.5.3	Total Petroleum Hydrocarbons .....	3-3
3.5.4	Polychlorinated Biphenyls.....	3-3
3.5.5	Metals.....	3-3
3.5.6	Hazardous Characteristics.....	3-4
<b>4.0</b>	<b>RAM PLAN .....</b>	<b>4-1</b>
4.1	Disposal Site Ownership and Regulatory Status .....	4-1
4.2	Proposed RAM Activities .....	4-1
4.2.1	Site Preparation.....	4-1
4.2.2	Soil Excavation .....	4-2
4.2.3	Soil Management .....	4-2
4.2.4	Groundwater Management.....	4-2
4.2.5	Erosion Control.....	4-2
4.2.6	Environmental Monitoring.....	4-2
4.2.7	Supplemental Sampling .....	4-3
4.2.8	Backfill.....	4-3
4.3	Health and Safety .....	4-3
4.4	Permits and Approvals .....	4-3
4.5	Public Involvement pursuant to 310 CMR 40.1403(3)(d).....	4-3
4.6	Federal, State, and Local Permits .....	4-4
4.7	Reporting.....	4-4
4.8	Schedule.....	4-4
4.9	Certification of Financial Resources.....	4-4
<b>5.0</b>	<b>FEASIBILITY OF ACHIEVING BACKGROUND .....</b>	<b>5-1</b>
<b>6.0</b>	<b>REFERENCES.....</b>	<b>6-1</b>

## **FIGURES**

- Figure 1: Site Location Map
- Figure 2: Vicinity Plan
- Figure 3: MassDEP Phase I Site Assessment Map
- Figure 4: Sample Location Plan

## **TABLE**

- Table 1: Summary of Analytical Results for Soil Samples -- April 2014

## **APPENDICES**

- Appendix A – Park Development Specifications
- Appendix B – Geophysical Report
- Appendix C – Soil Boring Logs
- Appendix D – Laboratory Analytical Reports
- Appendix E – Order of Conditions
- Appendix F – Public Notification Letters

## **1.0 INTRODUCTION**

On behalf of our clients, Carol R. Johnson Associates (CRJA) and the City of Lowell, TRC Environmental Corporation (TRC) prepared this Release Abatement Measure (RAM) Plan to support earthwork to be conducted at the property located at 179 Bridge Street in Lowell, Massachusetts (the “Site”). TRC was retained to prepare a RAM Plan as set forth in Section 310 CMR 40.0444 of the Massachusetts Contingency Plan (MCP). The purpose of the RAM Plan is to provide a regulatory mechanism for the removal, transport, and disposal of regulated soil to facilitate the development of the proposed Riverwalk Park. The RAM activities described herein are required because site assessment activities conducted in April 2014 indicated a past release of oil and hazardous materials to soil, which was reported to the Massachusetts Department of Environmental Protection (MassDEP) by the City on July 11, 2014. MassDEP assigned Release Tracking Number (RTN) 3-32312 to the site. A copy of the park development plans are attached in Appendix A.

## **2.0 BACKGROUND**

### **2.1 Site Description**

The Site consists of one rectangular-shaped 0.16-acre (approximately 6,900 square feet) lot located at 179 Bridge Street in Lowell, Massachusetts. The Site is currently open landscaped areas. Two active drainage penstocks are located beneath the Site that currently discharge to the Merrimack River (the tailrace and waste way). Access to the Site is currently unrestricted and is provided by Bridge Street to the northwest and open parking lot to southwest. The southeasterly flowing Merrimack River is located adjacent to the Site to east. See Figures 1, 2 and 3 for a site location map, vicinity plan, and MassDEP site assessment map, respectively.

Based on a review of historical sources, in 1892 through at least 1907 the Site was part of a large cotton mill complex (Massachusetts Cotton Mills), and was occupied by multiple former industrial buildings, including a boiler house which was used to store large amounts of coal and fuel oil. By 1950, the Site was redeveloped with a small commercial building through at least 1957. In 1963, Massachusetts Electric Company (National Grid) purchased the property from Boott Mills Corporation to facilitate the construction of a hydroelectric power substation which likely housed multiple generators and oil-containing electrical transformers. A water turbine was located in the penstock immediately upstream of the Site and multiple water wheel and turbines were located in the buildings adjacent to the Site to the east and in the buildings across Bridge Street to the west. The substation was removed from the Site in 2013. (TRC, 2014)

### **2.2 Potential Receptors**

Based on Site reconnaissance, no wetlands are on the Site. According to data maintained on the Massachusetts Geographic Information System website (<http://www.mass.gov/mgis/>), there are no public drinking water supplies [i.e., Zone II, Interim Well Head Protection Areas (IWPAs) or Potentially Productive Aquifers (PPAs)] located within ½ mile radius of the Site. No ground water aquifers are identified within ½ mile of the Site and no Protected Open Space or Areas of Critical Environmental Concern are present within 500 feet of the Site. Additionally, there are no wetlands adjacent to the Site. The Site is located in a FEMA 100-year floodplain and within 500 feet of a Natural Heritage Estimated Rare Wetland Wildlife Habitat of the Merrimack River (MassDEP, 2015).

The City of Lowell's drinking water source is obtained from combined surface water and groundwater extraction points located approximately 0.5 to 1 mile north and west of the Site beyond the Merrimack River. According to the City of Lowell Board of Health, there are no private drinking water wells within 500 feet of the Site. Therefore, the MCP Method 1 GW-1 cleanup standards are not applicable. The GW-3 standard is applicable to all groundwater in Massachusetts.

The Site is primarily unpaved. Access to soils at the Site is currently limited because the Site is not occupied and contamination is located greater than 3 feet deep. MCP Method S-1 soil standards are appropriate to conservatively evaluate unrestricted future use of the Site.

Therefore, Site soil data are compared against MCP Method 1 S-1/GW-2 and S-1/GW-3 cleanup criteria.

## **3.0 SUMMARY OF SITE ASSESSMENT ACTIVITIES**

### **3.1 Geophysical Investigation**

Hager GeoScience, Inc. (HGI) performed a geophysical investigation of the Site on April 3, 2014. The purpose of the investigation was to locate potential subsurface utilities that would interfere with drilling work and to estimate the depth of the tailrace and waste way structures. HGI conducted a multi-method geophysical investigation using ground penetrating radar (GPR) methods as well as Precision Utility Locator (PUL) technology. The Site was mapped on a grid pattern with five foot spacing intervals and a several passes were made with different GPR antennae.

The geophysical investigation report, which includes a map summarizing the evaluation of the geophysical data, is attached as Appendix B. The 400-MHz antennae was able to scan to depths of 5 to 7 feet and the 200-MHz reached to depths of 10 to 15 feet below grade. An additional scan was made using a 100-MHz antennae which reached an effective depth of 25 to 30 feet below grade which successfully located the tailrace and waste way structures. The path of the waste way structure was found to curve back toward Bridge Street which is consistent with historical documents.

### **3.2 Soil Boring Advancement**

Between April 21 and April 23, 2014, TRC supervised the advancement of seven soil borings to completion (SB-1 through SB-7). Figure 4 shows the boring locations. Two of these soil borings, SB-1 and SB-2, required eight drilling attempts in total before reaching the target depth (natural soil). Auger refusal was encountered several times at each of these borings due to the presence of concrete in the subsurface. SB-1 through SB-3 were advanced using a CME 75 drill rig using Hollow Stem Augers and collecting split spoons with an autohammer for environmental testing and evaluation of geotechnical properties. Soil borings SB-4 through SB-7 were advanced using a truck mounted vacuum rig to refusal (10 feet) in order to identify the top of the tail race structure. No environmental or geotechnical testing of soil was conducted at SB-4 through SB-7. No groundwater monitoring wells were installed as part of this scope of work.

### **3.3 Soil Sampling**

Visual/olfactory observations and photoionization detector (PID) field screening results were used to select four discrete soil samples from borings SB-1 through SB-3 for volatile organic compound (VOC) analysis. Composite soil samples were also collected from borings SB-2 and SB-3 from the surface to approximately 14-feet below grade for landfill reuse/disposal criteria analysis as outlined in Massachusetts Department of Environmental Protection (MassDEP) Policy # COMM-97-001: *Reuse & Disposal of Contaminated Soil at Massachusetts Landfills*, and for hazardous waste characteristics. At SB-1 two composite soil samples were collected; one from 0-3 feet and a second from 3-14 feet below grade. The soil samples described above were submitted to Alpha Analytical of Westborough, Massachusetts and analyzed for the

following parameters:

- VOCs via Method 8260B;
- Semi-volatile Organic Compounds (SVOCs) via Method 8270D;
- Total Petroleum Hydrocarbons (TPH) via Method 8015C;
- Polychlorinated Biphenyls (PCBs) via Method 8082A;
- Resource Conservation and Recovery Act (RCRA) 8 Metals via Methods 6010B and 7471B;
- Conductivity;
- Reactive Sulfide & Reactive Cyanide;
- Ignitability; and,
- Corrosivity (pH).

Additionally, one soil sample was collected from SB-3 (14'-18') and analyzed for RCRA 8 metals because anthropogenic fill was present in the sample. The objective for this analysis was to evaluate the material which will be present at or near grade when the park has been constructed. Please note that because of its chemical characteristics, naphthalene is an analyte in both the VOC and SVOC analysis.

### **3.4 Subsurface Materials**

Soil boring logs are attached as Appendix C. The majority of the soil encountered up to 14 feet below grade is a brown, fine to medium sand with some to little silt, gravel, cobbles and trace boulders. As mentioned previously, concrete was encountered at several locations and caused auger refusal and subsequent reattempts. Sections of concrete material greater than a foot in thickness were encountered and were most commonly located in a zone between 10 and 15 feet below grade. Anthropogenic fill materials were encountered below 14 feet below grade in SB-3 including ash, cinders and slag to a depth of approximately 29 feet below grade. A rock core barrel was advanced between 30 and 35 feet below grade; however, only one seven inch section of schist was able to be recovered. A clay-rich silt is present under the block and likely extends to the interpreted bedrock surface at 68 feet below grade.

### **3.5 Chemical Soil Quality**

Four soil samples were collected to pre-characterize soil for off-Site disposal and evaluate MCP compliance. The attached Table 1 compares the analytical results to MCP standards and to disposal facility acceptance criteria, respectively. Because the Site will be for recreational open space, the applicable MCP criteria to determine if the results trigger a reportable condition under the MCP and if cleanup is necessary are the Reportable Concentration for Soil Category 1 (RCS-1) and the Method 1 S-1 standards, respectively. Laboratory analytical reports are attached as Appendix D.

#### **3.5.1 Volatile Organic Compounds**

Naphthalene was the only VOC detected above the RCS-1 standards. Naphthalene was detected in sample SB-3 (0-14') at 33 milligrams per kilogram (mg/kg), which exceeds the RCS-1

standard of 4 mg/kg and the MCP Method 1 S-1 standard of 20 mg/kg. Naphthalene was also detected in SB-1 (3'-14') and SB-2 (0-14') but at concentrations below the RCS-1 standard.

### **3.5.2 Semi-Volatile Organic Compounds**

Several SVOCs exceeded the RCS-1 standard in one or more soil samples, including:

- Acenaphthene
- Naphthalene
- Benzo(a)anthracene
- Benzo(a)pyrene
- Benzo(b)fluoranthene
- Acenaphthylene
- Phenanthrene
- Dibenzo(a,h)anthracene
- Indeno(1,2,3-cd)Pyrene
- 2-Methylnaphthalene

In addition to exceeding the RCS-1 standard, the following compounds exceeded the MCP Method 1 soil cleanup standards:

- Benzo(a)anthracene
- Benzo(a)pyrene
- Benzo(b)fluoranthene
- Dibenzo(a,h)anthracene
- Indeno(1,2,3-cd)Pyrene

### **3.5.3 Total Petroleum Hydrocarbons**

The TPH analytical results from soil samples SB-2 and SB-3 exceed the RCS-1 standard of 1,000 mg/kg.

### **3.5.4 Polychlorinated Biphenyls**

No PCBs were detected above laboratory method detection limits. Off-site disposal of soil will not be subject to the Toxic Substances Control Act regulations that regulate PCBs.

### **3.5.5 Metals**

No RCRA 8 metals were detected above the RCS-1 standard in any of the April 2014 samples. One sample [SB-3 (0-14')] contained lead at 150 mg/kg. The composite soil sample SB-3 (0-14') was also analyzed for leachable lead by the Toxicity Characteristic Leaching Procedure (TCLP) method (6010C) because the total lead results was greater than the "20X TCLP" limit of 100 mg/kg. Leachable lead results for this soil sample were less than the TCLP limit of 5 milligrams per liter. Therefore, this soil not classified as characteristic hazardous waste due to

the presence of lead. RCRA 8 metals will not restrict the acceptance of soil at a soil reuse and/or treatment facility.

### **3.5.6 *Hazardous Characteristics***

The soil samples were also tested for characteristics which would categorize the soil as “Characteristic Hazardous Waste” including pH, Ignitability, reactive sulfide and reactive cyanide. The results indicate the material is not a characteristic hazardous waste.

## **4.0 RAM PLAN**

### **4.1 Disposal Site Ownership and Regulatory Status**

The party assuming responsibility for undertaking this RAM is the City of Lowell, represented by:

Mr. Craig Thomas  
City of Lowell  
375 Merrimack Street  
Lowell, Massachusetts 01852  
(978) 674-1445

The Licensed Site Professional (LSP) overseeing this RAM is:

Mr. Matthew E. Robbins, PG  
LSP License Number: 9495  
TRC Environmental Corporation  
650 Suffolk Street  
Lowell, Massachusetts 01854  
(978) 656-3549

One release tracking number (RTN) is associated with the Site. Based on the results of the April 2014 site investigation, RTN 3-32312 was assigned by MassDEP to the City of Lowell on July 11, 2014.

### **4.2 Proposed RAM Activities**

The objectives of the proposed RAM are to remove up to 2,000 tons of SVOC and TPH-impacted soil to achieve the proposed grades for the park. The work will be conducted in two phases with approximately 300 tons of soil being removed in late May/early June 2015 and the remainder being removed during the development of the parcel into a park. Following the completion of soil export work loam and hardscape will be installed as part of development activities. A copy of the park development specifications is attached as Appendix A.

#### ***4.2.1 Site Preparation***

Prior to any ground intrusive activities, erosion controls will be installed. Clearing of above-ground vegetation and grubbing will be required to remove unsuitable top soils, stumps, roots, and debris. Prior to off-Site transport, all non-soil materials in contact with Site soils (i.e., stumps, debris, etc.) shall be decontaminated by removing adhered soils using hand tools. Soils may be dislodged within the stockpile/impacted materials staging area(s) or within the excavation by physical means such as a high-pressure air knife, a stiff-bristled broom, or a similar method. Soils shall not be dislodged by means that would generate remedial wastewater.

#### **4.2.2 Soil Excavation**

Excavation will be conducted using conventional excavation equipment such as an excavator or backhoe. TRC personnel will be present during Site activities to oversee the excavation, stockpiling and off-Site transport of soil. During excavation, soils will be visually examined and screened using a PID to segregate highly contaminated soils from less contaminated or uncontaminated soils. Soils that are excavated from each area described above will be segregated and stockpiled separately from one another in order to maximize off-Site soil disposal options. No shoring should be needed as part of the earthwork. A rock and concrete wall separating the site and the Merrimack River will be removed as part of park development

#### **4.2.3 Soil Management**

Excavated soil will either be stockpiled pending characterization or directly loaded onto trucks for transportation to the disposal/recycling facility. Stockpiled soil, if any, will be placed on 6-mil polyethylene plastic sheeting and sampled for characterization parameters for off-site disposal or recycling. The soil stockpile will be covered with 6-mil polyethylene sheeting that will be held in place using sandbags or similar weighted materials. Following characterization, the soil will be transported off Site for disposal under a MassDEP Bill of Lading (BOL) or uniform Hazardous Waste Manifest, as applicable. Stockpiled soil will be removed from the Site within 120 days of stockpiling, as required by the MCP. Based on available soil analytical data, it is expected that the majority of the petroleum contaminated soil will be transported to either an asphalt recycling or thermal desorption facility for treatment.

#### **4.2.4 Groundwater Management**

No groundwater is expected to be encountered during the development of the park.

#### **4.2.5 Erosion Control**

Erosion and sedimentation are not expected to be a concern given the small area of soil disturbance and the urban environment of the Site. Erosion will be controlled by covering stockpiled soil with plastic sheeting as described above. Sedimentation impacts will be mitigated by placing hay bales around catch basins and/or installing geotextile fabric over catch basins. Since the footprint of the site is less than one acre, a Stormwater Pollution Prevention Plan is not required.

The work is being conducted under an Order of Conditions from the City of Lowell Conservation Commission. This document is attached as Appendix E. The catch basins on the nearby Massachusetts Mills will be protected from siltation via installation of silt sacks or geotextile fabric.

#### **4.2.6 Environmental Monitoring**

TRC will be on Site during RAM activities to direct the excavation, segregation, and stockpiling of soil, and to perform soil screening and environmental monitoring of the breathing zone for

VOCs using a PID. Air monitoring will be performed using hand-held monitoring equipment to ensure that the remedial activities are not resulting in odor and/or nuisance dust conditions for surrounding populations. If nuisance and/or dust conditions are found to exist, corrective actions will be implemented, which may include one or more of the following actions:

- Temporarily discontinuing or slowing work;
- Implementing dust suppression (i.e., wetting soils); and
- Covering soil stockpiles.

#### ***4.2.7 Supplemental Sampling***

TRC will collect additional soil samples from the side walls of the excavation during the May 2015 soil removal. The samples will be analyzed to facilitate off-site disposal of additional soil during the second phase of the project. Excavation end point samples will be collected during the second phase of the project in order to facilitate a risk assessment to support closure of the RTN.

#### ***4.2.8 Backfill***

During the May 2015 fieldwork the trench will be backfilled by pushing in the sidewalls and sloping the adjacent grade for safety. During park construction imported loam will be placed over the final subgrade to support growth of grass. A simple geotextile fabric will be installed between the native soil and the imported loam and/or hardscape. No other imported backfill is anticipated to be required.

### **4.3 Health and Safety**

TRC has prepared a site-specific Health and Safety Plan (HASP) addressing remedial response actions at the Site. The HASP will be onsite during all field work with the exception of Site visits and utility clearance mark outs.

### **4.4 Permits and Approvals**

Bills of Lading, Material Shipping Records and/or Waste Manifests will be required, as appropriate, for the off-Site disposal of excavated materials generated during the RAM. TRC will generate Bills of Lading and/or Material Shipping Records for the off-Site transport disposal of excavated soil as appropriate. TRC will also secure approval from MassDEP Bureau of Waste Site Cleanup to implement this RAM pursuant to 310 CMR 40.0443 of the MCP. TRC will also provide notification to Dig-Safe at a minimum of three days prior to commencement of ground intrusive activities.

### **4.5 Public Involvement pursuant to 310 CMR 40.1403(3)(d)**

The City Manager and the Board of Health for the City of Lowell will be notified in writing of the proposed RAM activities prior to the implementation Site work. Copies of these notices are provided in Appendix F.

## **4.6 Federal, State, and Local Permits**

### ***Federal Permits***

Since the total footprint of disturbance to the Site during RAM-related activities is less than one acre, coverage under the Construction General Permit and preparation of a Storm Water Pollution Prevention Plan is not required by the EPA.

### ***State Permits***

There are no known State permit requirements for RAM activities.

### ***Local Permits***

The work will be conducted under the Order of Conditions issued by the City of Lowell Conservation Commission.

## **4.7 Reporting**

The first RAM Status Report will be submitted within 120 days following receipt of this report by the MassDEP pursuant to 40.0445(1). The schedule for park construction is not known at this time so RAM Status reports will be submitted every six months following Status Report #1. A RAM Completion Report will be submitted within sixty (60) days following the completion of the proposed remedial action in accordance with 310 CMR 40.0446. The RAM Completion Report will include a description of soil removal activities, a summary of environmental monitoring and the analytical results of soil sampling.

## **4.8 Schedule**

Excavation activities are tentatively anticipated to commence in late May and/or early June 2015. The park development is anticipated to be completed by the end of 2015. TRC will submit a RAM Completion Report to the MassDEP within 60 days of completion of remedial objectives pursuant to 310 CMR 40.0446.

## **4.9 Certification of Financial Resources**

Based on the estimates included in this RAM Plan, the total volume of soil to be excavated and transported for off-Site disposal is approximately 2,000 tons. The City of Lowell attests to the availability of sufficient financial resources for management of these soils.

## **5.0 FEASIBILITY OF ACHIEVING BACKGROUND**

The MCP requires that at Sites where cleanup up to level of No Significant Risk has been performed, an evaluation of the feasibility to achieve or approach background conditions be performed.

The objective of the RAM is remove soil to facilitate the development of the parcel into a park. Some SVOC-impacted soil will remain under the landscape and hardscape of the park; however, excavation and replacement of additional soil will require additional sidewall shoring design and implementation, excavation close to the sidewalks on Bridge Street, and additional soil transport and disposal costs which would not affect the end use of the parcel.

According to MassDEP Policy #WSC-04-160 Conducting Feasibility Evaluations Under the MCP, regarding petroleum compounds, “It is DEP’s position that achieving or approaching background can be deemed infeasible for degradable/non-persistent contaminants regardless of media classification, except for small quantities of petroleum contaminated soil considered accessible for remediation as described in Section 9.3.1 [not applicable to the Site]. The benefits of additional remedial action to achieve or approach background for degradable/non-persistent contaminant would be considered insufficient to justify the cost of those actions”

The remedial approach identified herein represents the most appropriate and cost effective alternative, based on TRC’s analysis. The scope of work outlined in this RAM Plan is intended to facilitate the filing of a Permanent Solution for the Site within the budgetary restrictions of the City of Lowell’s Park Development Program.

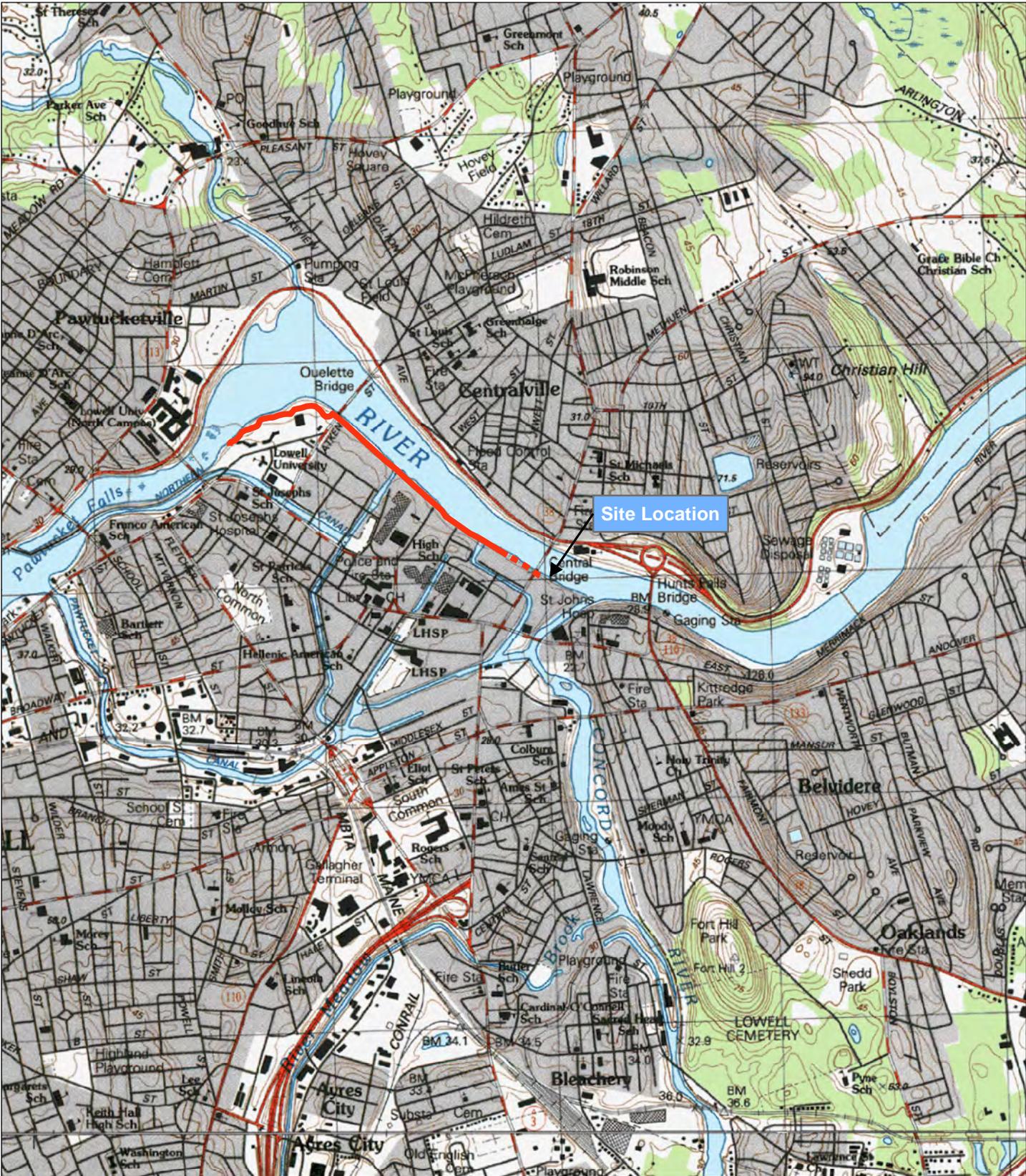
## **6.0 REFERENCES**

MassDEP, 2014. Massachusetts Contingency Plan, 310 CMR 40.0000. Effective April 25, 2014.

TRC, 2012. Phase I Environmental Site Assessment Report, Proposed Riverwalk Property, 179 Bridge Street, Lowell, Massachusetts. October 2012.

MassDEP, 2015. MassDEP Phase I Site Assessment Map  
(<http://maps.massgis.state.ma.us/images/dep/mcp/mcp.htm>)

# **FIGURES**



Billerica and Lowell 7.5-Minute  
USGS Topographic Quadrangles.

- Riverwalk Phase I (completed in 1999)
- - - - Riverwalk Phase II (to be constructed)



MASSACHUSETTS



QUADRANGLE  
LOCATION

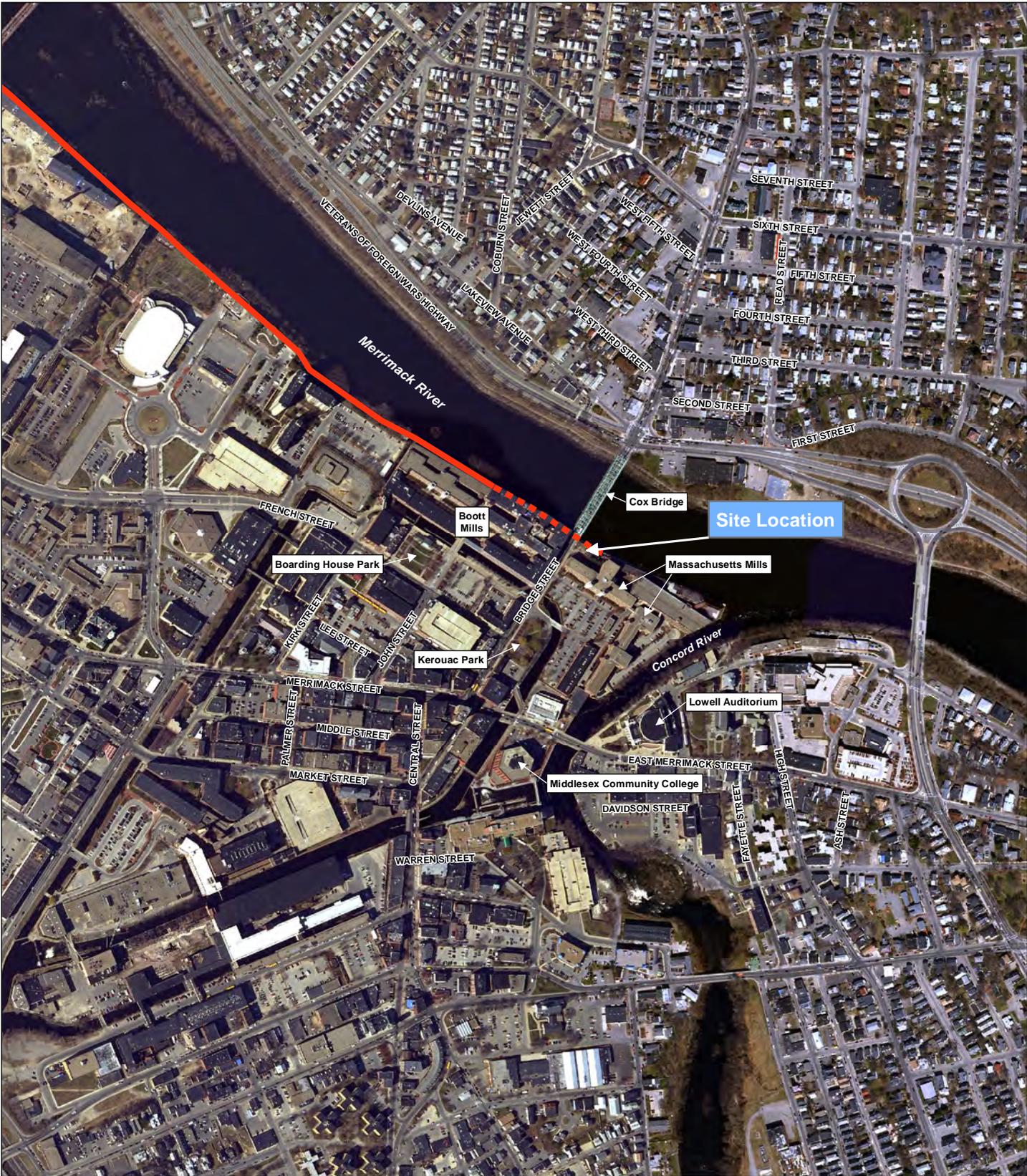


Wannalancit Mills  
650 Suffolk Street  
Lowell, MA 01854  
978-970-5600

**SITE LOCATION MAP (USGS)  
LOWELL RIVERWALK PHASE II**

FIGURE 1

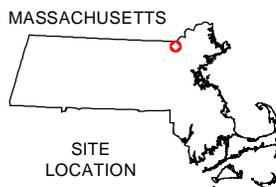
MAY 2008



Orthophotography: MassGIS, 2005

- Riverwalk Phase I (completed in 1999)
- - - Riverwalk Phase II (to be constructed)

0 500  
 Feet



Wannalancit Mills  
 650 Suffolk Street  
 Lowell, MA 01854  
 978-970-5600

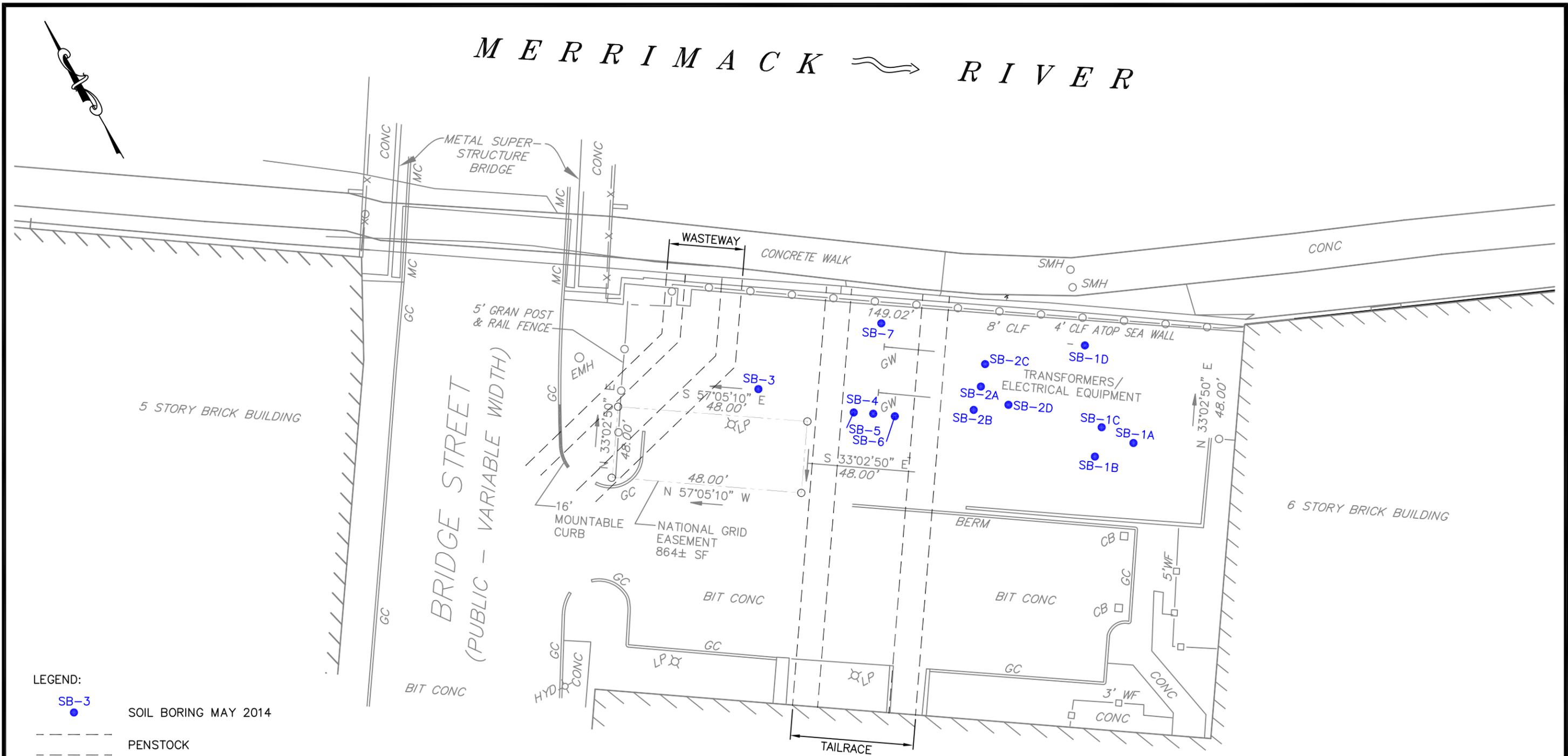
**AERIAL PHOTOGRAPH  
 LOWELL RIVERWALK PHASE II**

FIGURE 2

MAY 2008



# MERRIMACK RIVER



LEGEND:  
 ● SB-3 SOIL BORING MAY 2014  
 - - - - - PENSTOCK

NOTE:  
 DRAWING BASED ON "EASEMENT PLAN IN LOWELL, MA"  
 BY PRECISION LAND SURVEYING, INC. OF SOUTHBOROUGH,  
 MASSACHUSETTS, DATED JUNE 10, 2010.



CITY OF LOWELL RIVERWALK PHASE II LOWELL, MASSACHUSETTS	
SAMPLE LOCATION PLAN	
Wannalancit Mills 650 Suffolk Street Lowell, MA 01854 (978) 970-5600	FIGURE 4
DRAWN BY: HWB CHECKED BY: AHF	DATE: MAY 2015

FILE: T:\E-CAD\183757\_Lowell\_Riverwalk\Lowell\_Riverwalk\_Samples\_2014\_05\_02.dwg

# **TABLES**

**Table 1**  
**Summary of Analytical Results for Soil Samples -- April 2014**  
**179 Bridge Street**  
**Lowell, Massachusetts**

Analysis	Analyte	Sample ID:			SB-1		SB-2	SB-3	
		Sample Depth (ft.):*			0-3/3	3-14.5/10	0-14/12	0-14/7	14-18
		Sample Date:			4/21/2014	4/21/2014	4/21/2014	4/22/2014	4/23/2014
		S-1/GW-2	S-1/GW-3	RCS-1					
<b>VOCs</b>									
(mg/kg)	Methylene chloride	4	400	0.1	0.0062 U	0.88 U	0.90 U	2.1 U	NA
	1,1-Dichloroethane	9	500	0.4	0.00094 U	0.13 U	0.13 U	0.31 U	NA
	Chloroform	0.2	500	0.2	0.00094 U	0.13 U	0.13 U	0.31 U	NA
	Carbon tetrachloride	5	30	5	0.00062 U	0.088 U	0.090 U	0.21 U	NA
	1,2-Dichloropropane	0.1	30	0.1	0.0022 U	0.31 U	0.31 U	0.73 U	NA
	Dibromochloromethane	0.03	20	0.005	0.00062 U	0.088 U	0.090 U	0.21 U	NA
	1,1,2-Trichloroethane	2	40	0.1	0.00094 U	0.13 U	0.13 U	0.31 U	NA
	Tetrachloroethene	10	30	1	0.00062 U	0.088 U	0.090 U	0.21 U	NA
	Chlorobenzene	3	100	1	0.00062 U	0.088 U	0.090 U	0.21 U	NA
	Trichlorofluoromethane	NS	NS	1000	0.0025 U	0.35 U	0.36 U	0.84 U	NA
	1,2-Dichloroethane	0.1	20	0.1	0.00062 U	0.088 U	0.090 U	0.21 U	NA
	1,1,1-Trichloroethane	500	500	30	0.00062 U	0.088 U	0.090 U	0.21 U	NA
	Bromodichloromethane	0.1	30	0.1	0.00062 U	0.088 U	0.090 U	0.21 U	NA
	trans-1,3-Dichloropropene	0.4 <sup>(2)</sup>	20 <sup>(2)</sup>	0.01 <sup>(2)</sup>	0.00062 U	0.088 U	0.090 U	0.21 U	NA
	cis-1,3-Dichloropropene	0.4 <sup>(2)</sup>	20 <sup>(2)</sup>	0.01 <sup>(2)</sup>	0.00062 U	0.088 U	0.090 U	0.21 U	NA
	1,1-Dichloropropene	NS	NS	NS	0.0025 U	0.35 U	0.36 U	0.84 U	NA
	Bromoform	1	300	0.1	0.0025 U	0.35 U	0.36 U	0.84 U	NA
	1,1,2,2-Tetrachloroethane	0.02	10	0.005	0.00062 U	0.088 U	0.090 U	0.21 U	NA
	Benzene	40	40	2	0.00062 U	<b>0.20</b>	0.090 U	0.21 U	NA
	Toluene	500	500	30	0.00094 U	0.13 U	0.13 U	0.31 U	NA
	Ethylbenzene	500	500	40	0.00062 U	0.088 U	0.090 U	0.21 U	NA
	Chloromethane	NS	NS	100	0.0025 U	0.35 U	0.36 U	0.84 U	NA
	Bromomethane	0.5	30	0.5	0.0012 U	0.18 U	0.18 U	0.42 U	NA
	Vinyl chloride	0.7	1	0.7	0.0012 U	0.18 U	0.18 U	0.42 U	NA
	Chloroethane	NS	NS	100	0.0012 U	0.18 U	0.18 U	0.42 U	NA
	1,1-Dichloroethene	40	500	3	0.00062 U	0.088 U	0.090 U	0.21 U	NA
	trans-1,2-Dichloroethene	1	500	1	0.00094 U	0.13 U	0.13 U	0.31 U	NA
	Trichloroethene	0.3	30	0.3	0.00062 U	0.088 U	0.090 U	0.21 U	NA
	1,2-Dichlorobenzene	100	300	9	0.0025 U	0.35 U	0.36 U	0.84 U	NA
	1,3-Dichlorobenzene	100	100	3	0.0025 U	0.35 U	0.36 U	0.84 U	NA
	1,4-Dichlorobenzene	1	80	0.7	0.0025 U	0.35 U	0.36 U	0.84 U	NA
	Methyl tert butyl ether	100	100	0.1	0.0012 U	0.18 U	0.18 U	0.42 U	NA
	p/m-Xylene	100	500	100	0.0012 U	0.18 U	0.18 U	0.42 U	NA
	o-Xylene	100	500	100	0.0012 U	0.18 U	0.18 U	0.42 U	NA
	cis-1,2-Dichloroethene	0.1	100	0.1	0.00062 U	0.088 U	0.090 U	0.21 U	NA
	Dibromomethane	NS	NS	500	0.0025 U	0.35 U	0.36 U	0.84 U	NA
	1,2,3-Trichloropropane	NS	NS	100	0.0025 U	0.35 U	0.36 U	0.84 U	NA
	Styrene	4	70	3	0.0012 U	0.18 U	0.18 U	0.42 U	NA
	Dichlorodifluoromethane	NS	NS	1000	0.0062 U	0.88 U	0.90 U	2.1 U	NA
	Acetone	50	400	6	0.022 U	3.2 U	3.2 U	7.5 U	NA
	Carbon disulfide	NS	NS	100	0.0025 U	0.35 U	0.36 U	0.84 U	NA
	Methyl ethyl ketone	50	400	4	0.0062 U	0.88 U	0.90 U	2.1 U	NA
	Methyl isobutyl ketone	50	400	0.4	0.0062 U	0.88 U	0.90 U	2.1 U	NA
	2-Hexanone	NS	NS	100	0.0062 U	0.88 U	0.90 U	2.1 U	NA
	Bromochloromethane	NS	NS	NS	0.0025 U	0.35 U	0.36 U	0.84 U	NA
	Tetrahydrofuran	NS	NS	500	0.0025 U	0.35 U	0.36 U	0.84 U	NA
	2,2-Dichloropropane	NS	NS	NS	0.0031 U	0.44 U	0.45 U	1.0 U	NA
	1,2-Dibromoethane	0.1	1	0.1	0.0025 U	0.35 U	0.36 U	0.84 U	NA
	1,3-Dichloropropane	NS	NS	500	0.0025 U	0.35 U	0.36 U	0.84 U	NA
	1,1,1,2-Tetrachloroethane	0.1	80	0.1	0.00062 U	0.088 U	0.090 U	0.21 U	NA
	Bromobenzene	NS	NS	100	0.0031 U	0.44 U	0.45 U	1.0 U	NA
	n-Butylbenzene	100 <sup>(1)</sup>	100 <sup>(1)</sup>	100 <sup>(1)</sup>	0.00062 U	0.088 U	0.090 U	0.21 U	NA
	sec-Butylbenzene	100 <sup>(1)</sup>	100 <sup>(1)</sup>	100 <sup>(1)</sup>	0.00062 U	0.088 U	0.090 U	0.21 U	NA
	tert-Butylbenzene	100 <sup>(1)</sup>	100 <sup>(1)</sup>	100 <sup>(1)</sup>	0.0025 U	0.35 U	0.36 U	0.84 U	NA
	o-Chlorotoluene	NS	NS	100	0.0025 U	0.35 U	0.36 U	0.84 U	NA
	p-Chlorotoluene	NS	NS	NS	0.0025 U	0.35 U	0.36 U	0.84 U	NA
	1,2-Dibromo-3-chloropropane	NS	NS	10	0.0025 U	0.35 U	0.36 U	0.84 U	NA
	Hexachlorobutadiene	30	30	30	0.0025 U	0.35 U	0.36 U	0.84 U	NA
	Isopropylbenzene	100 <sup>(1)</sup>	100 <sup>(1)</sup>	100 <sup>(1)</sup>	0.00062 U	0.088 U	0.090 U	0.21 U	NA

**Table 1**  
**Summary of Analytical Results for Soil Samples -- April 2014**  
**179 Bridge Street**  
**Lowell, Massachusetts**

Analysis	Analyte	Sample ID:			SB-1		SB-2	SB-3	
		Sample Depth (ft.):*			0-3/3	3-14.5/10	0-14/12	0-14/7	14-18
		Sample Date:			4/21/2014	4/21/2014	4/21/2014	4/22/2014	4/23/2014
		S-1/GW-2	S-1/GW-3	RCS-1					
	p-Isopropyltoluene	100 <sup>(1)</sup>	100 <sup>(1)</sup>	100 <sup>(1)</sup>	0.00062 U	0.088 U	0.090 U	0.21 U	NA
	Naphthalene	20	500	4	0.0025 U	<b>1.6</b>	<b>1.3</b>	<b>33</b>	NA
	n-Propylbenzene	100 <sup>(1)</sup>	100 <sup>(1)</sup>	100 <sup>(1)</sup>	0.00062 U	0.088 U	0.090 U	0.21 U	NA
	1,2,3-Trichlorobenzene	NS	NS	NS	0.0025 U	0.35 U	0.36 U	0.84 U	NA
	1,2,4-Trichlorobenzene	6	700	2	0.0025 U	0.35 U	0.36 U	0.84 U	NA
	1,3,5-Trimethylbenzene	100 <sup>(1)</sup>	100 <sup>(1)</sup>	100 <sup>(1)</sup>	0.0025 U	0.35 U	0.36 U	0.84 U	NA
	1,2,4-Trimethylbenzene	100 <sup>(1)</sup>	100 <sup>(1)</sup>	100 <sup>(1)</sup>	0.0025 U	0.35 U	0.36 U	0.84 U	NA
	Diethyl ether	NS	NS	100	0.0031 U	0.44 U	0.45 U	1.0 U	NA
	Diisopropyl Ether	NS	NS	100	0.0025 U	0.35 U	0.36 U	0.84 U	NA
	Ethyl-Tert-Butyl-Ether	NS	NS	NS	0.0025 U	0.35 U	0.36 U	0.84 U	NA
	Tertiary-Amyl Methyl Ether	NS	NS	NS	0.0025 U	0.35 U	0.36 U	0.84 U	NA
	1,4-Dioxane	6	20	0.2	0.025 U	8.8 U	9.0 U	21 U	NA
<b>SVOCs</b>									
(mg/kg)	Acenaphthene	1000	1000	4	0.14 U	<b>0.90</b>	<b>4.4</b>	<b>2.4</b>	NA
	1,2,4-Trichlorobenzene	6	700	2	0.18 U	0.18 U	5.2 U	0.37 U	NA
	Hexachlorobenzene	0.7	0.7	0.7	0.1 U	0.11 U	3.1 U	0.22 U	NA
	Bis(2-chloroethyl)ether	0.7	2	0.7	0.16 U	0.16 U	4.7 U	0.33 U	NA
	2-Chloronaphthalene	NS	NS	1000	0.18 U	0.18 U	5.2 U	0.37 U	NA
	1,2-Dichlorobenzene	100	300	9	0.18 U	0.18 U	5.2 U	0.37 U	NA
	1,3-Dichlorobenzene	100	100	3	0.18 U	0.18 U	5.2 U	0.37 U	NA
	1,4-Dichlorobenzene	1	80	0.7	0.18 U	0.18 U	5.2 U	0.37 U	NA
	3,3'-Dichlorobenzidine	3	3	3	0.18 U	0.18 U	5.2 U	0.37 U	NA
	2,4-Dinitrotoluene	2	2	0.7	0.18 U	0.18 U	5.2 U	0.37 U	NA
	2,6-Dinitrotoluene	NS	NS	100	0.18 U	0.18 U	5.2 U	0.37 U	NA
	Azobenzene	NS	NS	50	0.18 U	0.18 U	5.2 U	0.37 U	NA
	Fluoranthene	1000	1000	1000	<b>0.16</b>	<b>42</b>	<b>86</b>	<b>43</b>	NA
	4-Bromophenyl phenyl ether	NS	NS	100	0.18 U	0.18 U	5.2 U	0.37 U	NA
	Bis(2-chloroisopropyl)ether	NS	NS	0.7	0.21 U	0.22 U	6.3 U	0.44 U	NA
	Bis(2-chloroethoxy)methane	NS	NS	500	0.19 U	0.19 U	5.6 U	0.40 U	NA
	Hexachlorobutadiene	30	30	30	0.18 U	0.18 U	5.2 U	0.37 U	NA
	Hexachloroethane	3	50	0.7	0.14 U	0.14 U	4.2 U	0.29 U	NA
	Isophorone	NS	NS	100	0.16 U	0.16 U	4.7 U	0.33 U	NA
	Naphthalene	20	500	4	0.18 U	<b>1.8</b>	5.2 U	<b>7.7</b>	NA
	Nitrobenzene	NS	NS	500	0.16 U	0.16 U	4.7 U	0.33 U	NA
	Bis(2-Ethylhexyl)phthalate	90	90	90	0.18 U	0.18 U	5.2 U	0.37 U	NA
	Butyl benzyl phthalate	NS	NS	100	0.18 U	0.18 U	5.2 U	0.37 U	NA
	Di-n-butylphthalate	NS	NS	50	0.18 U	0.18 U	5.2 U	0.37 U	NA
	Di-n-octylphthalate	NS	NS	1000	0.18 U	0.18 U	5.2 U	0.37 U	NA
	Diethyl phthalate	200	300	10	0.18 U	0.18 U	5.2 U	0.37 U	NA
	Dimethyl phthalate	50	600	0.7	0.18 U	0.18 U	5.2 U	0.37 U	NA
	Benzo(a)anthracene	7	7	7	0.1 U	<b>13</b>	<b>33</b>	<b>19</b>	NA
	Benzo(a)pyrene	2	2	2	0.14 U	<b>12</b>	<b>29</b>	<b>16</b>	NA
	Benzo(b)fluoranthene	7	7	7	0.1 U	<b>12</b>	<b>35</b>	<b>20</b>	NA
	Benzo(k)fluoranthene	70	70	70	0.1 U	<b>5.3</b>	<b>14</b>	<b>6.8</b>	NA
	Chrysene	70	70	70	0.1 U	<b>11</b>	<b>32</b>	<b>18</b>	NA
	Acenaphthylene	600	10	1	0.14 U	<b>6.7</b>	<b>6</b>	<b>7.2</b>	NA
	Anthracene	1000	1000	1000	0.1 U	<b>7.2</b>	<b>17</b>	<b>13</b>	NA
	Benzo(ghi)perylene	1000	1000	1000	0.14 U	<b>8.4</b>	<b>16</b>	<b>9.2</b>	NA
	Fluorene	1000	1000	1000	0.18 U	<b>4.1</b>	<b>6</b>	<b>6.0</b>	NA
	Phenanthrene	500	500	10	<b>0.1</b>	<b>37</b>	<b>72</b>	<b>42</b>	NA
	Dibenzo(a,h)anthracene	0.7	0.7	0.7	0.1 U	<b>2</b>	<b>3.8</b>	<b>2.5</b>	NA
	Indeno(1,2,3-cd)Pyrene	7	7	7	0.14 U	<b>9.1</b>	<b>18</b>	<b>11</b>	NA
	Pyrene	1000	1000	1000	<b>0.14</b>	<b>34</b>	<b>70</b>	<b>36</b>	NA
	Aniline	NS	NS	1000	0.21 U	0.22 U	6.3 U	0.44 U	NA
	4-Chloroaniline	7	3	1	0.18 U	0.18 U	5.2 U	0.37 U	NA
	Dibenzofuran	NS	NS	100	0.18 U	<b>2.7</b>	<b>5.6</b>	<b>4.8</b>	NA
	2-Methylnaphthalene	80	300	0.7	0.21 U	<b>0.60</b>	6.3 U	<b>2.7</b>	NA
	Acetophenone	NS	NS	1000	0.18 U	0.18 U	5.2 U	0.37 U	NA
	2,4,6-Trichlorophenol	20	20	0.7	0.1 U	0.11 U	3.1 U	0.22 U	NA
	2-Chlorophenol	100	100	0.7	0.18 U	0.18 U	5.2 U	0.37 U	NA

**Table 1**  
**Summary of Analytical Results for Soil Samples -- April 2014**  
**179 Bridge Street**  
**Lowell, Massachusetts**

Analysis	Analyte	Sample ID:			SB-1		SB-2	SB-3	
		Sample Depth (ft.):*			0-3/3	3-14.5/10	0-14/12	0-14/7	14-18
		Sample Date:			4/21/2014	4/21/2014	4/21/2014	4/22/2014	4/23/2014
		S-1/GW-2	S-1/GW-3	RCS-1					
	2,4-Dichlorophenol	60	40	0.7	0.16 U	0.16 U	4.7 U	0.33 U	NA
	2,4-Dimethylphenol	100	500	0.7	0.18 U	0.18 U	5.2 U	0.37 U	NA
	2-Nitrophenol	NS	NS	100	0.38 U	0.39 U	11 U	0.79 U	NA
	4-Nitrophenol	NS	NS	100	0.25 U	0.25 U	7.3 U	0.51 U	NA
	2,4-Dinitrophenol	50	50	3	0.84 U	0.87 U	25 U	1.8 U	NA
	Pentachlorophenol	3	3	3	0.35 U	0.36 U	10 U	0.73 U	NA
	Phenol	50	20	1	0.18 U	<b>0.23</b>	5.2 U	0.37 U	NA
	2-Methylphenol	NS	NS	500	0.18 U	0.18 U	5.2 U	0.37 U	NA
	3-Methylphenol/4-Methylphenol	NS	NS	500	0.25 U	<b>0.42</b>	7.5 U	0.53 U	NA
	2,4,5-Trichlorophenol	1000	600	4	0.18 U	0.18 U	5.2 U	0.37 U	NA
<b>Total Petroleum Hydrocarbons</b>									
(mg/kg)	TPH	1000	1000	1000	34.3 U	<b>524</b>	<b>2,160</b>	<b>2,580</b>	NA
<b>PCBs</b>									
(mg/kg)	Aroclor 1016	1	1	1	0.0347 U	0.0351 U	0.042 U	0.0361 U	NA
	Aroclor 1221	1	1	1	0.0347 U	0.0351 U	0.042 U	0.0361 U	NA
	Aroclor 1232	1	1	1	0.0347 U	0.0351 U	0.042 U	0.0361 U	NA
	Aroclor 1242	1	1	1	0.0347 U	0.0351 U	0.042 U	0.0361 U	NA
	Aroclor 1248	1	1	1	0.0347 U	0.0351 U	0.042 U	0.0361 U	NA
	Aroclor 1254	1	1	1	0.0347 U	0.0351 U	0.042 U	0.0361 U	NA
	Aroclor 1260	1	1	1	0.0347 U	0.0351 U	0.042 U	0.0361 U	NA
	Aroclor 1262	1	1	1	0.0347 U	0.0351 U	0.042 U	0.0361 U	NA
	Aroclor 1268	1	1	1	0.0347 U	0.0351 U	0.042 U	0.0361 U	NA
	PCBs, Total	1	1	1	0.0347 U	0.0351 U	0.042 U	0.0361 U	NA
<b>Metals, total</b>									
(mg/kg)	Arsenic	20	20	20	<b>9.9</b>	<b>5.7</b>	<b>7.6</b>	<b>8.1</b>	<b>8.8</b>
	Barium	1000	1000	1000	<b>28</b>	<b>22</b>	<b>81</b>	<b>55</b>	<b>260</b>
	Cadmium	70	70	70	0.42 U	0.43 U	0.48 U	0.43 U	0.43 U
	Chromium	100	100	100	<b>20</b>	<b>10</b>	<b>18</b>	<b>17</b>	<b>9.8</b>
	Lead	200	200	200	<b>6.7</b>	<b>33</b>	<b>45</b>	<b>150</b>	<b>97</b>
	Mercury	20	20	20	0.073 U	0.081 U	<b>0.102</b>	<b>0.523</b>	<b>0.096</b>
	Selenium	400	400	400	2.1 U	2.1 U	2.4 U	2.1 U	2.1 U
	Silver	100	100	100	0.42 U	0.43 U	0.48 U	0.43 U	0.43 U
<b>Metals, TCLP</b>									
(mg/L)	Lead	N/A	N/A	5**	NA	NA	NA	0.50 U	NA
<b>General Chemistry</b>									
(s.u.)	Ignitability	N/A	N/A	N/A	NI	NI	NI	NI	NA
	pH (H)	N/A	N/A	N/A	<b>7.8</b>	<b>7.4</b>	<b>8.4</b>	<b>10.3</b>	NA
(mg/kg)	Cyanide, Reactive	N/A	N/A	N/A	10 U	10 U	10 U	10 U	NA
(mg/kg)	Sulfide, Reactive	N/A	N/A	N/A	10 U	10 U	10 U	10 U	NA

**Notes:**

mg/kg - milligrams per kilogram (dry weight) or parts per million (ppm).

mg/L - milligrams per liter.

s.u. - Standard unit.

J - Estimated value.

NA - Sample not analyzed for the listed analyte.

N/A - Not applicable.

NS - No MassDEP standards exist for this analyte.

U - Compound was not detected at specified quantitation limit.

Values in **Bold** indicate the compound was detected.

**Values shown in Bold and shaded type exceed one or more of the listed MassDEP Method 1 standards and RCS-1.**

VOCs - Volatile Organic Compounds.

SVOCs - Semivolatile Organic Compounds.

PCBs - Polychlorinated Biphenyls.

TCLP - Toxicity Characteristic Leaching Procedure.

(1) - MassDEP Method 1 standards and RC for C9-C10 aromatics used.

(2) - MassDEP Method 1 standards and RC for 1,3-Dichloropropene used.

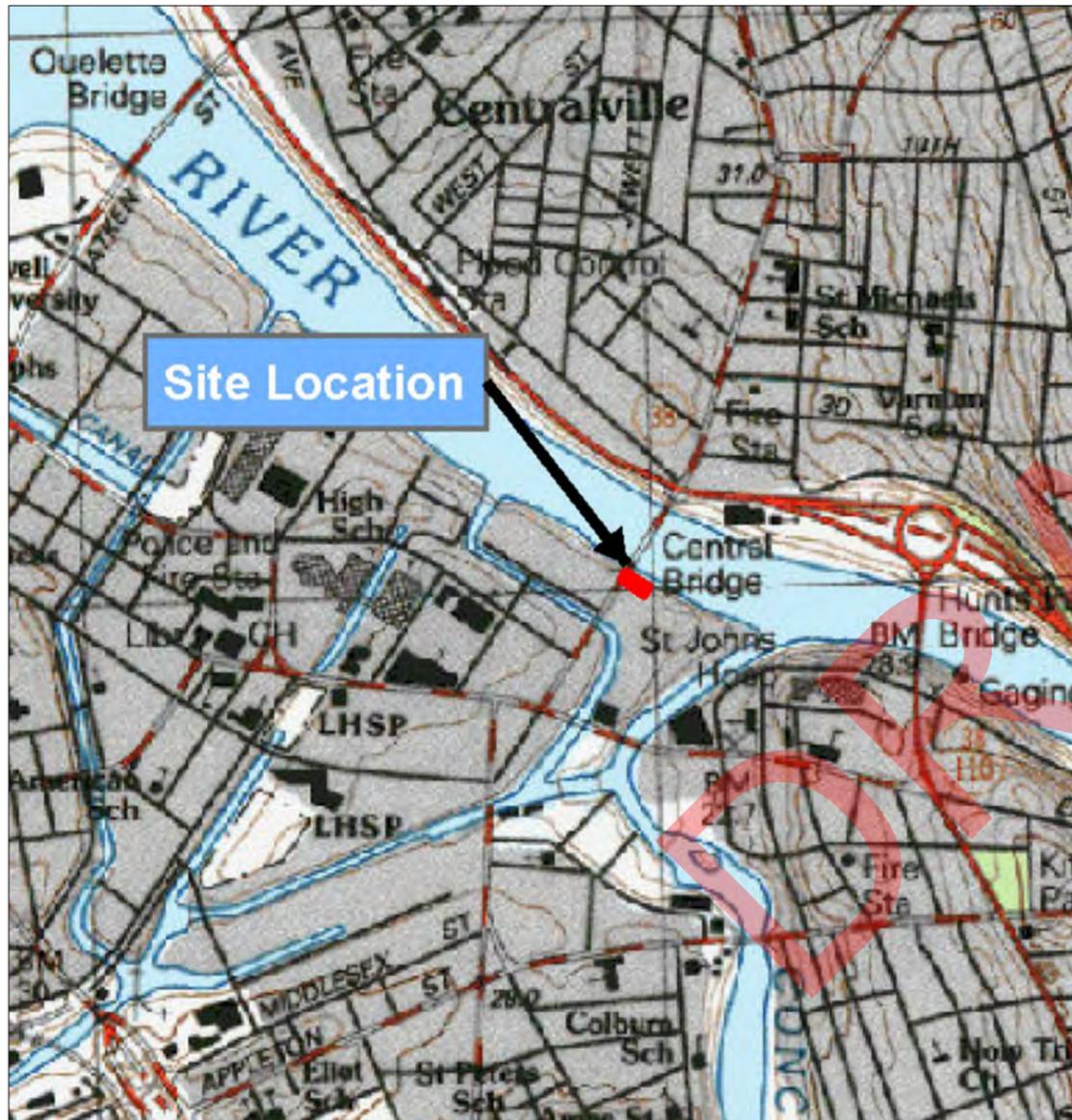
\* - Sample depth for other/VOCs analysis; otherwise the sample depth applies to all listed analyses.

\*\* - EPA SW-846 Chapter 7, Table 7-1, Maximum Concentration of Contaminants for Toxicity Characteristic.

**APPENDIX A**

**PARK DEVELOPMENT SPECIFICATIONS**

# LOWELL RIVERWALK SOIL REMOVAL PLAN



NOT TO SCALE



## *BID PLAN SET*

*PREPARED BY:*

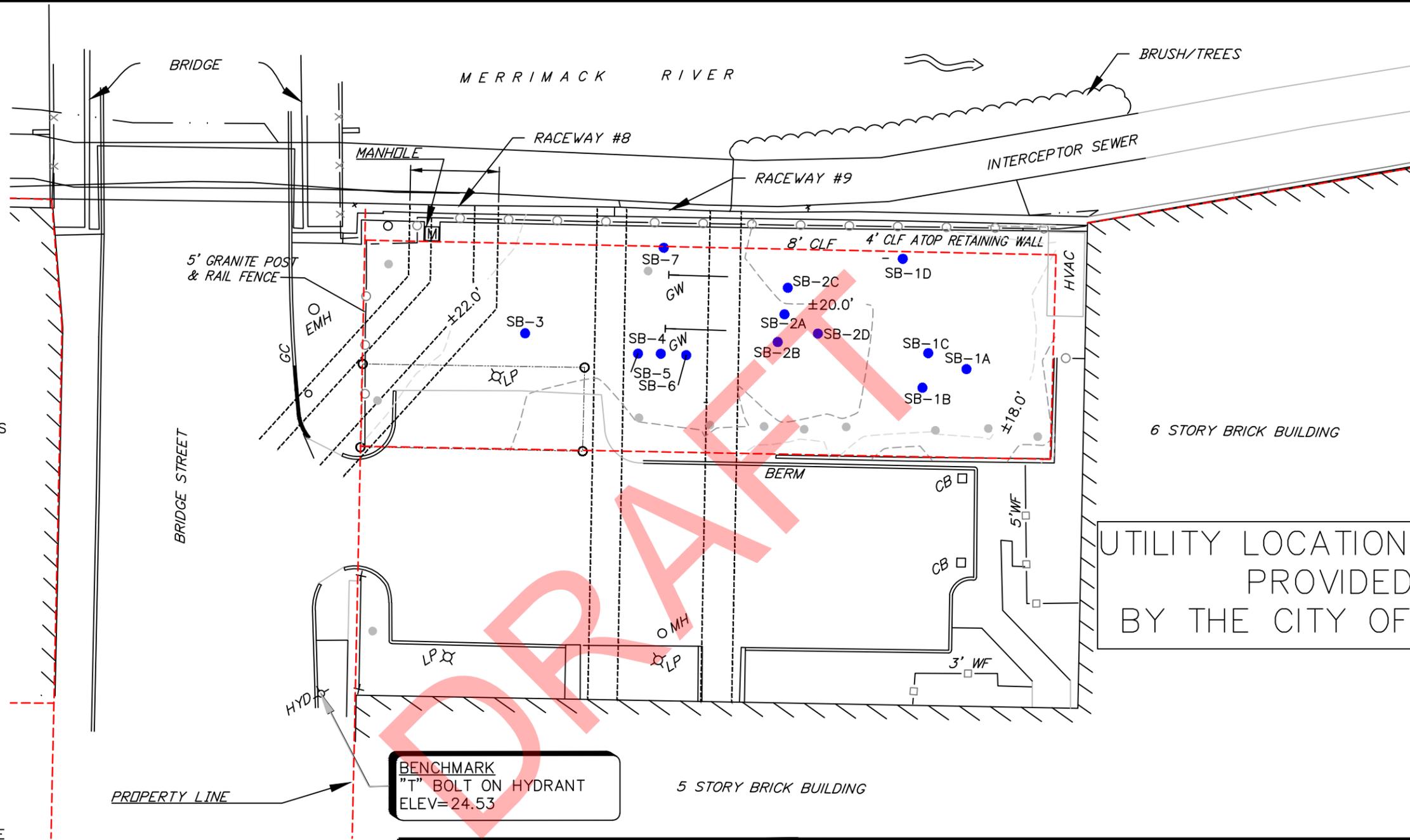


*TRC ENVIRONMENTAL*

*650 SUFFOLK ST*

*LOWELL, MASSACHUSETTS*

- |                 |                                   |
|-----------------|-----------------------------------|
| C-1             | EXISTING CONDITIONS               |
| C-2             | EXCAVATION PLAN                   |
| C-3             | EXCAVATION SECTION A-A'           |
| C-4             | EXCAVATION SECTION B-B' & DETAILS |
| C-5 THROUGH C-8 | BORING LOGS                       |



UTILITY LOCATIONS TO BE PROVIDED BY THE CITY OF LOWELL

**LEGEND:**

- - - - - PROPERTY LINE
- - - - - APPROXIMATE CONTOURS
- TREE
- SOIL BORING
- HYD HYDRANT
- EMH ELECTRICAL MANHOLE
- LP LIGHT POST
- CB CATCH BASIN
- WF WIRE FENCE
- GW GROUND WIRE
- GC GRANITE CURB
- CLF CHAIN LINK FENCE



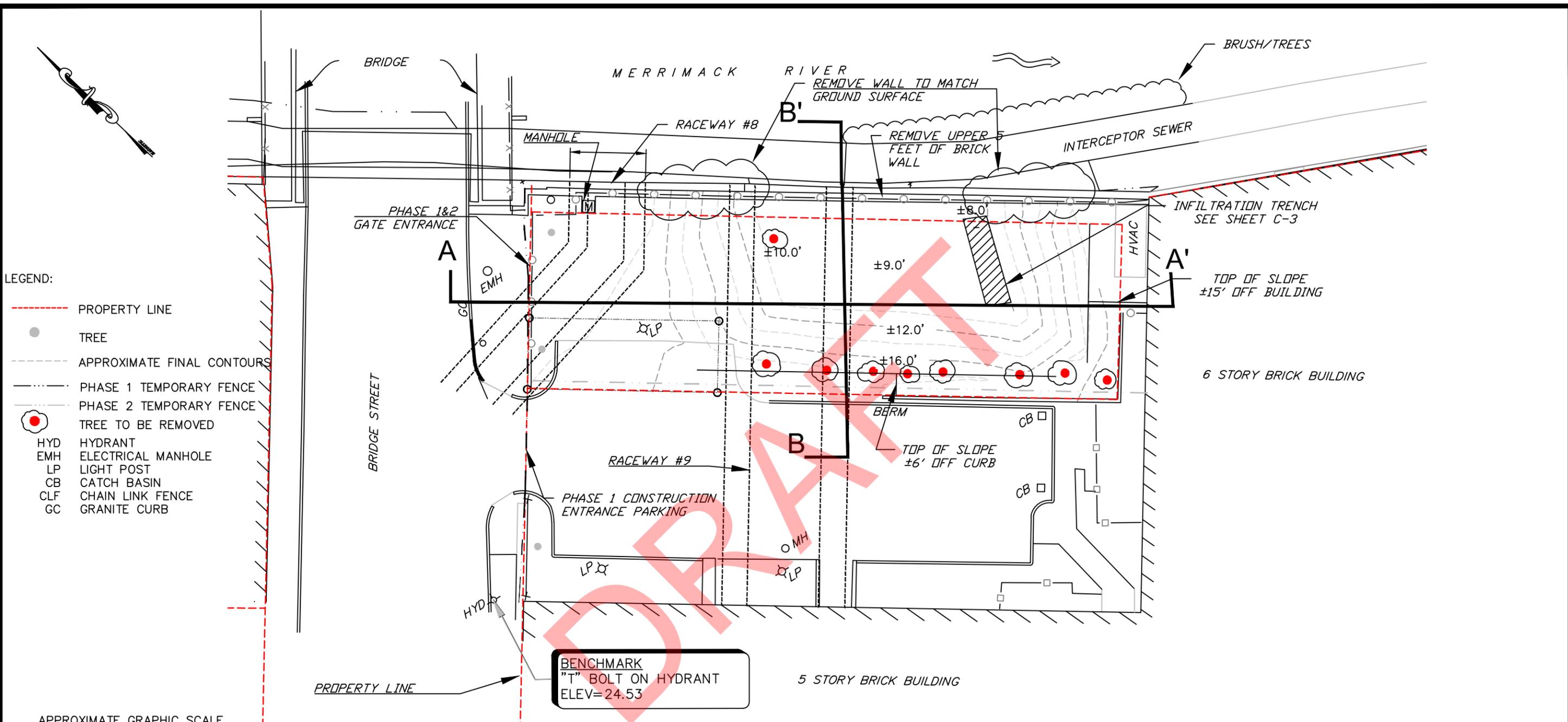
NOTE:  
EXISTING CONDITION SURFACE CONTOURS AND SURVEY DATA WAS CREATED USING "RIVERWALK PHASE II" BY PRECISION LAND SURVEYING OF SOUTHBOROUGH MA, MARCH 2006.

BENCHMARK  
"T" BOLT ON HYDRANT  
ELEV=24.53

FILE: C:\Users\sbrown\EMPLOYEEES\appdata\local\Temp\AcPublish\_3728\Lowell\_Riverwalk\_Soil\_Plan\_v2.dwg

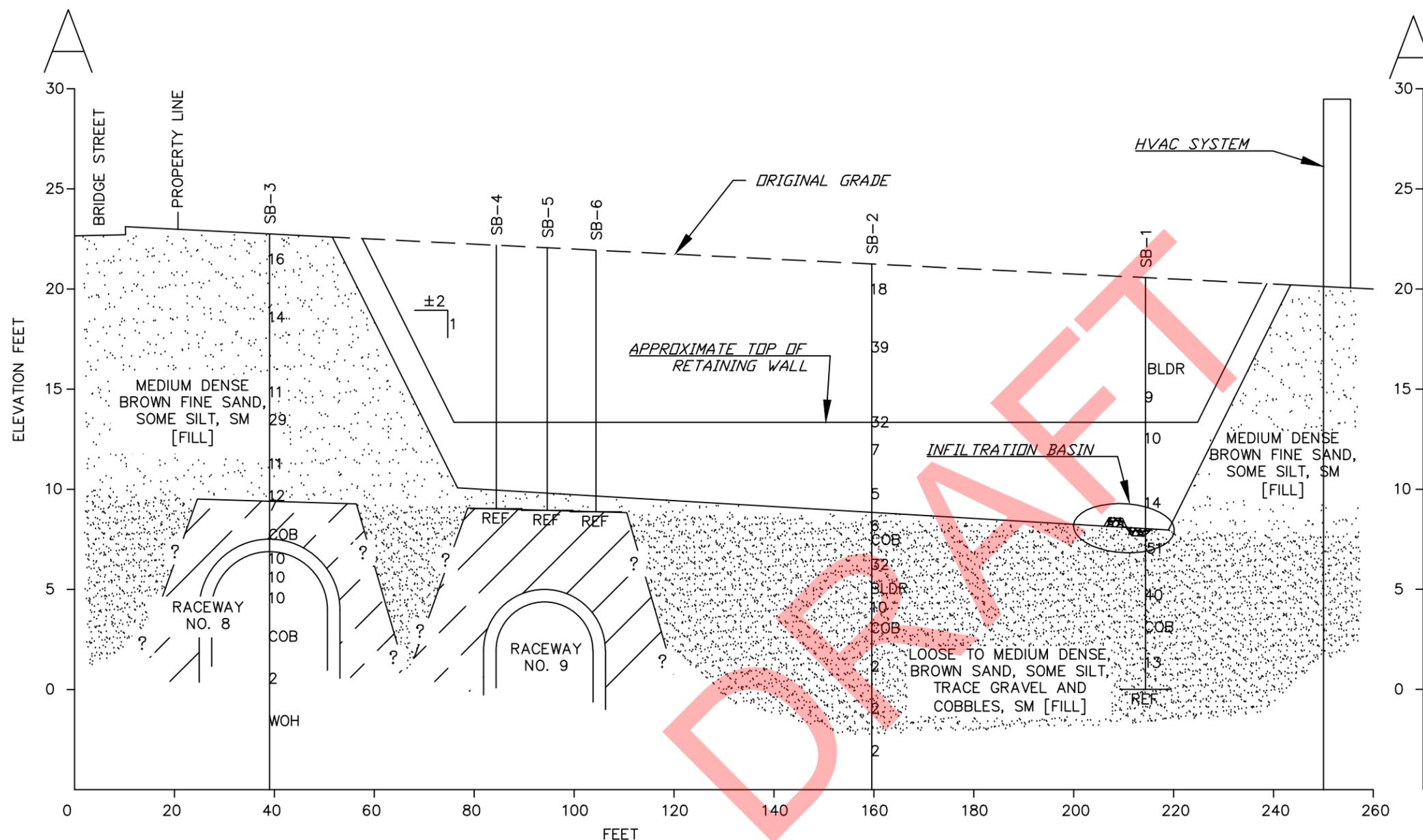
		CLIENT APPROVAL	D. ANDREWS DESIGNED	<b>CITY OF LOWELL RIVERWALK</b>					
			S. BROWN DRAWN	PHASE II					
		APPROVED BY	J. STAPLETON CHECKED	EXISTING CONDITIONS					
		COMPANY	APPROVED	LOWELL	MASS				
		DATE	REVIEWED						
NO.	REVISION	DATE	BY	CK	P.E. STAMPED BY	P.E. No.			
A	BID PLAN SET	10/2014							C-1
								SCALE: AS NOTED	DATE: 10/2014
								REV. A	

FILE: C:\Users\sbrown\EMPLOYEEES\appdata\local\temp\AcPublish\_3728\Lowell Riverwalk Soil Plan v2.dwg



		<b>CLIENT APPROVAL</b> APPROVED BY _____ COMPANY _____ DATE _____		D. ANDREWS DESIGNED S. BROWN DRAWN J. STAPLETON CHECKED APPROVED	<b>CITY OF LOWELL RIVERWALK</b> PHASE II EXCAVATION PLAN LOWELL MASS														
		REVIEWED _____																	
<table border="1"> <thead> <tr> <th>NO.</th> <th>REVISION</th> <th>DATE</th> <th>BY</th> <th>CK</th> <th>P.E. STAMPED BY</th> <th>P.E. No.</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>BID PLAN SET</td> <td>10/2014</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		NO.	REVISION	DATE	BY	CK	P.E. STAMPED BY	P.E. No.	A	BID PLAN SET	10/2014					SCALE: AS NOTED      DATE: 10/2014		C-2      REV. A	
NO.	REVISION	DATE	BY	CK	P.E. STAMPED BY	P.E. No.													
A	BID PLAN SET	10/2014																	

FILE: C:\Users\sbrown\EMPLOYEEES\appdata\local\Temp\AcPublish\_3728\Lowell\_Riverwalk\_Soil\_Plan\_v2.dwg



SECTION A-A'  
1 INCH = 20 FEET HORIZONTAL  
1 INCH = 5 FEET VERTICAL

NO.	REVISION	DATE	BY	CK	P.E. STAMPED BY	P.E. No.
A	BID PLAN SET	10/2014				

CLIENT APPROVAL	D. ANDREWS DESIGNED
APPROVED BY	S. BROWN DRAWN
COMPANY	J. STAPLETON CHECKED
DATE	APPROVED
	REVIEWED

**CITY OF LOWELL RIVERWALK**

PHASE II

EXCAVATION SECTION A-A'

LOWELL MASS

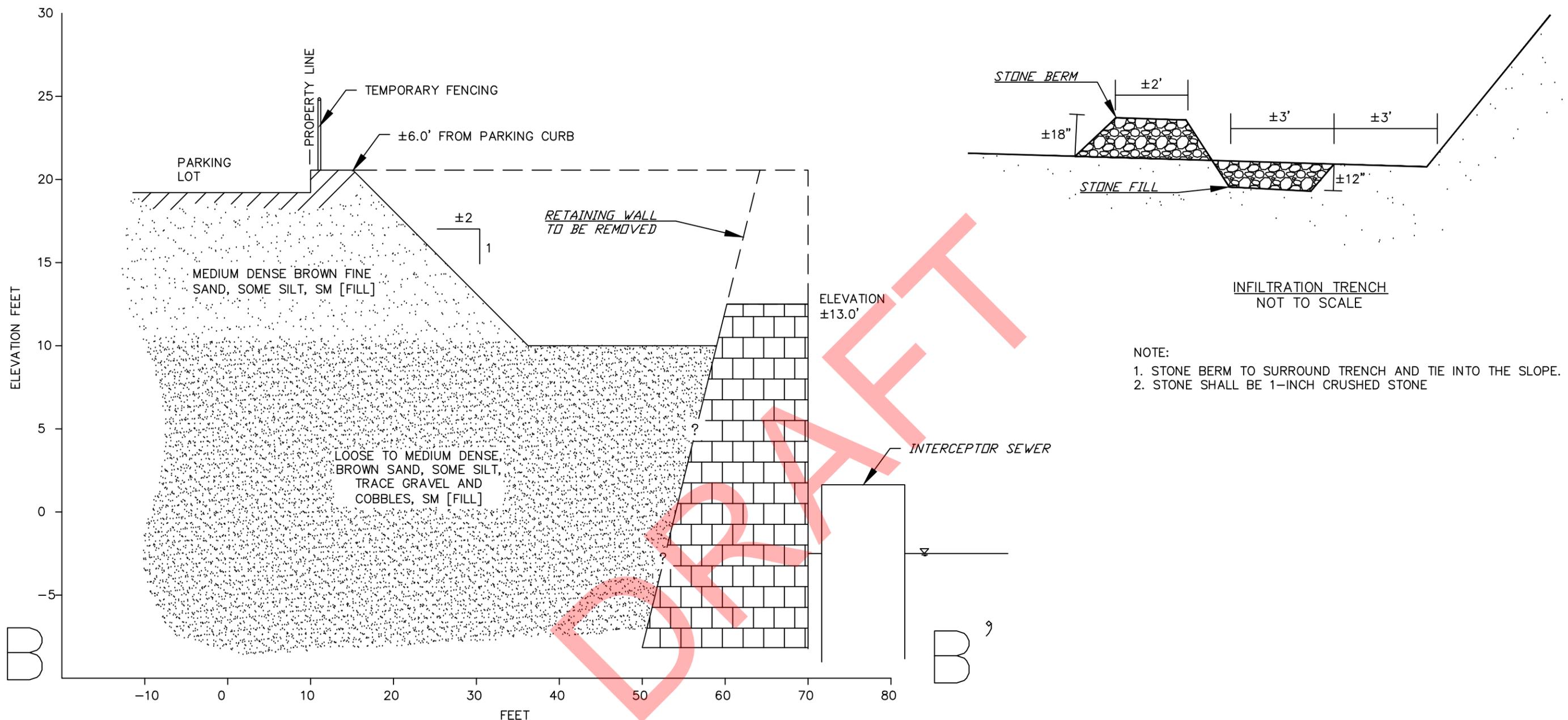
SCALE: AS NOTED      DATE: 10/2014

**TRC**

C-3

REV. A

FILE: C:\Users\sbrown\EMPLOYEEES\appdata\local\temp\AcPublish\_3728\Lowell\_Riverwalk\_Soil\_Plan\_v2.dwg



NO.	REVISION	DATE	BY	CK	P.E. STAMPED BY	P.E. No.
A	BID PLAN SET	10/2014				

--

CLIENT APPROVAL	D. ANDREWS DESIGNED
APPROVED BY	S. BROWN DRAWN
COMPANY	J. STAPLETON CHECKED
DATE	APPROVED
	REVIEWED

**CITY OF LOWELL RIVERWALK**

PHASE II

EXCAVATION SECTION B-B' AND DETAILS

LOWELL MASS

SCALE: AS NOTED      DATE: 10/2014

C-4      REV. A

FILE: C:\Users\spbrown\EMPLOYEES\appdata\local\temp\AcPublish\_3728\Lowell\_Riverwalk\_Soil\_Plan\_v2.dwg

**TRC** Wannalancit Mills  
650 Suffolk Street  
Lowell, MA 01854  
Telephone: 978-970-5600  
Fax: 978-453-1995

**BORING/WELL CONSTRUCTION LOG**

CLIENT/PROJECT NUMBER Lowell Riverwalk/ 183757 BORING/WELL NUMBER SB-1  
 EVENT ID \_\_\_\_\_ SCREEN TYPE/DIAMETER/SLOT NA  
 TRC GEOLOGIST Jamie Stapleton FILTER PACK TYPE/SIZE NA  
 DRILLING CONTRACTOR/FOREMAN GeoSearch/Kenny Byland GROUT TYPE NA  
 DATE DRILLED 4/21/2014 DEPTH TO WATER (Approximate Feet) NA  
 LOCATION Eastern side of site TOTAL DEPTH (Feet) 19  
 SAMPLING METHOD 24" Split Spoon GROUND ELEVATION (Feet, NAVD 88) 20.00  
 DRILLING METHOD Hand Auger and Hollow Stem Auger REFERENCE ELEVATION (Feet, NAVD 88) NA

NOTES Hand Augered to 3 feet. SB-1A refusal @ 16 ft. SB-1B refusal @ 12 ft. SB-1C refusal @ 12 ft. SB-1D refusal @ 12.5 ft.

DEPTH (ft. bgs)	BLOW COUNTS	PEN/REC (INCHES)	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	PID (ppm)	SOIL SAMPLE ID/ ROCHE ID	WELL DIAGRAM
0				Hand-augered to 3 feet. Dry, light brown, fine SAND, some silt, trace subangular gravel (SM/FILL).			No Monitoring Well Installed
1							
2				Auger through boulder to 5 feet.			
3							
4							
5	24	13"		Dry, light brown, fine SAND, some silt (SM/FILL).	0.3		
6	4	5"					
7	6	18"		Dry, light brown, fine SAND, some silt, trace subangular gravel (SM/FILL).	0.0		
8	6	4"					
9	4	9"		6" Dry to slightly moist, light brown, fine to medium SAND, some silt (SM/FILL).	2.1		
10	6	8"					
11	38	21"		3" Slightly moist, dark brown to black ASH, some brick, some fine sand (FILL).			
12	31	7"		Dry, light gray ROCK fragments (FILL).	1.2		
13	20	10"					
14	50/3"	18/10"		Auger through cobble to 13 feet. 3" Dry to slightly moist, light brown, fine SAND, some silt (SM).	0.6		
15	2	10"		7" Dry to slightly moist, brown, fine SAND, some silt (less than above) (SM).			
16	30	50/0"		Auger through cobble to 15 feet.			

Note: Soil screened with PID every 6 inches and was non-detect unless otherwise indicated. PAGE 1 OF 2

**TRC** Wannalancit Mills  
650 Suffolk Street  
Lowell, MA 01854  
Telephone: 978-970-5600  
Fax: 978-453-1995

**BORING/WELL CONSTRUCTION LOG**

CLIENT/PROJECT NUMBER Lowell Riverwalk/ 183757 BORING/WELL NUMBER SB-1  
 EVENT ID \_\_\_\_\_ DATE DRILLED 4/21/2014

DEPTH (ft. bgs)	BLOW COUNTS	PEN/REC (INCHES)	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	PID (ppm)	SOIL SAMPLE ID/ ROCHE ID	WELL DIAGRAM
16	7	6"		Dry, dark brown, fine to medium SAND, some silt (SM).	1.2		No Monitoring Well Installed
17	14	12"		Dry to moist, tan, fine SAND, some silt, trace subangular fine gravel (SM).	0.1		
18	3	4"		Dry, brown to dark brown, fine SAND, some medium sand and silt, trace coarse sand (SM).			
19	4	4"		End of Exploration. Auger refusal @ 16 feet, Split Spoon advanced to 19 feet.			

Note: Soil screened with PID every 6 inches and was non-detect unless otherwise indicated. PAGE 2 OF 2

**TRC** Wannalancit Mills  
650 Suffolk Street  
Lowell, MA 01854  
Telephone: 978-970-5600  
Fax: 978-453-1995

**BORING/WELL CONSTRUCTION LOG**

CLIENT/PROJECT NUMBER Lowell Riverwalk/ 183757 BORING/WELL NUMBER SB-2  
 EVENT ID \_\_\_\_\_ SCREEN TYPE/DIAMETER/SLOT NA  
 TRC GEOLOGIST Jamie Stapleton FILTER PACK TYPE/SIZE NA  
 DRILLING CONTRACTOR/FOREMAN GeoSearch/Kenny Byland GROUT TYPE NA  
 DATE DRILLED 4/21/2014 DEPTH TO WATER (Approximate Feet) NA  
 LOCATION Central portion of site TOTAL DEPTH (Feet) 26  
 SAMPLING METHOD 24" Split Spoon GROUND ELEVATION (Feet, NAVD 88) 21.00  
 DRILLING METHOD Hollow Stem Auger REFERENCE ELEVATION (Feet, NAVD 88) NA

NOTES Composite lithology from SB-2A refusal @ 11 ft. SB-2B refusal @ 17.75 ft. SB-2C refusal @ 13.5 ft and SB-2D refusal @ 26 ft.

DEPTH (ft. bgs)	BLOW COUNTS	PEN/REC (INCHES)	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	PID (ppm)	SOIL SAMPLE ID/ ROCHE ID	WELL DIAGRAM
1	8	18"		Dry, light brown, fine to medium SAND with little silt (SM/FILL).	0.0		No Monitoring Well Installed
2	8	10"					
3	11	12"		Dry, light brown, fine to medium SAND with little silt (SM/FILL).	0.8		
4	27	12"					
5	7	18"		Dry, light brown, fine to medium SAND with little silt and brick (SM/FILL).	0.0		
6	20	12"					
7	5	4"		Dry, brown, fine to medium SAND, little gravel (SM/FILL).	1.3		
8	2	5"					
9	0	11"		Dry, dark brown fine to medium SAND, some silt, little broken rock fragments (SM/FILL).	0.5		
10	2	3"					
11	3	5"		Dry, black fine SAND, with ash and black soot (FILL).			
12	50/3"	15/9"		Dry, dark brown, fine to medium SAND, some silt (SM/FILL).	0.1		
13	6	12"		Augered through cobble to 12 feet.			
14	12	20"		Moist, greenish brown to olive brown, fine SAND, some silt (more than above) little medium SAND (SM/FILL).	1.8		
15	50/2"	20/15"		Augered through boulder to 15 feet.			

Note: Soil screened with PID every 6 inches and was non-detect unless otherwise indicated. PAGE 1 OF 2

<p><b>CITY OF LOWELL RIVERWALK</b></p> <p>PHASE II</p> <p>BORING LOGS</p> <p>LOWELL MASS</p>					
<p>CLIENT APPROVAL</p> <p>APPROVED BY _____</p> <p>COMPANY _____</p> <p>DATE _____</p>		<p>D. ANDREWS DESIGNED</p> <p>S. BROWN DRAWN</p> <p>J. STAPLETON CHECKED</p> <p>APPROVED _____</p>		<p>REVIEWED _____</p>	
<p>NO. _____</p> <p>REVISION _____</p>		<p>DATE _____</p> <p>BY _____</p> <p>CK _____</p>		<p>P.E. STAMPED BY _____</p> <p>P.E. No. _____</p>	
<p>A</p>		<p>BID PLAN SET</p>		<p>10/2014</p>	
<p>SCALE: AS NOTED</p>		<p>DATE: 10/2014</p>		<p>TRC</p> <p>C-5</p>	
<p>REV. A</p>		<p>REV. A</p>		<p>REV. A</p>	

FILE: C:\Users\spbrown\EMPLOYEEES\appdata\local\temp\AcPublish\_3728\Lowell Riverwalk Soil Plan v2.dwg

**TRC** Wannalancit Mills  
650 Suffolk Street  
Lowell, MA 01854  
Telephone: 978-970-5600  
Fax: 978-453-1995

**BORING/WELL CONSTRUCTION LOG**

CLIENT/PROJECT NUMBER Lowell Riverwalk/ 183757 BORING/WELL NUMBER SB-2  
EVENT ID \_\_\_\_\_ DATE DRILLED 4/21/2014

DEPTH (ft. bgs)	BLOW COUNTS	PEN/REC (INCHES)	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	PID (ppm)	SOIL SAMPLE ID/ ROCHE ID	WELL DIAGRAM
3		24/0"		No Recovery.			
5							
16							
17		9/8"		Moist, dark brown, fine to medium SAND, some to little clay and silt (SM/FILL).	1.0		
17	50/3"			Augered through cobble to 18 feet.			
18		24/3"		Moist, black, fine SAND with ash and clinkers (FILL).	0.2		
19							
20		24/3"		Moist, black, fine SAND, some silt, little medium sand, trace clay (SM/FILL).	0.2		
21							
22		24/11"		Wet, FILL (boiler slag, clinkers, brick fragments) with some fine sand, trace fines (FILL).	0.3		
23							
24		24/9"		Wet, dark brown, fine to coarse SAND with SILT (SM).	0.0		
25							
26	50/0"			End of Exploration @ 26 feet (auger and split spoon refusal).			

Note: Soil screened with PID every 6 inches and was non-detect unless otherwise indicated. PAGE 2 OF 2

**TRC** Wannalancit Mills  
650 Suffolk Street  
Lowell, MA 01854  
Telephone: 978-970-5600  
Fax: 978-453-1995

**BORING/WELL CONSTRUCTION LOG**

CLIENT/PROJECT NUMBER Lowell Riverwalk/ 183757 BORING/WELL NUMBER SB-3  
EVENT ID \_\_\_\_\_ DATE DRILLED 4/22/2014 & 4/23/2014

TRC GEOLOGIST Jamie Stapleton SCREEN TYPE/DIAMETER/SLOT NA  
DRILLING CONTRACTOR/FOREMAN GeoSearch/Kenny Byland FILTER PACK TYPE/SIZE NA  
DATE DRILLED 4/22/2014 & 4/23/2014 GROUT TYPE NA  
LOCATION Western side of site. DEPTH TO WATER (Approximate Feet) NA  
SAMPLING METHOD 24" Split Spoon TOTAL DEPTH (Feet) 68  
DRILLING METHOD Hollow Stem Auger/ Drive & Wash GROUND ELEVATION (Feet, NAVD 88) 22.00  
REFERENCE ELEVATION (Feet, NAVD 88) NA

NOTES Resumed drilling for rock coring on 4/23/2014.

DEPTH (ft. bgs)	BLOW COUNTS	PEN/REC (INCHES)	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	PID (ppm)	SOIL SAMPLE ID/ ROCHE ID	WELL DIAGRAM
7		24/4"		Dry, gray, fine to medium SAND, some coarse sand and silt, little clay and fine gravel (SM/FILL).	0.0		
8							
1							
2		24/10"		4" Dry, gray, fine to medium SAND, some coarse sand and silt, little clay and fine gravel (SM/FILL).	0.0		No Monitoring Well Installed
3				6" Dry, light brown, fine SAND, some silt (SM/FILL).			
4							
5		24/15"		Dry, brown, fine to medium SAND, some silt, trace gravel and brick fragments (SM/FILL).	0.7		
6							
8		24/13"		Dry, dark brown, fine SAND, some ash and clinkers, trace brick fragments (SM/FILL).	1.8		
7							
8		24/12"		Dry, dark brown, fine to medium SAND, some silt little brick fragments and ash (SM/FILL).	NA		
9							
10		24/8"		Moist, brown, fine SAND, some brick (SP/FILL).	0.5		
11							
12		24/6"		Moist, brown, fine SAND, some medium sand, ash, cinders and brick fragments (SW/FILL).	0.0		
13							
14		24/8"		Dry, black FILL (cinders, ash, clinkers), some fine to medium sand (FILL).	0.5		
15							
16		24/9"		Dry, black FILL (cinders, ash, clinkers), some fine to medium sand (FILL).	1.0		
17							
18		24/10"		Dry, black FILL (cinders, ash, clinkers), some fine to medium sand (FILL).	1.0		
19							
20							
21		21/7"		Dry, black FILL (cinders, ash, clinkers), some fine to medium sand. Broken cobble in spoon (FILL).	0.0		
22							
23				Auger through cobble to 23 feet.			
24		24/7"		Wet, brown, FILL (ash, cinders, clinkers), some fine sand and silt (FILL).	0.0		
25							

Note: Soil screened with PID every 6 inches and was non-detect unless otherwise indicated. PAGE 1 OF 3

**TRC** Wannalancit Mills  
650 Suffolk Street  
Lowell, MA 01854  
Telephone: 978-970-5600  
Fax: 978-453-1995

**BORING/WELL CONSTRUCTION LOG**

CLIENT/PROJECT NUMBER Lowell Riverwalk/ 183757 BORING/WELL NUMBER SB-3  
EVENT ID \_\_\_\_\_ DATE DRILLED 4/22/2014 & 4/23/2014

DEPTH (ft. bgs)	BLOW COUNTS	PEN/REC (INCHES)	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	PID (ppm)	SOIL SAMPLE ID/ ROCHE ID	WELL DIAGRAM
26		24/8"		Wet, brown, FILL (ash, cinders, clinkers), some fine sand and silt (FILL).	0.0		
27							
28		24/8"		Wet, brown, FILL (ash, cinders, clinkers), some fine sand and silt (FILL).	0.0		
29				Auger through CONCRETE with rebar (FILL).			
30							
31		7/24"		Wet, fine SAND and SILT (slough) (SM).	0.0		
32				End of Soil Boring @ 30.5 feet (Auger refusal on 4/22/2014. Auger to 30.5 feet on 4/23/2014 with CME-75). 7" Dark phyllitic section with quartz intrusion recovered via NX rock core. Advance roller bit and split spoons.			
33							
34							
35							
36		24/16"		Wet, gray SILT, some clay (ML).	0.7		
37							
38		24/13"		Wet, gray SILT, some clay (ML).	No Odor		
39							
40		24/14"		Wet, gray SILT, some clay, little fine sand (ML).	No Odor		
41							
42		24/15"		Wet, gray SILT, little clay (ML).	No Odor		
43							
44		24/24"		12" Wet, gray SILT, some clay, little fine sand (ML).	No Odor		
45				12" Wet, gray CLAY with SILT (CL-ML).			
46				Advance Split Spoons.			
47							
48							
49							
50							
51							
52							
53							

Note: Soil screened with PID every 6 inches and was non-detect unless otherwise indicated. PAGE 2 OF 3

CLIENT APPROVAL  APPROVED BY _____  COMPANY _____  DATE _____	D. ANDREWS DESIGNED	<b>CITY OF LOWELL RIVERWALK</b>  PHASE II  BORING LOGS  LOWELL MASS		C-6	REV. A
	S. BROWN DRAWN				
	J. STAPLETON CHECKED				
	APPROVED				
REVIEWED _____	SCALE: AS NOTED	DATE: 10/2014			

NO.	REVISION	DATE	BY	CK	P.E. STAMPED BY	P.E. No.
A	BID PLAN SET	10/2014				

FILE: C:\Users\sbrown\EMPLOYEES\appdata\local\temp\AcPublish\_3728\Lowell Riverwalk Soil Plan v2.dwg

**TRC** Wannalancit Mills  
650 Suffolk Street  
Lowell, MA 01854  
Telephone: 978-970-5600  
Fax: 978-453-1995

**BORING/WELL CONSTRUCTION LOG**

CLIENT/PROJECT NUMBER Lowell Riverwalk/ 183757 BORING/WELL NUMBER SB-3  
EVENT ID \_\_\_\_\_ DATE DRILLED 4/22/2014 & 4/23/2014

DEPTH (ft. bgs)	BLOW COUNTS	PENREC (INCHES)	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	PID (ppm)	SOIL SAMPLE ID/ ROCHE ID	WELL DIAGRAM
54							
55							
56							
57							
58							
59	8	24/1"		Wet, gray SILT, some clay (ML).	NA		
60	9						
61	12			Rollerbit to 68 feet.			
62							
63							
64							
65							
66							
67							
68				End of Exploration @ 68 feet (potential bedrock).			

Note: Soil screened with PID every 6 inches and was non-detect unless otherwise indicated. PAGE 3 OF 3

**TRC** Wannalancit Mills  
650 Suffolk Street  
Lowell, MA 01854  
Telephone: 978-970-5600  
Fax: 978-453-1995

**BORING/WELL CONSTRUCTION LOG**

CLIENT/PROJECT NUMBER Lowell Riverwalk/ 183757 BORING/WELL NUMBER SB-4  
EVENT ID \_\_\_\_\_ DATE DRILLED \_\_\_\_\_

TRC GEOLOGIST Jamie Stapleton SCREEN TYPE/DIAMETER/SLOT NA  
DRILLING CONTRACTOR/FOREMAN GeoSearch/Donny Seczney FILTER PACK TYPE/SIZE NA  
GROUT TYPE NA  
DATE DRILLED 4/21/2014 DEPTH TO WATER (Approximate Feet) NA  
LOCATION Overlying tailrace. TOTAL DEPTH (Feet) 10  
SAMPLING METHOD NA GROUND ELEVATION (Feet, NAVD 88) 21.50  
DRILLING METHOD Vacuum Rig REFERENCE ELEVATION (Feet, NAVD 88) NA

NOTES \_\_\_\_\_

DEPTH (ft. bgs)	BLOW COUNTS	PENREC (INCHES)	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	PID (ppm)	SOIL SAMPLE ID/ ROCHE ID	WELL DIAGRAM
1	NA	NA		No Lithologic Description.	NA		No Monitoring Well Installed
2							
3							
4							
5							
6							
7							
8							
9							
10				End of Exploration @ 10 feet (refusal)			

Note: Soil screened with PID every 6 inches and was non-detect unless otherwise indicated. PAGE 1 OF 1

**TRC** Wannalancit Mills  
650 Suffolk Street  
Lowell, MA 01854  
Telephone: 978-970-5600  
Fax: 978-453-1995

**BORING/WELL CONSTRUCTION LOG**

CLIENT/PROJECT NUMBER Lowell Riverwalk/ 183757 BORING/WELL NUMBER SB-5  
EVENT ID \_\_\_\_\_ DATE DRILLED \_\_\_\_\_

TRC GEOLOGIST Jamie Stapleton SCREEN TYPE/DIAMETER/SLOT NA  
DRILLING CONTRACTOR/FOREMAN GeoSearch/Donny Seczney FILTER PACK TYPE/SIZE NA  
GROUT TYPE NA  
DATE DRILLED 4/21/2014 DEPTH TO WATER (Approximate Feet) NA  
LOCATION Overlying tailrace. TOTAL DEPTH (Feet) 10  
SAMPLING METHOD NA GROUND ELEVATION (Feet, NAVD 88) 21.50  
DRILLING METHOD Vacuum Rig REFERENCE ELEVATION (Feet, NAVD 88) NA

NOTES \_\_\_\_\_

DEPTH (ft. bgs)	BLOW COUNTS	PENREC (INCHES)	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	PID (ppm)	SOIL SAMPLE ID/ ROCHE ID	WELL DIAGRAM
1	NA	NA		No Lithologic Description.	NA		No Monitoring Well Installed
2							
3							
4							
5							
6							
7							
8							
9							
10				End of Exploration @ 10 feet (refusal)			

Note: Soil screened with PID every 6 inches and was non-detect unless otherwise indicated. PAGE 1 OF 1

	CLIENT APPROVAL	D. ANDREWS DESIGNED	<b>CITY OF LOWELL RIVERWALK</b>	
		S. BROWN DRAWN	PHASE II	
	APPROVED BY	J. STAPLETON CHECKED	BORING LOGS	
	COMPANY	APPROVED	LOWELL	MASS
	DATE	REVIEWED	<b>TRC</b>	
			SCALE: AS NOTED	DATE: 10/2014

NO.	REVISION	DATE	BY	CK	P.E. STAMPED BY	P.E. No.
A	BID PLAN SET	10/2014				

REV. **A**

FILE: C:\Users\sbrown\EMPLOYEES\appdata\local\temp\AcPublish\_3728\Lowell Riverwalk Soil Plan v2.dwg



Wannalancit Mills  
650 Suffolk Street  
Lowell, MA 01854  
Telephone: 978-970-5600  
Fax: 978-453-1995

**BORING/WELL CONSTRUCTION LOG**

CLIENT/PROJECT NUMBER Lowell Riverwalk/ 183757 BORING/WELL NUMBER SB-6  
 EVENT ID \_\_\_\_\_ SCREEN TYPE/DIAMETER/SLOT NA  
 TRC GEOLOGIST Jamie Stapleton FILTER PACK TYPE/SIZE NA  
 DRILLING CONTRACTOR/FOREMAN GeoSearch/Donny Seczney GROUT TYPE NA  
 DATE DRILLED 4/21/2014 DEPTH TO WATER (Approximate Feet) NA  
 LOCATION Overlying ballrace TOTAL DEPTH (Feet) 10  
 SAMPLING METHOD NA GROUND ELEVATION (Feet, NAVD 88) 21.50  
 DRILLING METHOD Vacuum Rig REFERENCE ELEVATION (Feet, NAVD 88) NA

NOTES \_\_\_\_\_

DEPTH (ft. bgs)	BLOW COUNTS	PEN/REC (INCHES)	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	PID (ppm)	SOIL SAMPLE ID/ ROCHE ID	WELL DIAGRAM
1	NA	NA		No Lithologic Description.	NA		No Monitoring Well Installed
2							
3							
4							
5							
6							
7							
8							
9							
10				End of Exploration @ 10 feet (refusal)			

Note: Soil screened with PID every 6 inches and was non-defect unless otherwise indicated. PAGE 1 OF 1



Wannalancit Mills  
650 Suffolk Street  
Lowell, MA 01854  
Telephone: 978-970-5600  
Fax: 978-453-1995

**BORING/WELL CONSTRUCTION LOG**

CLIENT/PROJECT NUMBER Lowell Riverwalk/ 183757 BORING/WELL NUMBER SB-7  
 EVENT ID \_\_\_\_\_ SCREEN TYPE/DIAMETER/SLOT NA  
 TRC GEOLOGIST Jamie Stapleton FILTER PACK TYPE/SIZE NA  
 DRILLING CONTRACTOR/FOREMAN GeoSearch/Donny Seczney GROUT TYPE NA  
 DATE DRILLED 4/21/2014 DEPTH TO WATER (Approximate Feet) NA  
 LOCATION Overlying ballrace TOTAL DEPTH (Feet) 10  
 SAMPLING METHOD NA GROUND ELEVATION (Feet, NAVD 88) 21.50  
 DRILLING METHOD Vacuum Rig REFERENCE ELEVATION (Feet, NAVD 88) NA

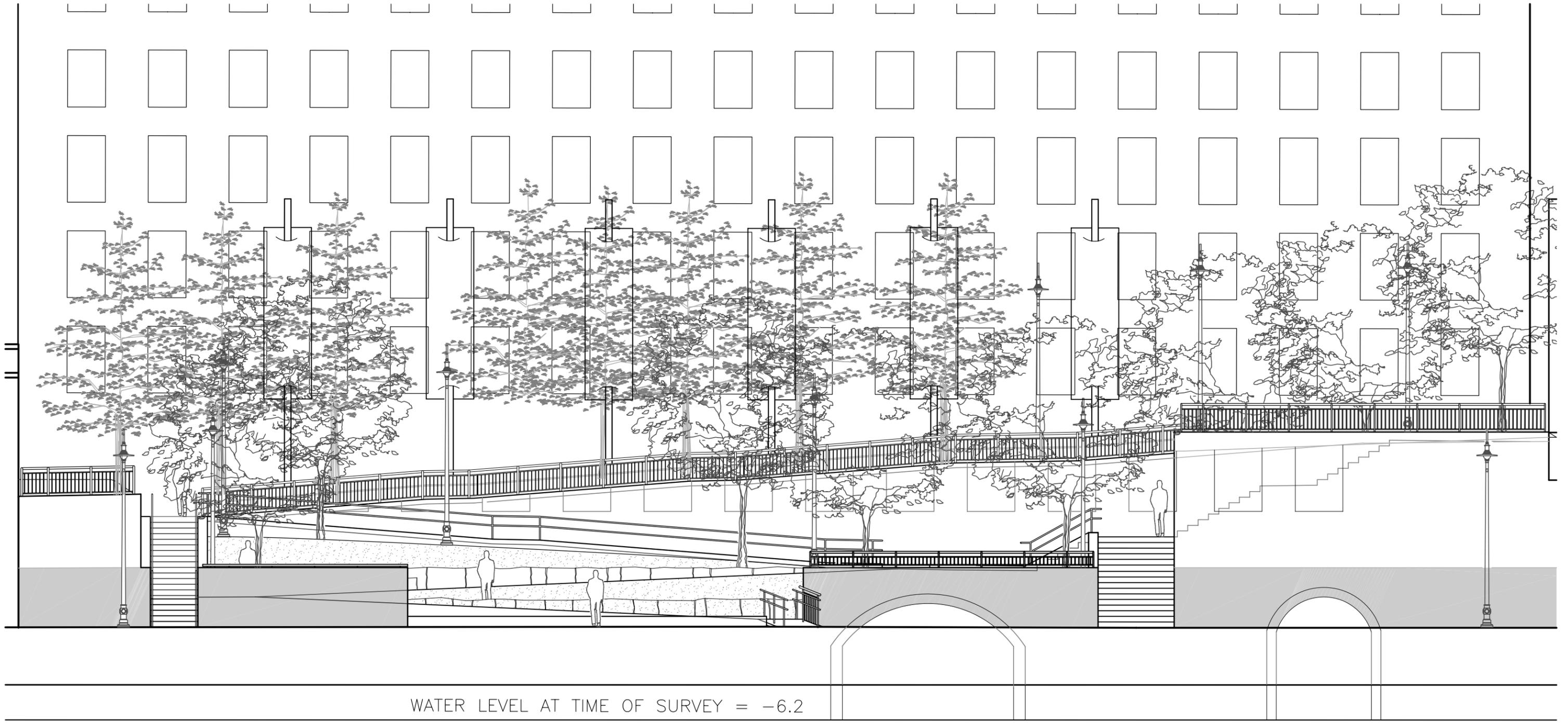
NOTES \_\_\_\_\_

DEPTH (ft. bgs)	BLOW COUNTS	PEN/REC (INCHES)	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	PID (ppm)	SOIL SAMPLE ID/ ROCHE ID	WELL DIAGRAM
1	NA	NA		No Lithologic Description.	NA		No Monitoring Well Installed
2							
3							
4							
5							
6							
7							
8							
9							
10				End of Exploration @ 10 feet (refusal)			

Note: Soil screened with PID every 6 inches and was non-defect unless otherwise indicated. PAGE 1 OF 1

							CLIENT APPROVAL  _____ APPROVED BY  _____ COMPANY  _____ DATE	D. ANDREWS DESIGNED  S. BROWN DRAWN  J. STAPLETON CHECKED  _____ APPROVED  REVIEWED	<h2 style="margin: 0;">CITY OF LOWELL RIVERWALK</h2> <p style="margin: 0;">PHASE II</p> <p style="margin: 0;">BORING LOGS</p> <p style="margin: 0;">LOWELL <span style="float: right;">MASS</span></p>		
NO.	REVISION	DATE	BY	CK	P.E. STAMPED BY	P.E. No.			SCALE: AS NOTED DATE: 10/2014	C-8	REV. A
A	BID PLAN SET	10/2014									

**ELEVATION:  
SOUTH VIEW**



WATER LEVEL AT TIME OF SURVEY = -6.2  
(FEMA FLOOD ELEVATION = 12.8)

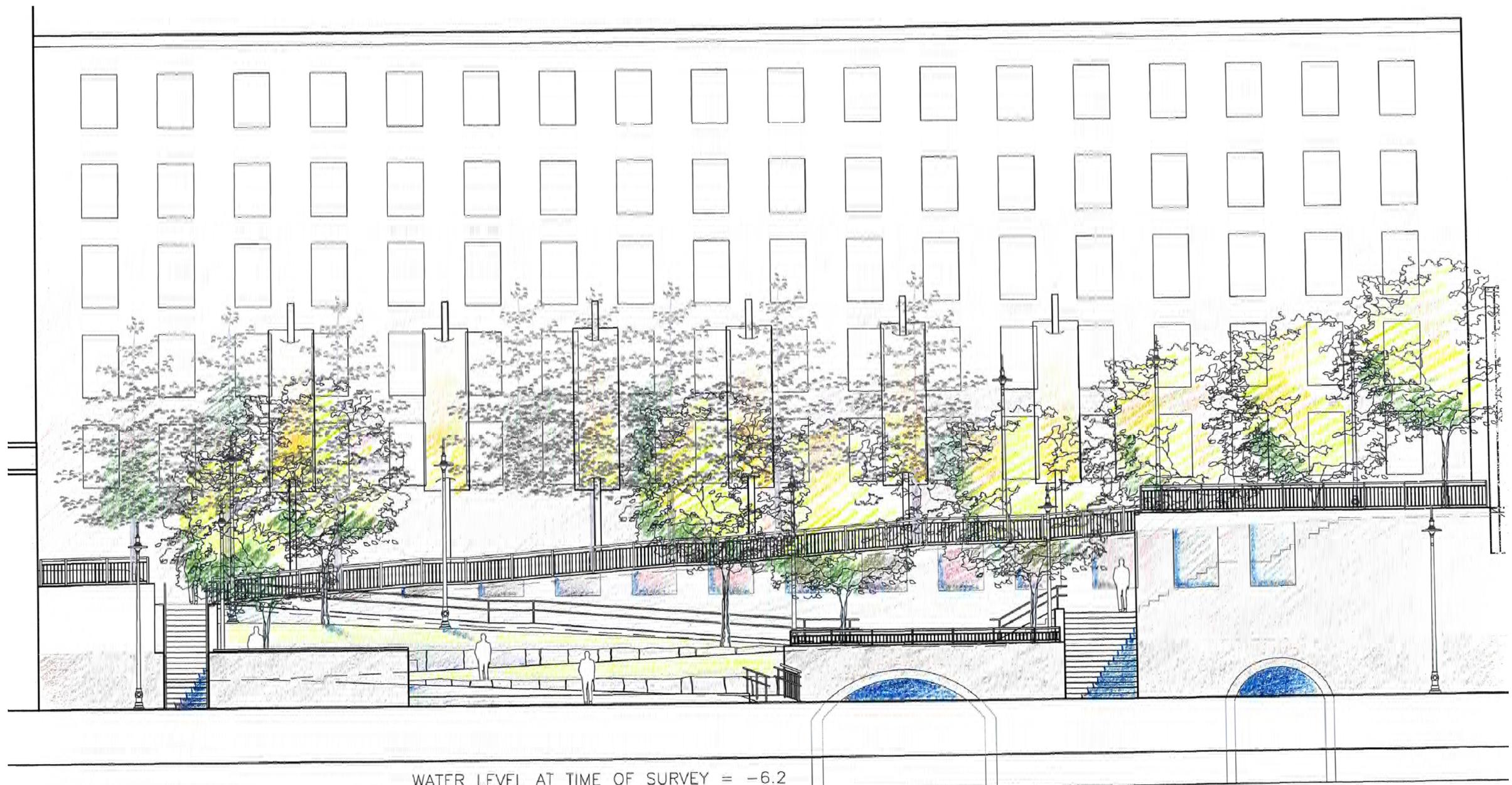
**LOWELL RIVERWALK PHASE II**  
LOWELL, MASSACHUSETTS  
MAY 2008

HORIZONTAL SCALE: 1" = 10'-0"  
VERTICAL SCALE: 1" = 10'-0"



ARCHITECT:  
FENNICK McCREDIE  
ARCHITECTS  
BOSTON, MA

**C R J : A**  
CAROL R JOHNSON ASSOCIATES, INC



ELEVATION

WATER LEVEL AT TIME OF SURVEY = -6.2  
 (FEMA FLOOD ELEVATION = 12.8)

REV	DATE	BY	SUB	APP	DESCRIPTION

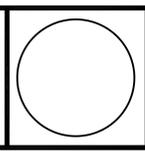
DESIGN DEVELOPMENT

LANDSCAPE ARCHITECT:  
**C R J : A**  
CAROL R. JOHNSON ASSOCIATES INC.

ARCHITECT:  
**FENNICK McCREDIE**

ENGINEER:  
**AMMAN AND WHITNEY**

PERMITTING:  
**TRC**



City of Lowell, Massachusetts

**Lowell Riverwalk Phase II**

DESIGNED BY  
KZ

DRAWN BY  
CR

CHECKED BY  
JA

IN CHARGE  
JA

**LAYOUT & MATERIALS PLAN**

FILE NAME

DATE FEBRUARY 12, 2008

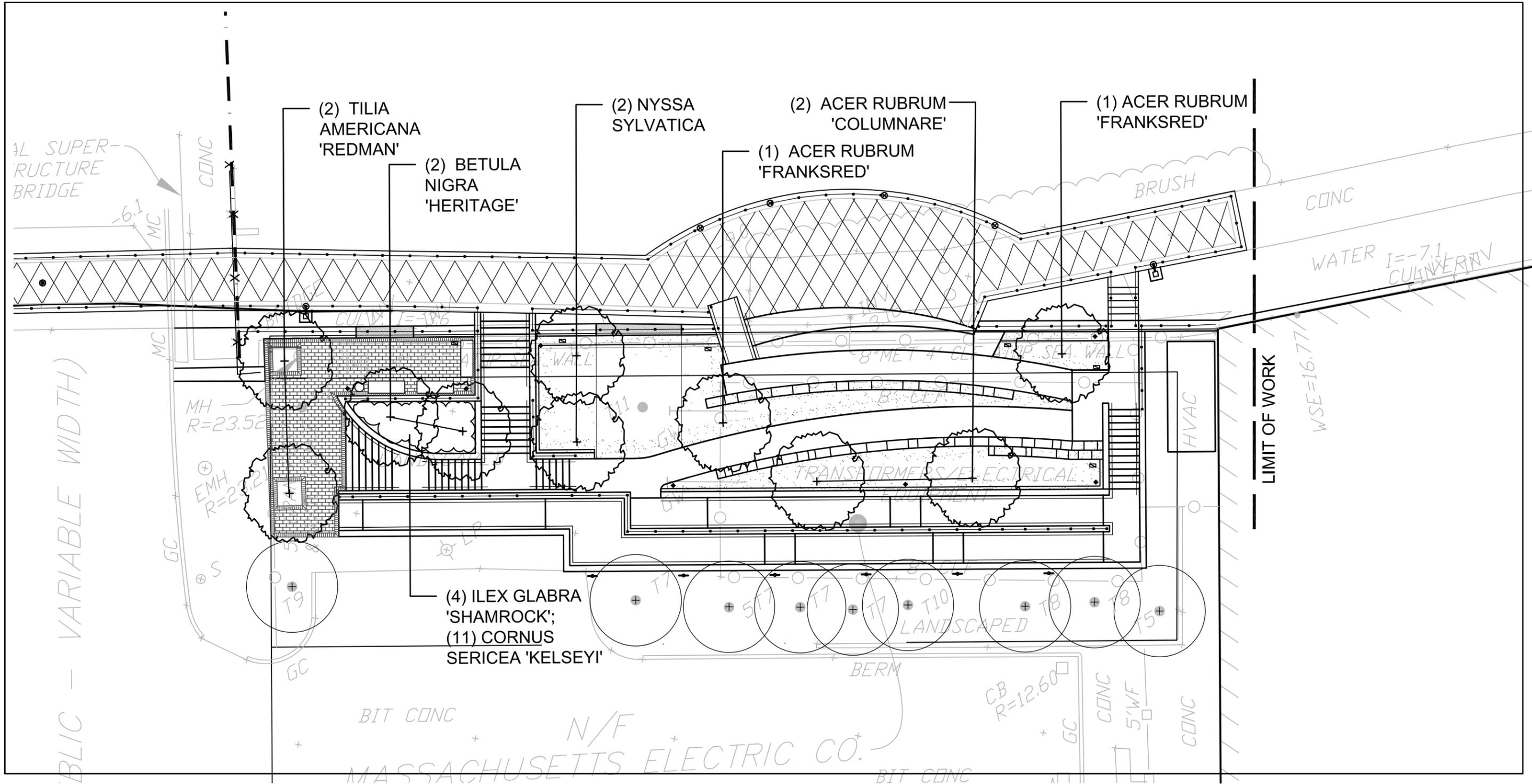
SCALE: AS NOTED

CONTRACT NO.  
XXXXX

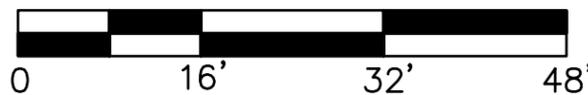
DRAWING NO.  
**L1**

REV.

# PLANTING PLAN



SCALE: 1" = 16'-0"

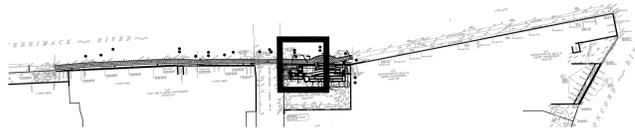


ARCHITECT:  
 FENNICK McCREDIE  
 ARCHITECTS  
 BOSTON, MA

LANDSCAPE ARCHITECTS:

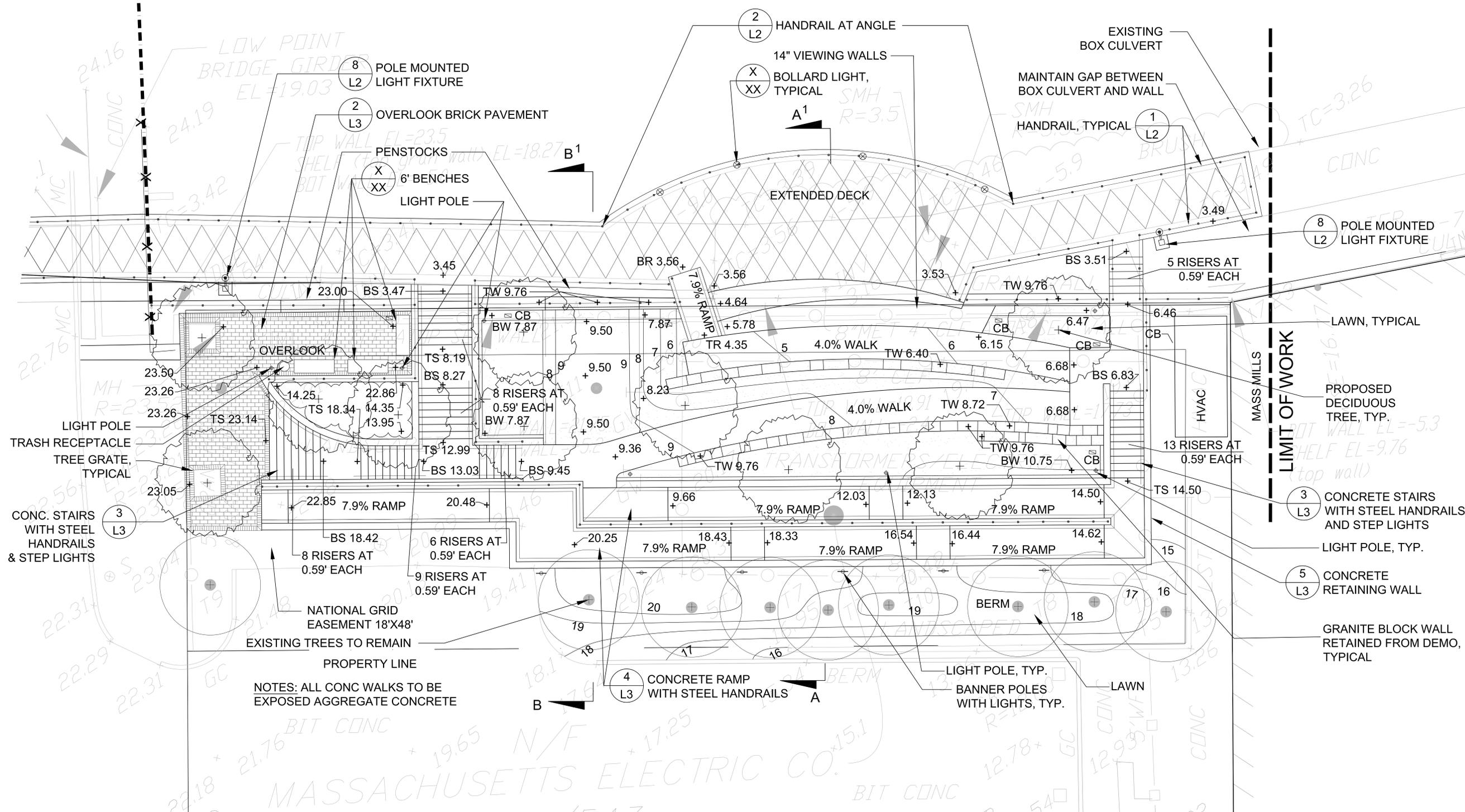
**C R J : A**  
 CAROL R JOHNSON ASSOCIATES, INC





KEYPLAN  
N.T.S.

MERRIMACK RIVER



NOTES: ALL CONC WALKS TO BE EXPOSED AGGREGATE CONCRETE

SCALE: 1" = 5'-0"

REV	DATE	BY	SUB	APP	DESCRIPTION

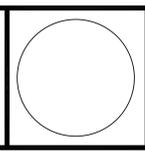
DESIGN DEVELOPMENT

LANDSCAPE ARCHITECT:  
**C R J : A**  
CAROL R JOHNSON ASSOCIATES INC

ARCHITECT:  
FENNICK MCCREDIE

ENGINEER:  
AMMAN AND WHITNEY

PERMITTING:  
TRC



City of Lowell, Massachusetts

## Lowell Riverwalk Phase II

DESIGNED BY  
KZ

DRAWN BY  
CR

CHECKED BY  
JA

IN CHARGE  
JA

LAYOUT & MATERIALS PLAN

FILE NAME

DATE  
FEBRUARY 12, 2008

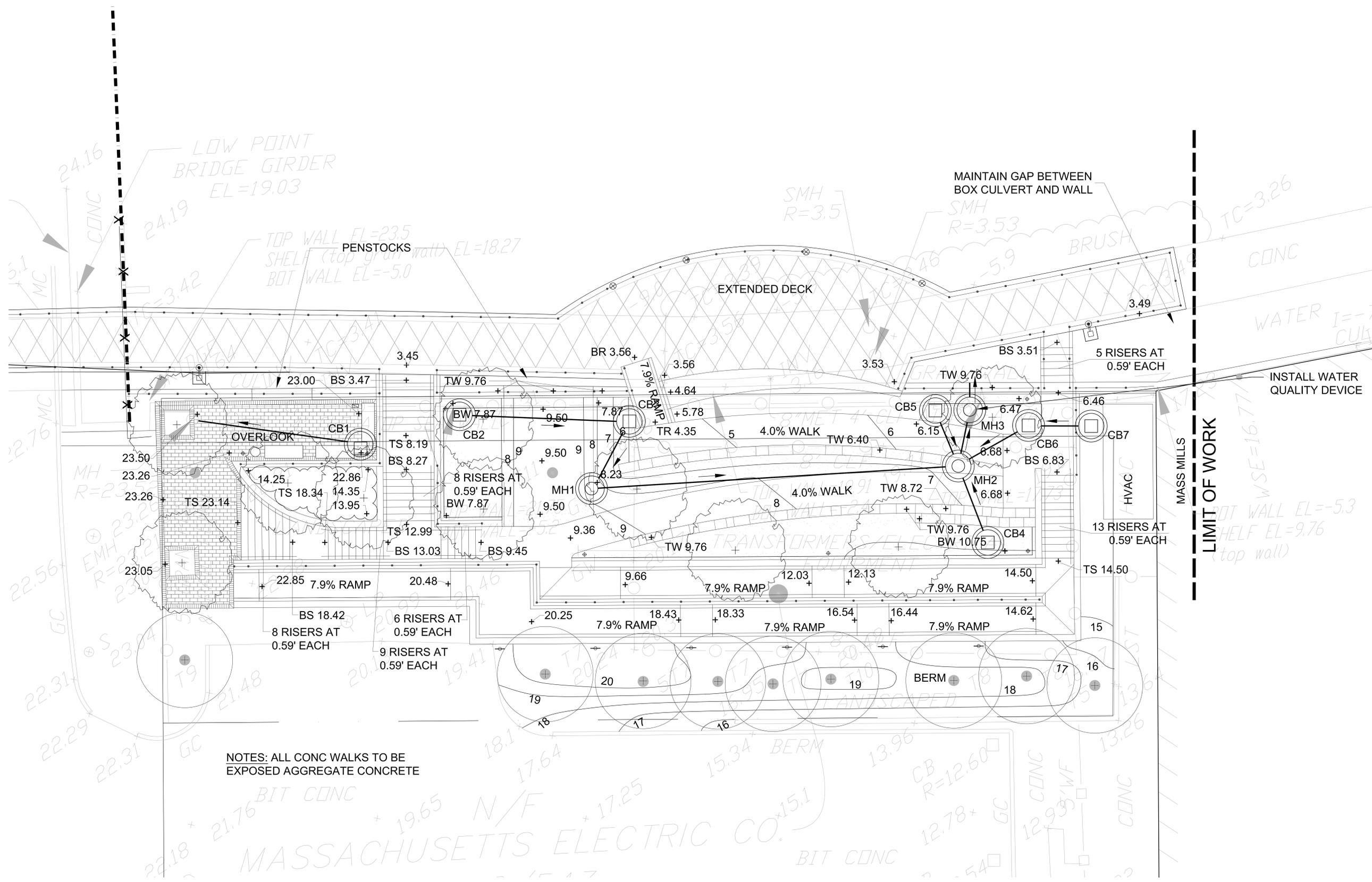
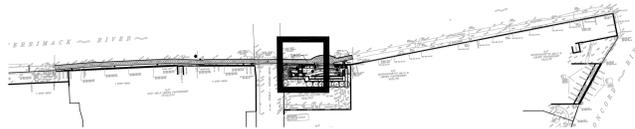
SCALE:  
AS NOTED

CONTRACT NO.  
XXXXX

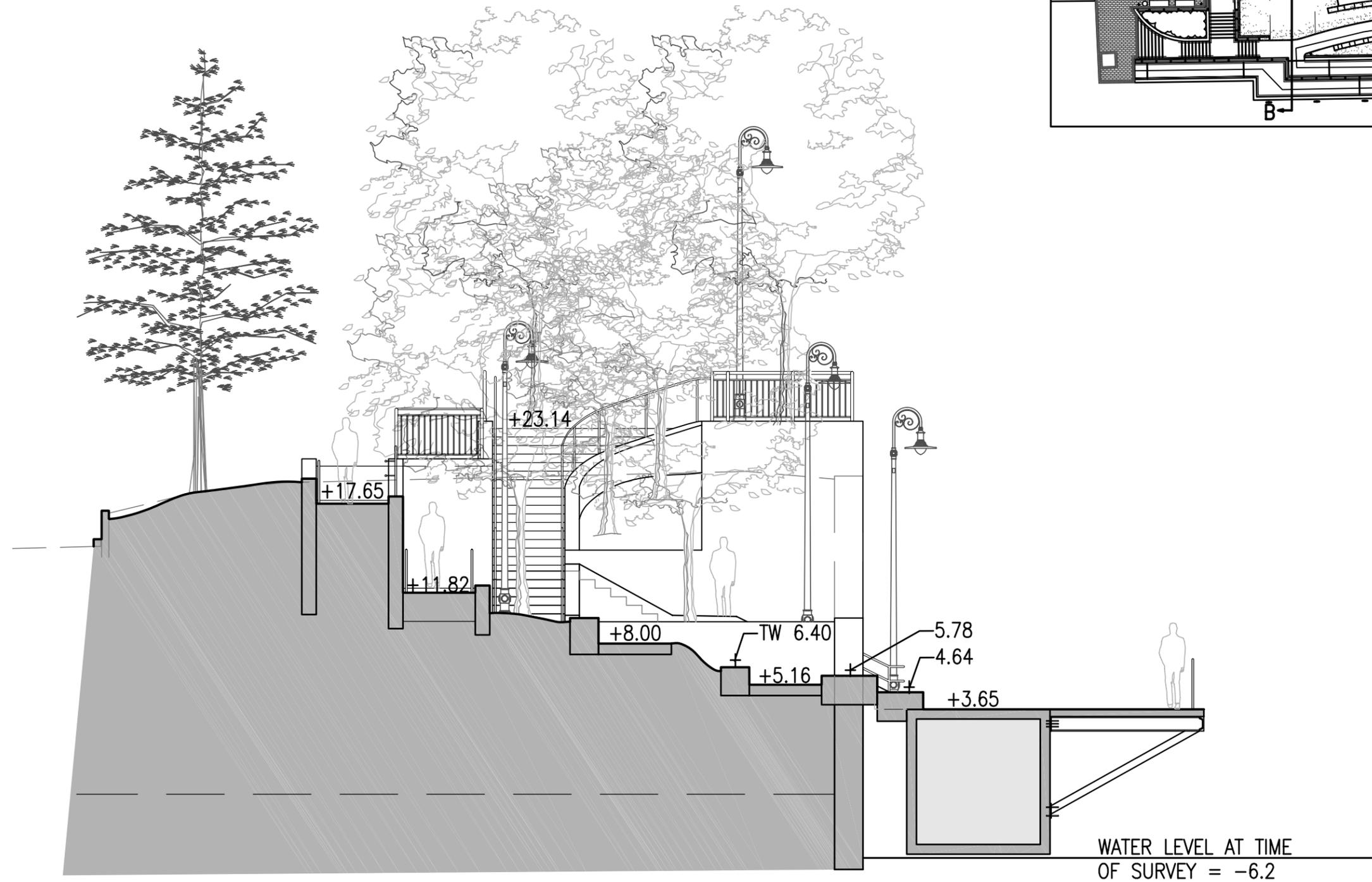
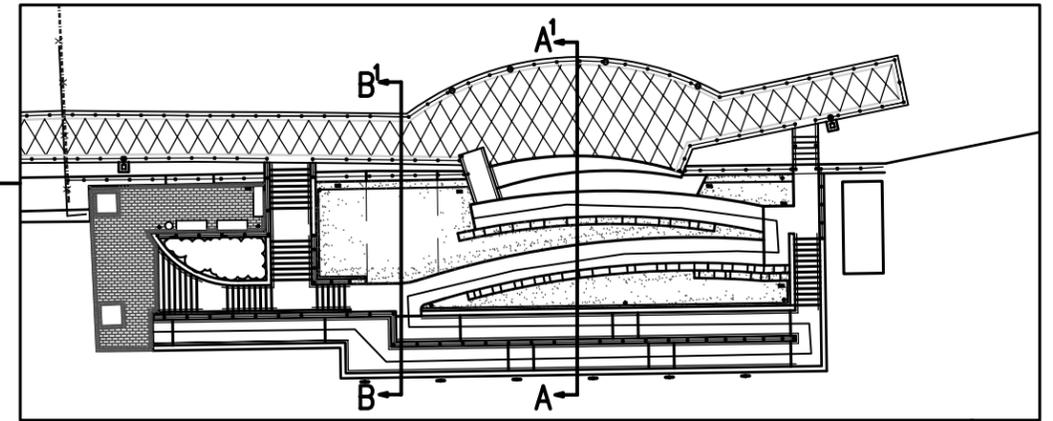
DRAWING NO.  
**L1**

REV.



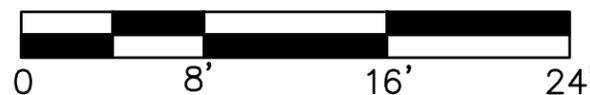


**SECTION VIEW:  
SECTION A**



**LOWELL RIVERWALK PHASE II**  
 LOWELL, MASSACHUSETTS  
 MAY 2008

HORIZONTAL SCALE: 1" = 8'-0"  
 VERTICAL SCALE: 1" = 8'-0"



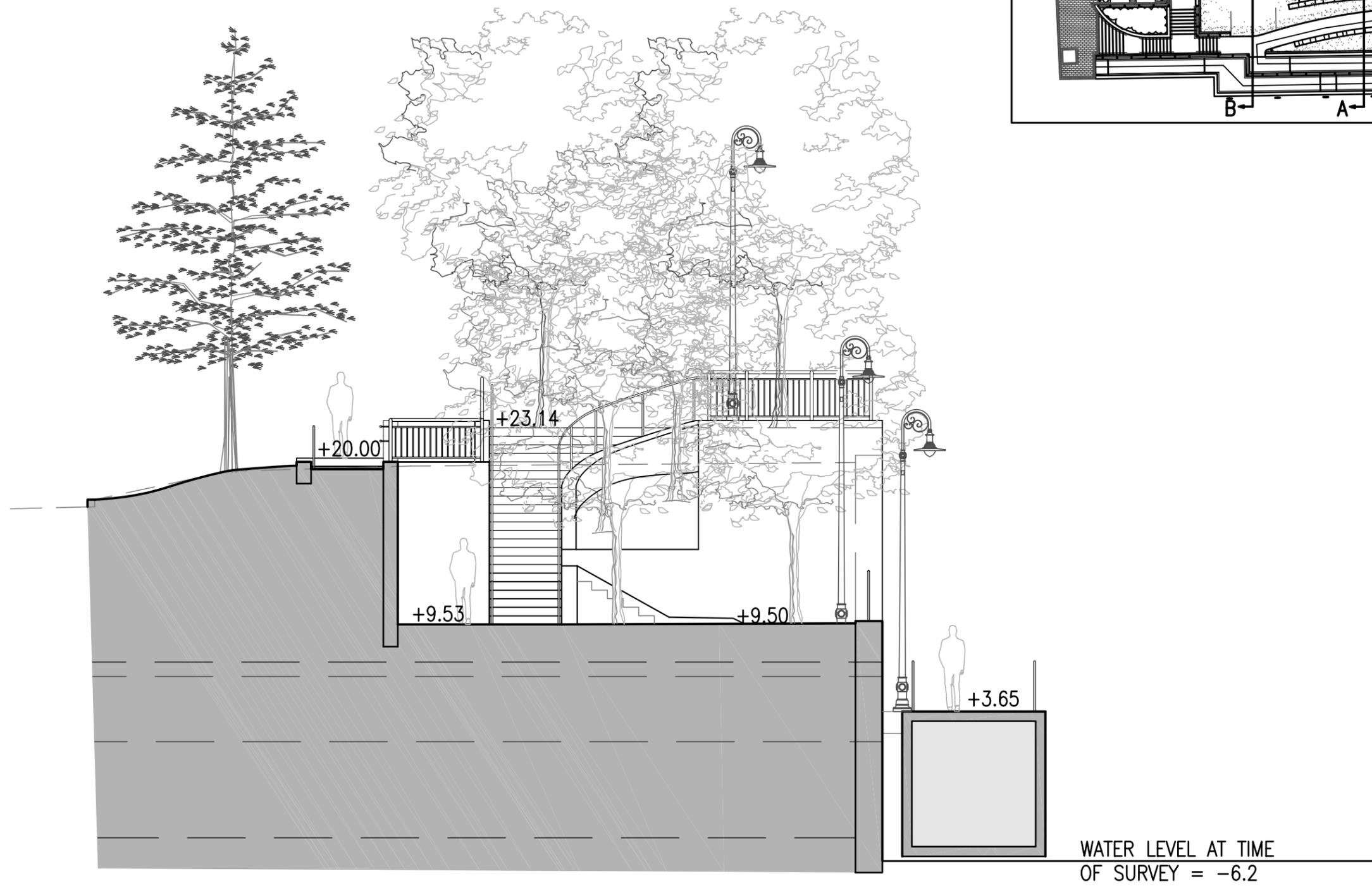
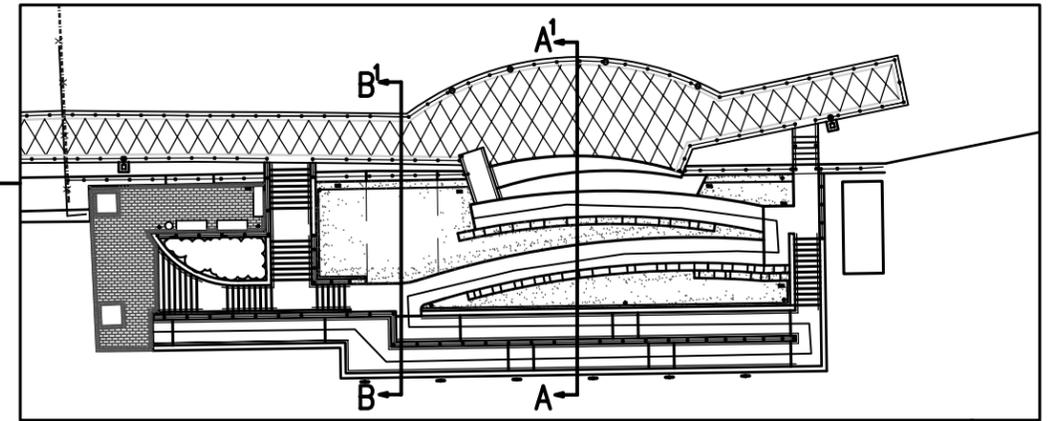
STRUCTURAL  
 ENGINEER:

AMMANN & WHITNEY  
 BOSTON, MA

LANDSCAPE ARCHITECTS:

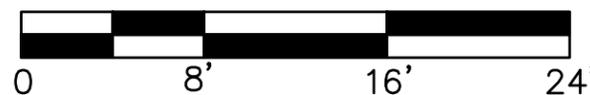
**C R J : A**  
 CAROL R JOHNSON ASSOCIATES, INC

**SECTION VIEW:  
SECTION B**



**LOWELL RIVERWALK PHASE II**  
LOWELL, MASSACHUSETTS  
MAY 2008

HORIZONTAL SCALE: 1" = 8'-0"  
VERTICAL SCALE: 1" = 8'-0"



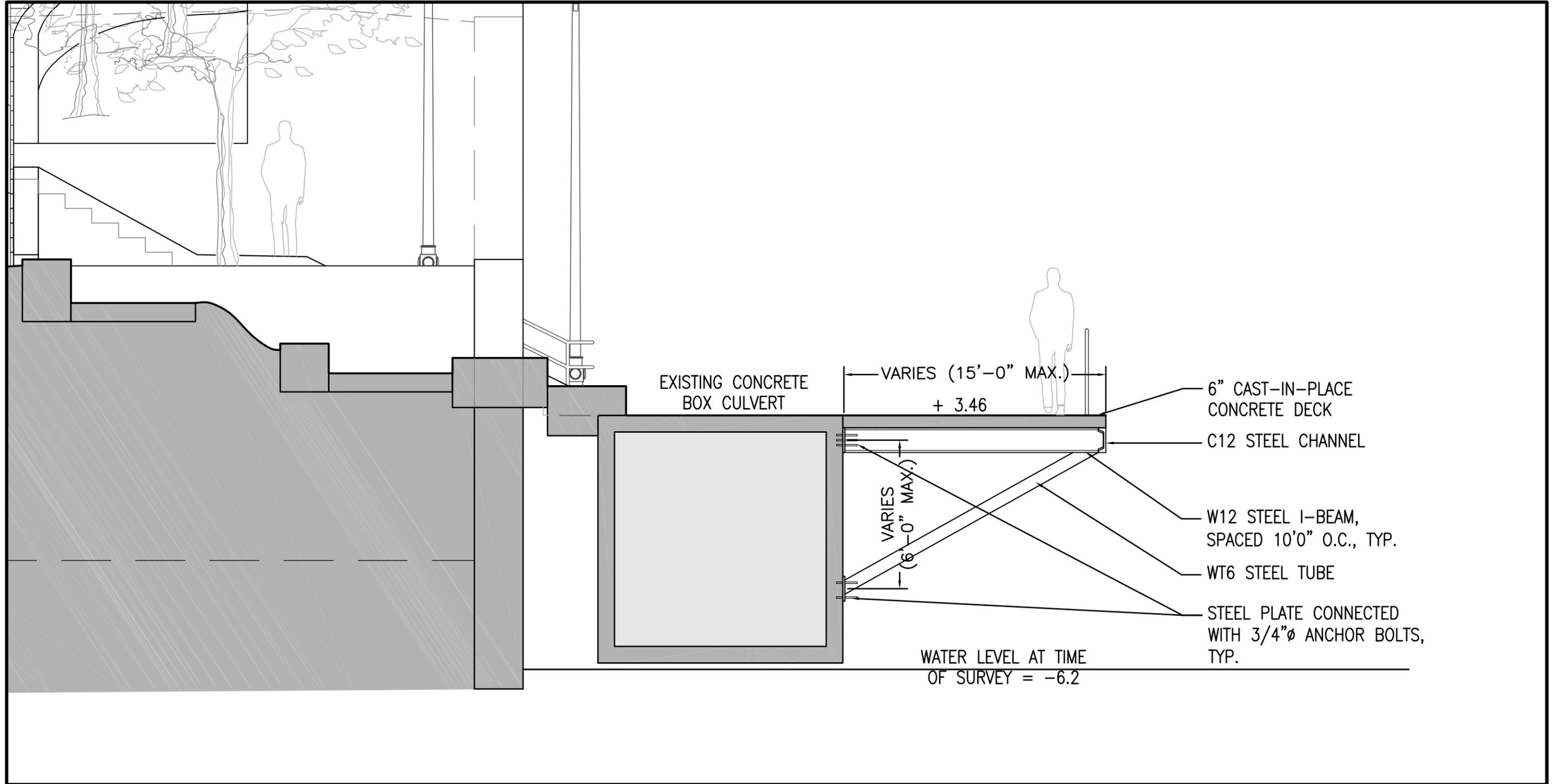
STRUCTURAL  
ENGINEER:

AMMANN & WHITNEY  
BOSTON, MA

LANDSCAPE ARCHITECTS:

**C R J : A**  
CAROL R JOHNSON ASSOCIATES, INC

**PROFILE VIEW:  
CANTILEVER DECKING OVER MERRIMACK RIVER**



**LOWELL RIVERWALK PHASE II**  
LOWELL, MASSACHUSETTS  
MAY 2008

HORIZONTAL SCALE: 1" = 4'-0"  
VERTICAL SCALE: 1" = 4'-0"



STRUCTURAL  
ENGINEER:

AMMANN & WHITNEY  
BOSTON, MA

LANDSCAPE ARCHITECTS:

**C R J : A**  
CAROL R JOHNSON ASSOCIATES, INC

**APPENDIX B**

**GEOPHYSICAL REPORT**

**GEOPHYSICAL SURVEY  
FOR UTILITIES  
FORMER NATIONAL GRID SUBSTATION  
175 BRIDGE STREET  
LOWELL, MA**

*Prepared for:*

TRC  
650 Suffolk Street  
Lowell, MA 01854

*Prepared by:*

Hager GeoScience, Inc.  
596 Main Street  
Woburn, MA 01801

File 2014011  
April 2014

Copyright © 2014, Hager GeoScience, Inc. All rights reserved.

*Hager GeoScience, Inc.*

## **1.0 INTRODUCTION**

This report details the results of the geophysical conducted by Hager GeoScience, Inc. (HGI) for TRC at the former National Grid substation located at 175 Bridge Street in Lowell, Massachusetts. The objective of the survey was to locate utilities and two large penstocks prior to drilling.

## **2.0 DATA ACQUISITION**

HGI personnel performed the survey during the day on April 3<sup>rd</sup>, 2014, using ground penetrating radar (GPR) supplemented by Ditch Witch Subsite 950 R/T and 3M Dynatel 2250 precision utility locators (PUL). A TRC representative was onsite to delineate the extent of the survey area.

HGI personnel used spray paint and fiberglass tapes to lay out a survey grid covering all accessible portions of the project area.

Discussions specific to the GPR and PUL collection are provided below, while Appendix A provides more general discussions of the methods and their limitations.

### **2.1 GPR Data Acquisition**

GPR data were collected using a Geophysical Survey Systems, Inc. (GSSI) SIR-3000 digital acquisition system. Both 400- and 200-MHz data were collected along bidirectional traverses spaced no more than 5 feet apart, using a survey wheel for horizontal distance control. A 100-MHz antenna was used separately to collect GPR data along approximate east-west traverses spaced 5 feet apart with the objective of locating the north-south-aligned deeper penstocks. All data were displayed in real time on the system's color monitor while being simultaneously recorded onto a flash drive.

The effective GPR signal penetration was variable and ranged from approximately 5 to 7 feet and 10 to 15 feet below grade for the 400- and 200-MHz antennas, respectively. The 100-MHz antenna reached an effective depth of 25 to 30 feet below grade. Identifying targets below these respective depths was difficult.

Table 1 in Appendix B shows the pertinent parameters used for the GPR data collection.

Data from the GPR survey were downloaded to a PC at the HGI office for processing and analysis using GSSI's RADAN® 7 software.

## **2.2 Precision Utility Locating**

Ditch Witch Subsite 950 R/T and 3M Dynatel 2250 Precision Utility Locators (PUL) were used in conjunction with the GPR method to provide real-time utility locating. Where utilities were physically accessible (e.g., hydrant, water valve, etc.) the Subsite transmitter box was directly coupled with them in order to propagate a current with a unique frequency along the conductive conduit or utility. A receiver wand was then used to identify the location of the connected utility. The Subsite receiver was also used independently of the transmitter box in passive 50/60 Hz and radio mode to locate live electric lines. The Dynatel was used to sweep the survey area for underground utilities that had no surface features on which to induce a current.

The PUL-identified utilities were marked in the field with spray paint using industry-standard colors and their locations surveyed in using HGI's GPS system (see below).

## **2.3 GPS**

HGI used its Sokkia 2700 ISX RTK GPS to locate the survey grid, as well as surface features such as catch basins and manholes. The Sokkia system provided a relative accuracy of less than 0.164 feet horizontally and 0.328 feet vertically for points in the Massachusetts State Plane coordinate system.

## **3.0 DATA REDUCTION AND ANALYSIS**

The downloaded GPR data were archived, processed, and analyzed using GSSI's RADAN® 7. Prior to analysis, the raw GPR data required processing to reduce the detrimental effects of site-specific noise associated with interfering background frequency signals and reflections from surface and subsurface structures. The processed records were then used to construct 3D models of the surveyed areas. 3D models are useful for viewing the spatial qualities of the data and identifying subtle spatial features that may not be apparent in individual 2D records. The 3D models were sliced horizontally and vertically to observe patterns of GPR anomalies present in the radar data.

Each 2D record was also individually evaluated for possible anomalies. Preliminary interpretations based on analysis of the individual 2D records were plotted and evaluated in a spatial context using the 3D model. Conversely, spatial anomalies observed in the 3D model were re-examined on the individual records to ensure that all possible anomalies were evaluated.

The interpreted individual GPR targets were then exported to AutoCAD, where linear trends and areal anomalies were determined.

## 4.0 RESULTS

The results of the survey area shown on Plate 1, an AutoCAD map created from HGI's GPR interpretations and the base map "8-1-12-Riverwalk Easement Plan.dwg" provided by TRC.

The two known penstocks are shown in orange on Plate 1. The penstock located at the center of the survey area was fully characterized; however, the penstock located on the west edge of the survey area, toward Bridge Street, could only be partially mapped.

Multiple linear and discrete anomalies were observed in the GPR records, but no utilities were detected with the PUL.

The "Potential Utility/Linear Anomaly" category represents utilities that could not be categorized as to type. Short segments in this category may represent sections of utilities or buried debris. Dashed lines/shapes indicate a lower confidence level in the interpretation, tildes indicate the termination of a potential utility/linear feature in the GPR records, and arrows indicate the possible continuation of a linear feature beyond the survey area. The utilities are color-coded in accordance with industry-accepted standards.

The "GPR-Identified - Anomaly" and "GPR-Identified - Anomalous Zone" categories (cyan) represent anomalies or anomalous areas with geometry and/or signal strength that stands out from the background GPR signal. The "GPR-Identified - Anomaly" category represents a single anomaly, while the "GPR-Identified - Anomalous Zone" category represents an area containing multiple individual anomalies or an area that stands out from the background GPR signal. These anomalies should be considered potential obstructions and can have causes ranging from changes in the soil/fill to buried debris. GPR anomaly and anomalous zone shapes may vary from those depicted in the legend. The shape of each anomaly reflects the general outline that best fits that anomaly or anomalous area and may not actually reflect the shape of the potential subsurface obstruction.

GPR-identified features are labeled with their approximate depth in feet below ground surface. Depths shown adjacent to both GPR-identified utilities and anomalies are intended to indicate the approximate top of the utility or anomaly, not its vertical extent. These depths are based on velocity migration calculations and are approximate.

In order to meet the objectives of the geophysical investigation, HGI used a conservative approach for anomaly identification. Obstructions of varying types can produce many unique and non-unique responses, particularly in the GPR records. Even slight variations in the GPR signals may be caused by legitimate obstructions and should be considered suspect. However, a subsurface medium with a high degree of heterogeneity (e.g., fill containing bricks, cobbles, etc.) can produce a large number of GPR anomalies that might not be considered obstructions by others.

HGI recommends a minimum buffer of 2 to 3 feet on either side of the utility centerlines indicated on the map due to utility dimensions and inaccuracies from grid creation, data collection, and survey locating. It should be noted that GPR is an indirect method and thus cannot unambiguously determine the physical properties of anomalies, or that all reflectors interpreted as utilities or anomalies are related (see Limitations Section). In areas of particular concern, we recommend hand digging.

## APPENDIX A: THE GEOPHYSICAL METHODS

### A.1 Ground Penetrating Radar (GPR)

**A.1.1 Description of the Method.** The principle of ground penetrating radar (GPR) is the same as that used by police radar, except that GPR transmits electromagnetic energy into the ground. The energy is reflected back to the surface from interfaces between materials with contrasting electrical (dielectric and conductivity) and physical properties. The greater the contrast between two materials in the subsurface, the stronger the reflection observed on the GPR record. The depth of GPR signal penetration depends on the properties of the subsurface materials and the frequency of the antenna used to collect radar data. The lower the antenna frequency, the greater the signal penetration, but the lower the signal resolution.

**A.1.2 Data Collection.** HGI collects GPR data using a Geophysical Survey Systems (GSSI) SIR 2, 20, 2000 or 3000 ground penetrating radar system. Data are digitally recorded on the internal hard drive or flash memory of the GPR system. System controls allow the GPR operator to filter out noise, attributed to coupling noise caused by conductive soil conditions, spurious noise caused by local EMF fields, and internal system noise. For shallow surveys, we use antennas with center frequencies ranging from 2000- to 400-megahertz (MHz). For deeper penetration, we use lower frequency antennas ranging from 300 MHz to 15 MHz, depending on the anticipated target depth and the degree of signal penetration. All of these antenna configurations can collect data in continuous mode, distance mode, or as discrete point measurements using signal-stacking techniques. Since there is a trade-off between signal penetration and resolution, test data are sometimes collected using antennas at several different frequencies, with the highest frequency antenna that produces the highest quality data used. In some cases, data are collected with several antenna frequencies.

The horizontal scale of the GPR record shows distance along the survey traverse. In the continuous data collection mode, the horizontal scale on each GPR record is determined by the antenna speed along the surface. When a survey wheel is used, the GPR system records data with a fixed number of traces per unit distance. The GPR record is automatically marked at specified distance intervals along the survey line. The vertical scale of the radar record is determined by the velocity of the transmitted signal in the media under study and the range setting, or recording time window of the GPR system. The recording time interval, or range, represents the maximum two-way travel time in which data are recorded. The conversion of the two-way travel time of the transmitted signals to depth is determined by the propagation velocity of the GPR signal, which is site (media) specific. When little or no information is available about the makeup of subsurface materials, we estimate propagation velocities from handbook values and experience at similar sites or by CDP velocity surveys with a bi-static antenna.

**A.1.3 Data Processing.** After completion of data collection, the GPR data are transferred to a PC for review and processing using RADAN® software. When appropriate, we prepare 3D models of GPR data, which can be sliced in the X, Y, and Z directions.

The size, shape, and amplitude of GPR reflections are used to interpret GPR data. Objects such as metallic UST's and utilities produce reflections with high amplitude and distinctive hyperbolic shapes. Clay, concrete pipes, boulders and other in-situ features may produce radar signatures of similar shape but lower amplitude. The boundaries between saturated and unsaturated materials such as sand and clay, bedrock and overburden, generally also produce strong reflections.

**A.1.4 Limitations of the Method.** GPR signal penetration is site-specific. It is determined by the dielectric properties of local soil and fill materials. GPR signals propagate well in resistive materials such as sand and gravel; however, soils containing clay, ash- or cinder-laden fill or fill saturated with brackish or otherwise electrically conductive groundwater cause GPR signal attenuation and loss of target resolution. Concrete containing rebar or wire mesh also inhibits signal penetration.

The interpreted depths of objects detected using GPR are based on on-site calibration, handbook values, and/or estimated GPR signal propagation velocities from similar sites. GPR velocities and depth estimates may vary if the medium under investigation or soil water content is not uniform throughout the site.

Utilities are interpreted on the basis of reflections of similar size and depth that exhibit a linear trend; however GPR cannot unambiguously determine that all such reflectors are related. Fiberglass USTs or utilities composed of plastic or clay may be difficult to detect if situated in soils with similar electromagnetic properties, or if situated in fill with other reflecting targets that generate "clutter" or signal scattering and thus obscure other deeper reflectors. Objects buried beneath reinforced concrete pads or slabs may also be difficult, but possible, to detect.

As a rule of thumb, GPR can resolve utilities with a diameter of 1" per foot of depth (i.e., a 1"-diameter utility can be detected to a burial depth of 1 foot).

Changes in the speed at which the GPR antenna is moved along the surface causes slight variations in the horizontal scale of the recorded traverse. Distance interpolation may be performed to minimize the error in interpreted object positions. The variation in the horizontal scale of the GPR record may be controlled, to a certain extent, with a distance encoder or survey wheel. The GPR antenna produces a cone-shaped signal pattern that emanates approximately 45 degrees from horizontal front and back of the antenna. Therefore, buried objects may be detected before the antenna is located directly over them. GPR anomalies may appear larger than actual target dimensions.

GPR interpretation is more subjective than other geophysical methods. The interpretive method is based on the identification of reflection patterns that do not uniquely identify a subsurface target. Borings, test pits, site utility plans and other ground-truth are recommended to verify the interpreted GPR results.

## **A.2 Precision Utility Locating (PUL)**

**A.2.1 Description of the Method.** HGI uses a Schonstedt MAC-51B, Ditch Witch SUBSITE 950 R/T precision utility locators, and/or a 3M Dynatel 2250 pipe and cable locator for utility location. The locator is a two-part system consisting of a signal transmitter and receiver. In active mode using the transmitter, utilities are traced by inducing a variety of signals onto exposed portions of conduits and piping. Alternatively, in the absence of convenient exposures, signals can be induced onto the lines by placing the transmitter on the ground above the suspected utility location. The receiver can also be used without the transmitter as a magnetic locator or to detect signal emissions (e.g., 60 Hertz for electric lines) at specific frequencies.

**A.2.2 Limitations of the Method.** Mapping subsurface objects, pipes, and utilities using a locator depends on recognizing physical phenomena at the ground surface. These phenomena can be electromagnetic waves or magnetic fields that are interpreted as being caused by subsurface objects. These waves or fields, however, can be attenuated and/or distorted by factors including soil moisture, steel reinforced concrete, and proximity to other surface and subsurface utilities. It has been found that vertical depth resolution beyond 5 feet below grade is questionable.

## **A.3 RTK GNSS Global Positioning System (GPS)**

**A.3.1 Description of the Method.** The RTK GPS system consists of a base (reference) receiver and a roving receiver. The base receiver remains stationary during a survey and is mounted on a tribrach and tripod. A rover receiver is used to record points remotely and can be mounted on a staff, vehicle, or other object. The base provides real-time corrections to the rover over a radio connection. The system can produce accuracy on a centimeter scale, but the level of accuracy depends on factors that include the geometry of the transmitting satellites and the receivers' view of the horizons. (e.g., the density of buildings and trees). The data can be collected as quickly as 1 Hz or 1 reading per second.

**A.3.2 Data Collection.** We perform our GPS surveys using a Sokkia GNSS RTK 2700 ISX. The base station can be set up over a known or unknown point, with the position taken from satellite information. Once the system has achieved a fixed solution for the rover receiver, data points can be collected with survey-grade (centimeter-scale) precision. When GPS points are being collected at a site where the fixed solution is constantly lost and gained, points are checked multiple times for precision. All data points are saved to an Allegro CX field computer.

**A.3.3 Data Processing.** The GPS data are corrected automatically by the base receiver in the field prior to being recorded. If the base station is located on an unknown point that is later defined, the GPS data can be corrected in the office to fit the real world coordinates.

**A.3.4 Limitations of the Method.** The quality of the GPS signal is site-specific. The base and rover receiver need to have clear views of the horizon and good satellite geometry to achieve the

highest level of accuracy and precision. Although a fixed solution can be achieved in wooded environments or sites with taller buildings, it may take more time to achieve the solutions, the fixed solution may be lost frequently when moving the rover, and in some cases the fixed solution may be wrong. Each of these situations requires longer to locate data points accurately and precisely. When the point is too close to a building, beneath a building overhang, under a tree, or obscured by some other object, a fixed solution may not be possible.

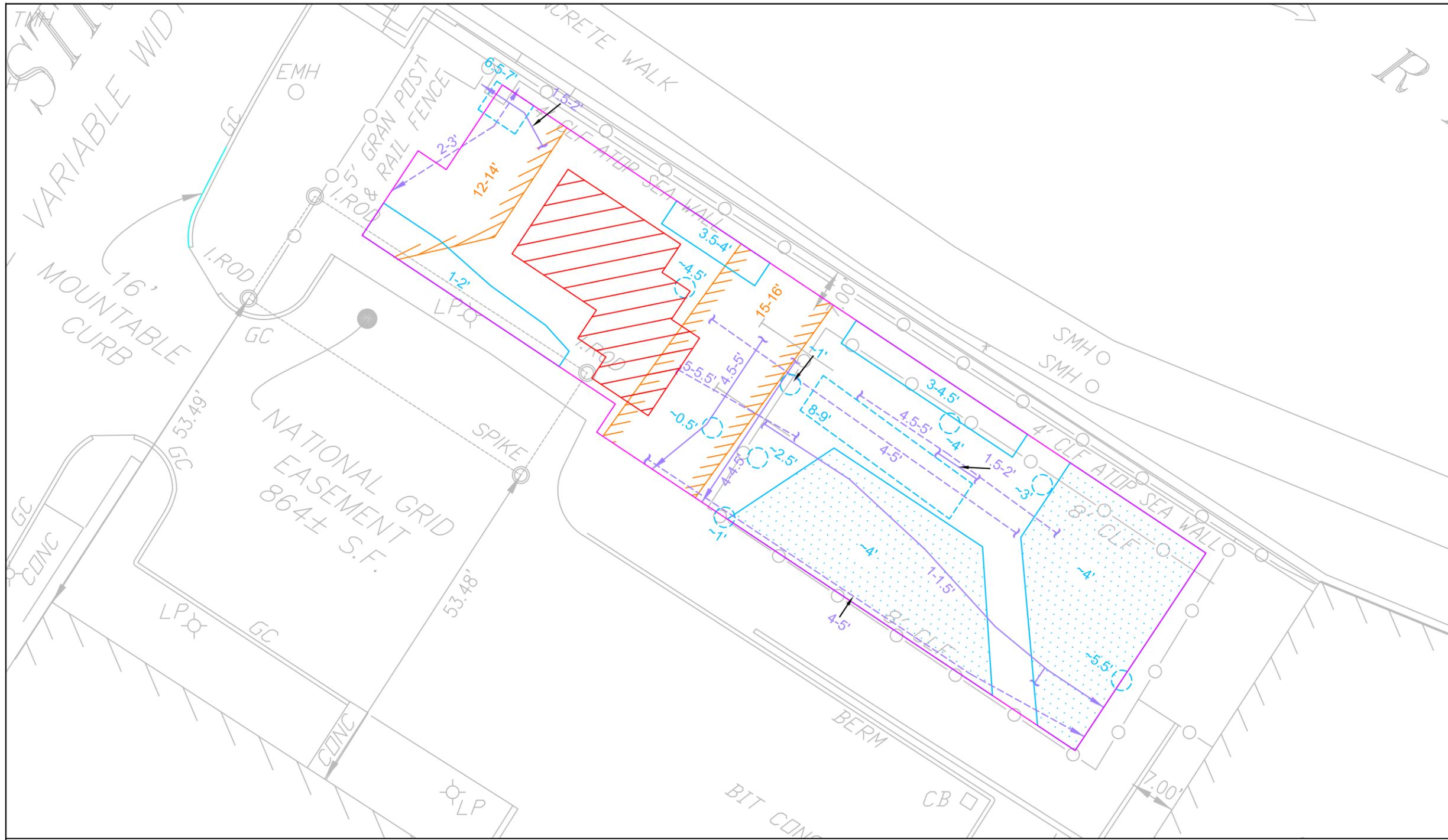
When the base station is set up over an unknown point, the survey data location can be at least several tens of meters from the real world location. The data points will have survey grade precision relative to the location of the base station and other data points, but will have a real world accuracy discrepancy.

HGI does not guarantee to produce a surveyor-quality map from its GPS data, as this is not its profession. If survey-level accuracy is critical for a project, we recommend hiring professional surveyors for that purpose.

**APPENDIX B: TABLE**

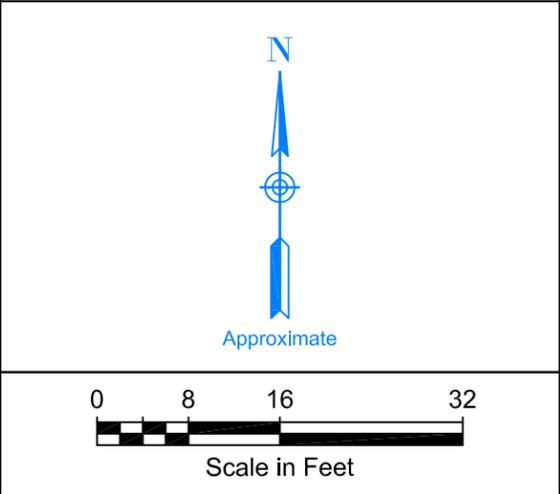
**Table 1  
GPR Survey Acquisition Parameters**

<b>Antenna Frequency (MHz)</b>	<b>Range (ns)</b>	<b>Survey Mode</b>	<b>Scan Rate (per sec)</b>	<b>Scan Rate (per ft)</b>	<b>Sample Rate (samples)</b>	<b>Effective Signal Depth (ft)</b>
400	110	Wheel	120	32	512	5-7
200	200	Wheel	120	32	512	10-15
100	500	Wheel	120	16	515	25-30



**LEGEND**

	GPR Survey Extent
	1-1.5' GPR-Identified - Utility /Linear Anomaly
	GPR-Identified Penstock
	1-1.5' GPR-Identified - Anomaly
	1-1.5' GPR-Identified - Anomalous Zone
	Obstruction - No Data



**NOTES:**

- 1.) The base map was created from HGI field notes, interpretations, and the file "8-1-12-Riverwalk Easement Plan.dwg" provided by TRC.
- 2.) HGI's contributions to the base map are listed in the legend. All other features are from the file listed above and have been grayed.
- 3.) The locations of utilities and obstructions presented by HGI are a "best fit" to the base map and should be considered approximate.
- 4.) The "~" symbol indicates the termination of a utility or the inability of the geophysical tool to resolve that utility.
- 5.) An arrow ending a feature indicates the possible continuation of that feature beyond the surveyed limits.
- 6.) Dashed GPR-identified utilities indicate lower confidence in the interpretation of the feature.
- 7.) Values listed with GPR-identified features are depths in feet; depths of GPR-identified features are based on GPR two way travel time velocity conversions and are approximate.
- 8.) GPR-identified utilities are categorized based on their proximity to surface features (e.g., manholes, catch basins, hydrants, etc.).
- 9.) The "GPR-Identified - Anomaly" and "GPR-Identified - Anomalous Zone" categories represent anomalies or anomalous areas with geometry and/or signal strength that stands out from the background GPR signal. The "GPR-Identified - Anomaly" category represents a single anomaly, while the "GPR-Identified - Anomalous Zone" category represents an area containing multiple individual anomalies or an area that stands out from the background GPR signal. These anomalies can have causes ranging from changes in the soil/fill to buried debris.
- 10.) GPR anomaly and anomalous zone shapes may vary from those depicted in the legend. The shape of each anomaly reflects the general outline that best fits that anomaly or anomalous area and may not actually reflect the shape of the potential subsurface obstruction.
- 11.) Utility information presented on the base map not identified by HGI should be considered as present during any drilling or excavation activities.
- 12.) HGI recommends a minimum buffer of 2 to 3 feet on either side of utility centerlines and around anomaly extents as indicated on the map due to utility dimensions and inaccuracies from grid creation, data collection, and survey locating. We recommend a larger buffer for electric lines, and further that they be turned off prior to excavating. In addition, it should be assumed that utilities that appear to terminate prior to crossing any excavation may actually continue, but could not be traced farther with GPR and/or PUL. Drilling and/or excavating should proceed with caution.

**Plate 1**

APRIL 2014	FILE NO. 2014011
Geophysical Survey GPR and PUL Interpretation Map Former National Grid Substation 175 Bridge Street Lowell, MA	
<b>Hager GeoScience, Inc.</b> 596 Main Street, Woburn, MA 01801 (781) 935-8111 hgi@hagergeoscience.com	
<b>NOT ALL SUBSURFACE FEATURES            MAY BE DEPICTED ON THIS MAP</b>	

**APPENDIX C**

**SOIL BORING LOGS**



650 Suffolk Street  
 Lowell, MA  
 Telephone: 978-970-5600  
 Fax: 978-453-1995

# BORING/WELL CONSTRUCTION LOG

CLIENT/PROJECT NUMBER Lowell Riverwalk/ 183757 SCREEN TYPE/SLOT NA  
 BORING/WELL NUMBER SB-1 FILTER PACK TYPE NA  
 TRC GEOLOGIST Jamie Stapleton SEAL TYPE NA  
 DRILLING CONTRACTOR/FOREMAN GeoSearch/Kenny Byland DEPTH TO WATER (Approximate Feet) NA  
 DATE DRILLED 4/21/2014 TOTAL DEPTH (Feet) 19  
 LOCATION Eastern side of site. GROUND ELEVATION (Feet) 20  
 SAMPLING METHOD 24" Split Spoon REFERENCE ELEVATION (Feet) NA  
 DRILLING METHOD Hand Auger and Hollow Stem Auger  
 NOTES Hand Augered to 3 feet. SB-1A refusal @ 16 ft, SB-1B refusal @ 12 ft, SB-1C refusal @ 12 ft, SB-1D refusal @ 12.5 ft.

DEPTH (ft. BGL)	BLOW COUNTS	PEN/REC (INCHES)	CORE #	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	Field Testing (ppm)	SAMPLE ID/ TIME	WELL DIAGRAM		
1					Hand-augered to 3 feet. Dry, light brown, fine SAND, some silt, trace subangular gravel (SM/FILL).			No Monitoring Well Installed		
2										SB-1 (0-3') for Composite
3					Auger through boulder to 5 feet.					SB-1 (3') for VOCs
4										
5	2	24/13"				Dry, light brown, fine SAND, some silt (SM/FILL).	0.3			
6	4									
7	5									
8	6	24/18"				Dry, light brown, fine SAND, some silt, trace subangular gravel (SM/FILL).	0.0			
9	6									
10	4	24/9"				6" Dry to slightly moist, light brown, fine to medium SAND, some silt (SM/FILL).	2.1			SB-1 (3-14.5') for Composite
11	6									
12	8					3" Slightly moist, dark brown to black ASH, some brick, some fine sand (FILL).				SB-1 (10') for VOCs
13	29									
14	38	21/7"				Dry, light gray ROCK fragments (FILL).	1.2			
15	31									
16	20				Auger through cobble to 13 feet.					
17	50/3"				3" Dry to slightly moist, light brown, fine SAND, some silt (SM).	0.6				
18	2	18/10"			7" Dry to slightly moist, brown, fine SAND, some silt (less than above) (SM).					
19	10									
20	30				Auger through cobble to 15 feet.					
21	50/0"									



650 Suffolk Street  
 Lowell, MA  
 Telephone: 978-970-5600  
 Fax: 978-453-1995

# BORING/WELL CONSTRUCTION LOG

**BORING/WELL NUMBER** SB-1

**DATE DRILLED** 4/21/2014

DEPTH (ft. BGL)	BLOW COUNTS	PEN/REC (INCHES)	CORE #	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	Field Testing (ppm)	SAMPLE ID/ TIME	WELL DIAGRAM
16	7 9 14 11	24/6"			Dry, dark brown, fine to medium SAND, some silt (SM).	1.2		
17	3	24/12"			Dry to moist, tan, fine SAND, some silt, trace subangular fine gravel (SM).	0.1		
18	4 9 6				Dry, brown to dark brown, fine SAND, some medium sand and silt, trace coarse sand (SM).			
19					End of Exploration. Auger refusal @ 16 feet, Split Spoon advanced to 19 feet.			



650 Suffolk Street  
 Lowell, MA  
 Telephone: 978-970-5600  
 Fax: 978-453-1995

# BORING/WELL CONSTRUCTION LOG

CLIENT/PROJECT NUMBER Lowell Riverwalk/ 183757 SCREEN TYPE/SLOT NA  
 BORING/WELL NUMBER SB-2 FILTER PACK TYPE NA  
 TRC GEOLOGIST Jamie Stapleton SEAL TYPE NA  
 DRILLING CONTRACTOR/FOREMAN GeoSearch/Kenny Byland DEPTH TO WATER (Approximate Feet) NA  
 DATE DRILLED 4/21/2014 TOTAL DEPTH (Feet) 26  
 LOCATION Central portion of site. GROUND ELEVATION (Feet) 21  
 SAMPLING METHOD 24" Split Spoon REFERENCE ELEVATION (Feet) NA  
 DRILLING METHOD Hollow Stem Auger  
 NOTES Composite lithology from SB-2A refusal @ 11 ft, SB-2B refusal @ 17.75 ft, SB-2C refusal @ 13.5 ft and SB-2D refusal @ 26 ft.

DEPTH (ft. BGL)	BLOW COUNTS	PEN/REC (INCHES)	CORE #	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	Field Testing (ppm)	SAMPLE ID/ TIME	WELL DIAGRAM
1	8 8 10 11	24/18"			Dry, light brown, fine to medium SAND with little silt (SM/FILL).	0.0		No Monitoring Well Installed
2	11 27 12 14	24/12"			Dry, light brown, fine to medium SAND with little silt (SM/FILL).	0.8		
4	7 20 12 6	24/18"			Dry, light brown, fine to medium SAND with little silt and brick (SM/FILL).	0.0		
6	5 2 5 3	24/4"			Dry, brown, fine to medium SAND, little gravel (SM/FILL).	1.3	SB-2 (0-14') for Composite	
8	0 2 3 5	24/11"			Dry, dark brown fine to medium SAND, some silt, little broken rock fragments (SM/FILL).	0.5	SB-2 (10') for VOCs	
9					Dry, black fine SAND, with ash and black soot (FILL).			
10	3 5 50/3"	15/9"			Dry, dark brown, fine to medium SAND, some silt (SM/FILL).	0.1		
11					Augered through cobble to 12 feet.			
12	6 12 20 50/2"	20/15"			Moist, greenish brown to olive brown, fine SAND, some silt (more than above) little medium SAND (SM/FILL).	1.8	SB-2 (12') for VOCs	
13					Augered through boulder to 15 feet.			
14								
15								



650 Suffolk Street  
 Lowell, MA  
 Telephone: 978-970-5600  
 Fax: 978-453-1995

# BORING/WELL CONSTRUCTION LOG

**BORING/WELL NUMBER** SB-2

**DATE DRILLED** 4/21/2014

DEPTH (ft. BGL)	BLOW COUNTS	PEN/REC (INCHES)	CORE #	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	Field Testing (ppm)	SAMPLE ID/TIME	WELL DIAGRAM
16	3 5 5 6	24/0"			No Recovery.			
17	17 50/3"	9/8"			Moist, dark brown, fine to medium SAND, some to little clay and silt (SM/FILL).	1.0		
18	1 1 1 1	24/3"			Augered through cobble to 18 feet. Moist, black, fine SAND with ash and clinkers (FILL).	0.2		
20	1 1 1 1	24/3"			Moist, black, fine SAND, some silt, little medium sand, trace clay (SM/FILL).	0.2		
22	1 1 1 1	24/11"			Wet, FILL (boiler slag, clinkers, brick fragments) with some fine sand, trace fines (FILL).	0.3		
24	10 12 12 8	24/9"			Wet, dark brown, fine to coarse SAND with SILT (SM).	0.0		
26	50/0"				End of Exploration @ 26 feet (auger and split spoon refusal).			



650 Suffolk Street  
 Lowell, MA  
 Telephone: 978-970-5600  
 Fax: 978-453-1995

# BORING/WELL CONSTRUCTION LOG

CLIENT/PROJECT NUMBER Lowell Riverwalk/ 183757 SCREEN TYPE/SLOT NA  
 BORING/WELL NUMBER SB-3 FILTER PACK TYPE NA  
 TRC GEOLOGIST Jamie Stapleton SEAL TYPE NA  
 DRILLING CONTRACTOR/FOREMAN GeoSearch/Kenny Byland DEPTH TO WATER (Approximate Feet) NA  
 DATE DRILLED 4/22/2014 & 4/23/2014 TOTAL DEPTH (Feet) 68  
 LOCATION Western side of site. GROUND ELEVATION (Feet) 22  
 SAMPLING METHOD 24" Split Spoon REFERENCE ELEVATION (Feet) NA  
 DRILLING METHOD Hollow Stem Auger/ Drive & Wash  
 NOTES Resumed drilling for rock coring on 4/23/2014.

DEPTH (ft. BGL)	BLOW COUNTS	PEN/REC (INCHES)	CORE #	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	Field Testing (ppm)	SAMPLE ID/ TIME	WELL DIAGRAM	
1	8	24/4"			Dry, gray, fine to medium SAND, some coarse sand and silt, little clay and fine gravel (SM/FILL).	0.0		No Monitoring Well Installed	
2	6	24/10"			4" Dry, gray, fine to medium SAND, some coarse sand and silt, little clay and fine gravel (SM/FILL). 6" Dry, light brown, fine SAND, some silt (SM/FILL).	0.0			
3	7								
4	7								
5	4	24/15"			Dry, brown, fine to medium SAND, some silt, trace gravel and brick fragments (SM/FILL).	0.7			
6	5								
7	6								
8	8	24/13			Dry, dark brown, fine SAND, some ash and clinkers, trace brick fragments (SM/FILL).	1.8			
9	16								
10	13	24/12"			Dry, dark brown, fine to medium SAND, some silt little brick fragments and ash (SM/FILL).	NA	SB-3 (7) for VOCs SB-3 (0-14') for Composite		
11	20								
12	2	24/8"			Moist, brown, fine SAND, some brick (SP/FILL).	0.5			
13	4								
14	6	24/6"			Moist, brown, fine SAND, some medium sand, ash, cinders and brick fragments (SW/FILL).	0.0			
15	3								
16	4	24/8"			Dry, black FILL (cinders, ash, clinkers), some fine to medium sand (FILL).	0.5			
17	6								
18	10	24/9"			Dry, black FILL (cinders, ash, clinkers), some fine to medium sand (FILL).	1.0			
19	2								
20	2	24/10"			Dry, black FILL (cinders, ash, clinkers), some fine to medium sand (FILL).	1.0			
21	3								
22	4	21/7"			Dry, black FILL (cinders, ash, clinkers), some fine to medium sand. Broken cobble in spoon (FILL).	0.0			
23	6								
24	3								
25	54	24/7"			Wet, brown, FILL (ash, cinders, clinkers), some fine sand and silt (FILL).	0.0			
	13								
	13								
	50/3"				Auger through cobble to 23 feet.				
	1								
	1								
	1								
	1								



650 Suffolk Street  
 Lowell, MA  
 Telephone: 978-970-5600  
 Fax: 978-453-1995

# BORING/WELL CONSTRUCTION LOG

**BORING/WELL NUMBER** SB-3

**DATE DRILLED** 4/22/2014 & 4/23/2014

DEPTH (ft. BGL)	BLOW COUNTS	PEN/REC (INCHES)	CORE #	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	Field Testing (ppm)	SAMPLE ID/TIME	WELL DIAGRAM
26	WOH	24/8"			Wet, brown, FILL (ash, cinders, clinkers), some fine sand and silt (FILL).	0.0		
27	WOH	24/8"			Wet, brown, FILL (ash, cinders, clinkers), some fine sand and silt (FILL).	0.0		
28	WOH							
29	WOH							
30	1				Auger through CONCRETE with rebar (FILL).			
31	23	7/24"			Wet, fine SAND and SILT (slough) (SM).	0.0		
32	50/1"				End of Soil Boring @ 30.5 feet (Auger refusal on 4/22/2014. Auger to 30.5 feet on 4/23/2014 with CME-75). 7" Dark phyllitic section with quartz intrusion recovered via NX rock core. Advance roller bit and split spoons.			
33								
34								
35								
36	3	24/16"			Wet, gray SILT, some clay (ML).	0.7		
37	3							
38	6							
39	7	24/13"			Wet, gray SILT, some clay (ML).	No Odor		
40	5							
41	6	24/14"			Wet, gray SILT, some clay, little fine sand (ML).	No Odor		
42	6							
43	8	24/15"			Wet, gray SILT, little clay (ML).	No Odor		
44	8							
45	8	24/24"			12" Wet, gray SILT, some clay, little fine sand (ML).	No Odor		
46	10							
47	10				12" Wet, gray CLAY with SILT (CL-ML).			
48	12				Advance SplitSpoons.			
49								
50								
51								
52								
53								



650 Suffolk Street  
 Lowell, MA  
 Telephone: 978-970-5600  
 Fax: 978-453-1995

# BORING/WELL CONSTRUCTION LOG

**BORING/WELL NUMBER** SB-3

**DATE DRILLED** 4/22/2014 & 4/23/2014

DEPTH (ft. BGL)	BLOW COUNTS	PEN/REC (INCHES)	CORE #	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	Field Testing (ppm)	SAMPLE ID/ TIME	WELL DIAGRAM
54	8 9 12 12	24/1"				NA		
55								
56								
57								
58								
59								
60								
61								
62								
63								
64								
65								
66								
67								
68								
					Wet, gray SILT, some clay (ML).			
					Rollerbit to 68 feet.			
					End of Exploration @ 68 feet (potential bedrock).			



650 Suffolk Street  
 Lowell, MA  
 Telephone: 978-970-5600  
 Fax: 978-453-1995

# BORING/WELL CONSTRUCTION LOG

**CLIENT/PROJECT NUMBER** Lowell Riverwalk/ 183757      **SCREEN TYPE/SLOT** NA  
**BORING/WELL NUMBER** SB-4      **FILTER PACK TYPE** NA  
**TRC GEOLOGIST** Jamie Stapleton      **SEAL TYPE** NA  
**DRILLING CONTRACTOR/FOREMAN** GeoSearch/Donny Seczney      **DEPTH TO WATER (Approximate Feet)** NA  
**DATE DRILLED** 4/21/2014      **TOTAL DEPTH (Feet)** 10  
**LOCATION** Overlying tailrace.      **GROUND ELEVATION (Feet)** 21.5  
**SAMPLING METHOD** NA      **REFERENCE ELEVATION (Feet)** NA  
**DRILLING METHOD** Vacuum Rig  
**NOTES** \_\_\_\_\_

DEPTH (ft. BGL)	BLOW COUNTS	PEN/REC (INCHES)	CORE #	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	Field Testing (ppm)	SAMPLE ID/TIME	WELL DIAGRAM	
1	NA	NA	NA		No Lithologic Description.	NA			No Monitoring Well Installed
2									
3									
4									
5									
6									
7									
8									
9									
10									



650 Suffolk Street  
 Lowell, MA  
 Telephone: 978-970-5600  
 Fax: 978-453-1995

# BORING/WELL CONSTRUCTION LOG

**CLIENT/PROJECT NUMBER** Lowell Riverwalk/ 183757      **SCREEN TYPE/SLOT** NA  
**BORING/WELL NUMBER** SB-5      **FILTER PACK TYPE** NA  
**TRC GEOLOGIST** Jamie Stapleton      **SEAL TYPE** NA  
**DRILLING CONTRACTOR/FOREMAN** GeoSearch/Donny Seczney      **DEPTH TO WATER (Approximate Feet)** NA  
**DATE DRILLED** 4/21/2014      **TOTAL DEPTH (Feet)** 10  
**LOCATION** Overlying tailrace.      **GROUND ELEVATION (Feet)** 21.5  
**SAMPLING METHOD** NA      **REFERENCE ELEVATION (Feet)** NA  
**DRILLING METHOD** Vacuum Rig  
**NOTES** \_\_\_\_\_

DEPTH (ft. BGL)	BLOW COUNTS	PEN/REC (INCHES)	CORE #	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	Field Testing (ppm)	SAMPLE ID/ TIME	WELL DIAGRAM	
1	NA	NA	NA		No Lithologic Description.	NA			No Monitoring Well Installed
2									
3									
4									
5									
6									
7									
8									
9									
10									
					End of Exploration @ 10 feet (refusal)				



650 Suffolk Street  
 Lowell, MA  
 Telephone: 978-970-5600  
 Fax: 978-453-1995

# BORING/WELL CONSTRUCTION LOG

**CLIENT/PROJECT NUMBER** Lowell Riverwalk/ 183757      **SCREEN TYPE/SLOT** NA  
**BORING/WELL NUMBER** SB-6      **FILTER PACK TYPE** NA  
**TRC GEOLOGIST** Jamie Stapleton      **SEAL TYPE** NA  
**DRILLING CONTRACTOR/FOREMAN** GeoSearch/Donny Seczney      **DEPTH TO WATER (Approximate Feet)** NA  
**DATE DRILLED** 4/21/2014      **TOTAL DEPTH (Feet)** 10  
**LOCATION** Overlying tailrace.      **GROUND ELEVATION (Feet)** 21.5  
**SAMPLING METHOD** NA      **REFERENCE ELEVATION (Feet)** NA  
**DRILLING METHOD** Vacuum Rig  
**NOTES** \_\_\_\_\_

DEPTH (ft. BGL)	BLOW COUNTS	PEN/REC (INCHES)	CORE #	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	Field Testing (ppm)	SAMPLE ID/TIME	WELL DIAGRAM	
1	NA	NA	NA		No Lithologic Description.	NA			No Monitoring Well Installed
2									
3									
4									
5									
6									
7									
8									
9									
10									



650 Suffolk Street  
 Lowell, MA  
 Telephone: 978-970-5600  
 Fax: 978-453-1995

# BORING/WELL CONSTRUCTION LOG

**CLIENT/PROJECT NUMBER** Lowell Riverwalk/ 183757      **SCREEN TYPE/SLOT** NA  
**BORING/WELL NUMBER** SB-7      **FILTER PACK TYPE** NA  
**TRC GEOLOGIST** Jamie Stapleton      **SEAL TYPE** NA  
**DRILLING CONTRACTOR/FOREMAN** GeoSearch/Donny Seczney      **DEPTH TO WATER (Approximate Feet)** NA  
**DATE DRILLED** 4/21/2014      **TOTAL DEPTH (Feet)** 10  
**LOCATION** Overlying tailrace.      **GROUND ELEVATION (Feet)** 21.5  
**SAMPLING METHOD** NA      **REFERENCE ELEVATION (Feet)** NA  
**DRILLING METHOD** Vacuum Rig  
**NOTES** \_\_\_\_\_

DEPTH (ft. BGL)	BLOW COUNTS	PEN/REC (INCHES)	CORE #	GRAPHIC LOG	LITHOLOGIC DESCRIPTION	Field Testing (ppm)	SAMPLE ID/ TIME	WELL DIAGRAM	
1	NA	NA	NA		No Lithologic Description.	NA			No Monitoring Well Installed
2									
3									
4									
5									
6									
7									
8									
9									
10									

## **APPENDIX D**

# **LABORATORY ANALYTICAL REPORTS**



## ANALYTICAL REPORT

Lab Number:	L1408396
Client:	TRC Environmental Consultants Wannalancit Mills 650 Suffolk Street Lowell, MA 01854
ATTN:	Matt Robbins
Phone:	(978) 656-3549
Project Name:	RIVER WALK
Project Number:	183757
Report Date:	05/06/14

The original project report/data package is held by Alpha Analytical. This report/data package is paginated and should be reproduced only in its entirety. Alpha Analytical holds no responsibility for results and/or data that are not consistent with the original.

Certifications & Approvals: MA (M-MA086), NY (11148), CT (PH-0574), NH (2003), NJ NELAP (MA935), RI (LAO00065), ME (MA00086), PA (68-03671), USDA (Permit #P-330-11-00240), NC (666), TX (T104704476), DOD (L2217), US Army Corps of Engineers.

---

Eight Walkup Drive, Westborough, MA 01581-1019  
508-898-9220 (Fax) 508-898-9193 800-624-9220 - [www.alphalab.com](http://www.alphalab.com)



**Project Name:** RIVER WALK  
**Project Number:** 183757

**Lab Number:** L1408396  
**Report Date:** 05/06/14

<b>Alpha Sample ID</b>	<b>Client ID</b>	<b>Sample Location</b>	<b>Collection Date/Time</b>
L1408396-01	SB-1 (3')	179 BRIDGE ST. LOWELL, MA	04/21/14 09:15
L1408396-02	SB-1 (0-3')	179 BRIDGE ST. LOWELL, MA	04/21/14 09:10
L1408396-03	SB-2 (12')	179 BRIDGE ST. LOWELL, MA	04/21/14 11:05
L1408396-04	SB-2 (0-14')	179 BRIDGE ST. LOWELL, MA	04/21/14 11:10
L1408396-05	SB-1 (10')	179 BRIDGE ST. LOWELL, MA	04/21/14 15:55
L1408396-06	SB-1 (3-14.5')	179 BRIDGE ST. LOWELL, MA	04/21/14 16:00

Project Name: RIVER WALK

Lab Number: L1408396

Project Number: 183757

Report Date: 05/06/14

**MADEP MCP Response Action Analytical Report Certification**

**This form provides certifications for all samples performed by MCP methods. Please refer to the Sample Results and Container Information sections of this report for specification of MCP methods used for each analysis. The following questions pertain only to MCP Analytical Methods.**

<b>An affirmative response to questions A through F is required for "Presumptive Certainty" status</b>		
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
B	Were the analytical method(s) and all associated QC requirements specified in the selected CAM protocol(s) followed?	YES
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
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data?"	YES
E a.	VPH, EPH, and APH Methods only: Was each method conducted without significant modification(s)? (Refer to the individual method(s) for a list of significant modifications).	N/A
E b.	APH and TO-15 Methods only: Was the complete analyte list reported for each method?	N/A
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
<b>A response to questions G, H and I is required for "Presumptive Certainty" status</b>		
G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)?	NO
H	Were all QC performance standards specified in the CAM protocol(s) achieved?	NO
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?	NO
<b>For any questions answered "No", please refer to the case narrative section on the following page(s).</b>		

**Please note that sample matrix information is located in the Sample Results section of this report.**



**Project Name:** RIVER WALK  
**Project Number:** 183757

**Lab Number:** L1408396  
**Report Date:** 05/06/14

### Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet all of the requirements of NELAC, for all NELAC accredited parameters. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. Performance criteria for CAM and RCP methods allow for some LCS compound failures to occur and still be within method compliance. In these instances, the specific failures are not narrated but are noted in the associated QC table. This information is also incorporated in the Data Usability format for our Data Merger tool where it can be reviewed along with any associated usability implications. Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances the specific failure is not narrated but noted in the associated QC table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

#### HOLD POLICY

For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Client Service Representative and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Client Services at 800-624-9220 with any questions.

---

**Project Name:** RIVER WALK  
**Project Number:** 183757

**Lab Number:** L1408396  
**Report Date:** 05/06/14

### Case Narrative (continued)

#### MCP Related Narratives

##### Volatile Organics

In reference to question G:

L1408396-03 and -05: The analysis of Volatile Organics by EPA Method 5035/8260 Low Level could not be performed due to the elevated concentrations of target compounds in the sample, therefore, one or more of the target analytes did not achieve the requested CAM reporting limits.

In reference to question H:

The WG687160-1 LCS recovery, associated with L1408396-03 and -05, is below the individual acceptance criteria for 1,2-dibromo-3-chloropropane (68%), but within the overall method allowances. The results of the associated samples are reported; however, all results are considered to have a potentially low bias for this compound.

The WG687161-1 LCS recovery, associated with L1408396-01, is below the individual acceptance criteria for 1,2-dibromo-3-chloropropane (68%), but within the overall method allowances. The results of the associated samples are reported; however, all results are considered to have a potentially low bias for this compound.

The initial calibration, associated with L1408396-01, -03, and -05, did not meet the method required minimum response factor on the lowest calibration standard for 4-methyl-2-pentanone (0.05585), as well as the average response factor for 2-butanone and 4-methyl-2-pentanone.

The continuing calibration standards, associated with L1408396-01, -03, and -05, are outside the acceptance criteria for several compounds; however, they are within overall method allowances. Copies of the continuing calibration standards are included as addenda to this report.

##### Semivolatile Organics

L1408396-06 was re-analyzed on dilution in order to quantify the sample within the calibration range. The results should be considered estimated, and are qualified with an E flag, for any compounds that exceeded the calibration range in the initial analysis. The re-analysis was performed only for the compounds that exceeded the calibration range.

In reference to question G:

L1408396-04 has elevated detection limits due to the dilution required by the sample matrix, therefore, one or

**Project Name:** RIVER WALK  
**Project Number:** 183757

**Lab Number:** L1408396  
**Report Date:** 05/06/14

### Case Narrative (continued)

more of the target analytes did not achieve the requested CAM reporting limits.

In reference to question H:

The surrogate recoveries for L1408396-04 are below the acceptance criteria for 2-fluorophenol, phenol-d6, nitrobenzene-d5, 2-fluorobiphenyl, 2,4,6-tribromophenol, and 4-terphenyl-d14 (all 0%) due to the dilution required to quantitate the sample. Re-extraction was not required; therefore, the results of the original analysis are reported.

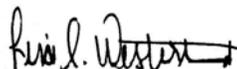
#### Metals

In reference to question I:

All samples were analyzed for a subset of MCP elements per the Chain of Custody.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature:

 Lisa Westerlind

Title: Technical Director/Representative

Date: 05/06/14

# ORGANICS

# VOLATILES

**Project Name:** RIVER WALK**Lab Number:** L1408396**Project Number:** 183757**Report Date:** 05/06/14**SAMPLE RESULTS**

**Lab ID:** L1408396-01  
**Client ID:** SB-1 (3')  
**Sample Location:** 179 BRIDGE ST. LOWELL, MA  
**Matrix:** Soil  
**Analytical Method:** 97,8260C  
**Analytical Date:** 05/02/14 09:48  
**Analyst:** MV  
**Percent Solids:** 93%

**Date Collected:** 04/21/14 09:15  
**Date Received:** 04/22/14  
**Field Prep:** Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
<b>MCP Volatile Organics by 8260/5035 - Westborough Lab</b>						
Methylene chloride	ND		ug/kg	6.2	--	1
1,1-Dichloroethane	ND		ug/kg	0.94	--	1
Chloroform	ND		ug/kg	0.94	--	1
Carbon tetrachloride	ND		ug/kg	0.62	--	1
1,2-Dichloropropane	ND		ug/kg	2.2	--	1
Dibromochloromethane	ND		ug/kg	0.62	--	1
1,1,2-Trichloroethane	ND		ug/kg	0.94	--	1
Tetrachloroethene	ND		ug/kg	0.62	--	1
Chlorobenzene	ND		ug/kg	0.62	--	1
Trichlorofluoromethane	ND		ug/kg	2.5	--	1
1,2-Dichloroethane	ND		ug/kg	0.62	--	1
1,1,1-Trichloroethane	ND		ug/kg	0.62	--	1
Bromodichloromethane	ND		ug/kg	0.62	--	1
trans-1,3-Dichloropropene	ND		ug/kg	0.62	--	1
cis-1,3-Dichloropropene	ND		ug/kg	0.62	--	1
1,1-Dichloropropene	ND		ug/kg	2.5	--	1
Bromoform	ND		ug/kg	2.5	--	1
1,1,2,2-Tetrachloroethane	ND		ug/kg	0.62	--	1
Benzene	ND		ug/kg	0.62	--	1
Toluene	ND		ug/kg	0.94	--	1
Ethylbenzene	ND		ug/kg	0.62	--	1
Chloromethane	ND		ug/kg	2.5	--	1
Bromomethane	ND		ug/kg	1.2	--	1
Vinyl chloride	ND		ug/kg	1.2	--	1
Chloroethane	ND		ug/kg	1.2	--	1
1,1-Dichloroethene	ND		ug/kg	0.62	--	1
trans-1,2-Dichloroethene	ND		ug/kg	0.94	--	1
Trichloroethene	ND		ug/kg	0.62	--	1
1,2-Dichlorobenzene	ND		ug/kg	2.5	--	1
1,3-Dichlorobenzene	ND		ug/kg	2.5	--	1
1,4-Dichlorobenzene	ND		ug/kg	2.5	--	1

Project Name: RIVER WALK

Lab Number: L1408396

Project Number: 183757

Report Date: 05/06/14

## SAMPLE RESULTS

Lab ID: L1408396-01

Date Collected: 04/21/14 09:15

Client ID: SB-1 (3')

Date Received: 04/22/14

Sample Location: 179 BRIDGE ST. LOWELL, MA

Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
MCP Volatile Organics by 8260/5035 - Westborough Lab						
Methyl tert butyl ether	ND		ug/kg	1.2	--	1
p/m-Xylene	ND		ug/kg	1.2	--	1
o-Xylene	ND		ug/kg	1.2	--	1
cis-1,2-Dichloroethene	ND		ug/kg	0.62	--	1
Dibromomethane	ND		ug/kg	2.5	--	1
1,2,3-Trichloropropane	ND		ug/kg	2.5	--	1
Styrene	ND		ug/kg	1.2	--	1
Dichlorodifluoromethane	ND		ug/kg	6.2	--	1
Acetone	ND		ug/kg	22	--	1
Carbon disulfide	ND		ug/kg	2.5	--	1
Methyl ethyl ketone	ND		ug/kg	6.2	--	1
Methyl isobutyl ketone	ND		ug/kg	6.2	--	1
2-Hexanone	ND		ug/kg	6.2	--	1
Bromochloromethane	ND		ug/kg	2.5	--	1
Tetrahydrofuran	ND		ug/kg	2.5	--	1
2,2-Dichloropropane	ND		ug/kg	3.1	--	1
1,2-Dibromoethane	ND		ug/kg	2.5	--	1
1,3-Dichloropropane	ND		ug/kg	2.5	--	1
1,1,1,2-Tetrachloroethane	ND		ug/kg	0.62	--	1
Bromobenzene	ND		ug/kg	3.1	--	1
n-Butylbenzene	ND		ug/kg	0.62	--	1
sec-Butylbenzene	ND		ug/kg	0.62	--	1
tert-Butylbenzene	ND		ug/kg	2.5	--	1
o-Chlorotoluene	ND		ug/kg	2.5	--	1
p-Chlorotoluene	ND		ug/kg	2.5	--	1
1,2-Dibromo-3-chloropropane	ND		ug/kg	2.5	--	1
Hexachlorobutadiene	ND		ug/kg	2.5	--	1
Isopropylbenzene	ND		ug/kg	0.62	--	1
p-Isopropyltoluene	ND		ug/kg	0.62	--	1
Naphthalene	ND		ug/kg	2.5	--	1
n-Propylbenzene	ND		ug/kg	0.62	--	1
1,2,3-Trichlorobenzene	ND		ug/kg	2.5	--	1
1,2,4-Trichlorobenzene	ND		ug/kg	2.5	--	1
1,3,5-Trimethylbenzene	ND		ug/kg	2.5	--	1
1,2,4-Trimethylbenzene	ND		ug/kg	2.5	--	1
Diethyl ether	ND		ug/kg	3.1	--	1
Diisopropyl Ether	ND		ug/kg	2.5	--	1
Ethyl-Tert-Butyl-Ether	ND		ug/kg	2.5	--	1
Tertiary-Amyl Methyl Ether	ND		ug/kg	2.5	--	1

**Project Name:** RIVER WALK**Lab Number:** L1408396**Project Number:** 183757**Report Date:** 05/06/14**SAMPLE RESULTS**

Lab ID: L1408396-01

Date Collected: 04/21/14 09:15

Client ID: SB-1 (3')

Date Received: 04/22/14

Sample Location: 179 BRIDGE ST. LOWELL, MA

Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
-----------	--------	-----------	-------	----	-----	-----------------

## MCP Volatile Organics by 8260/5035 - Westborough Lab

1,4-Dioxane	ND		ug/kg	25	--	1
-------------	----	--	-------	----	----	---

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	99		70-130
Toluene-d8	91		70-130
4-Bromofluorobenzene	98		70-130
Dibromofluoromethane	98		70-130

**Project Name:** RIVER WALK**Lab Number:** L1408396**Project Number:** 183757**Report Date:** 05/06/14**SAMPLE RESULTS**

**Lab ID:** L1408396-03  
**Client ID:** SB-2 (12')  
**Sample Location:** 179 BRIDGE ST. LOWELL, MA  
**Matrix:** Soil  
**Analytical Method:** 97,8260C  
**Analytical Date:** 05/02/14 10:14  
**Analyst:** MV  
**Percent Solids:** 92%

**Date Collected:** 04/21/14 11:05  
**Date Received:** 04/22/14  
**Field Prep:** Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
<b>MCP Volatile Organics by 8260/5035 - Westborough Lab</b>						
Methylene chloride	ND		ug/kg	900	--	1
1,1-Dichloroethane	ND		ug/kg	130	--	1
Chloroform	ND		ug/kg	130	--	1
Carbon tetrachloride	ND		ug/kg	90	--	1
1,2-Dichloropropane	ND		ug/kg	310	--	1
Dibromochloromethane	ND		ug/kg	90	--	1
1,1,2-Trichloroethane	ND		ug/kg	130	--	1
Tetrachloroethene	ND		ug/kg	90	--	1
Chlorobenzene	ND		ug/kg	90	--	1
Trichlorofluoromethane	ND		ug/kg	360	--	1
1,2-Dichloroethane	ND		ug/kg	90	--	1
1,1,1-Trichloroethane	ND		ug/kg	90	--	1
Bromodichloromethane	ND		ug/kg	90	--	1
trans-1,3-Dichloropropene	ND		ug/kg	90	--	1
cis-1,3-Dichloropropene	ND		ug/kg	90	--	1
1,1-Dichloropropene	ND		ug/kg	360	--	1
Bromoform	ND		ug/kg	360	--	1
1,1,2,2-Tetrachloroethane	ND		ug/kg	90	--	1
Benzene	ND		ug/kg	90	--	1
Toluene	ND		ug/kg	130	--	1
Ethylbenzene	ND		ug/kg	90	--	1
Chloromethane	ND		ug/kg	360	--	1
Bromomethane	ND		ug/kg	180	--	1
Vinyl chloride	ND		ug/kg	180	--	1
Chloroethane	ND		ug/kg	180	--	1
1,1-Dichloroethene	ND		ug/kg	90	--	1
trans-1,2-Dichloroethene	ND		ug/kg	130	--	1
Trichloroethene	ND		ug/kg	90	--	1
1,2-Dichlorobenzene	ND		ug/kg	360	--	1
1,3-Dichlorobenzene	ND		ug/kg	360	--	1
1,4-Dichlorobenzene	ND		ug/kg	360	--	1

Project Name: RIVER WALK

Lab Number: L1408396

Project Number: 183757

Report Date: 05/06/14

## SAMPLE RESULTS

Lab ID: L1408396-03

Date Collected: 04/21/14 11:05

Client ID: SB-2 (12')

Date Received: 04/22/14

Sample Location: 179 BRIDGE ST. LOWELL, MA

Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
MCP Volatile Organics by 8260/5035 - Westborough Lab						
Methyl tert butyl ether	ND		ug/kg	180	--	1
p/m-Xylene	ND		ug/kg	180	--	1
o-Xylene	ND		ug/kg	180	--	1
cis-1,2-Dichloroethene	ND		ug/kg	90	--	1
Dibromomethane	ND		ug/kg	360	--	1
1,2,3-Trichloropropane	ND		ug/kg	360	--	1
Styrene	ND		ug/kg	180	--	1
Dichlorodifluoromethane	ND		ug/kg	900	--	1
Acetone	ND		ug/kg	3200	--	1
Carbon disulfide	ND		ug/kg	360	--	1
Methyl ethyl ketone	ND		ug/kg	900	--	1
Methyl isobutyl ketone	ND		ug/kg	900	--	1
2-Hexanone	ND		ug/kg	900	--	1
Bromochloromethane	ND		ug/kg	360	--	1
Tetrahydrofuran	ND		ug/kg	360	--	1
2,2-Dichloropropane	ND		ug/kg	450	--	1
1,2-Dibromoethane	ND		ug/kg	360	--	1
1,3-Dichloropropane	ND		ug/kg	360	--	1
1,1,1,2-Tetrachloroethane	ND		ug/kg	90	--	1
Bromobenzene	ND		ug/kg	450	--	1
n-Butylbenzene	ND		ug/kg	90	--	1
sec-Butylbenzene	ND		ug/kg	90	--	1
tert-Butylbenzene	ND		ug/kg	360	--	1
o-Chlorotoluene	ND		ug/kg	360	--	1
p-Chlorotoluene	ND		ug/kg	360	--	1
1,2-Dibromo-3-chloropropane	ND		ug/kg	360	--	1
Hexachlorobutadiene	ND		ug/kg	360	--	1
Isopropylbenzene	ND		ug/kg	90	--	1
p-Isopropyltoluene	ND		ug/kg	90	--	1
Naphthalene	1300		ug/kg	360	--	1
n-Propylbenzene	ND		ug/kg	90	--	1
1,2,3-Trichlorobenzene	ND		ug/kg	360	--	1
1,2,4-Trichlorobenzene	ND		ug/kg	360	--	1
1,3,5-Trimethylbenzene	ND		ug/kg	360	--	1
1,2,4-Trimethylbenzene	ND		ug/kg	360	--	1
Diethyl ether	ND		ug/kg	450	--	1
Diisopropyl Ether	ND		ug/kg	360	--	1
Ethyl-Tert-Butyl-Ether	ND		ug/kg	360	--	1
Tertiary-Amyl Methyl Ether	ND		ug/kg	360	--	1

**Project Name:** RIVER WALK**Lab Number:** L1408396**Project Number:** 183757**Report Date:** 05/06/14**SAMPLE RESULTS**

Lab ID: L1408396-03

Date Collected: 04/21/14 11:05

Client ID: SB-2 (12')

Date Received: 04/22/14

Sample Location: 179 BRIDGE ST. LOWELL, MA

Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
-----------	--------	-----------	-------	----	-----	-----------------

## MCP Volatile Organics by 8260/5035 - Westborough Lab

1,4-Dioxane	ND		ug/kg	9000	--	1
-------------	----	--	-------	------	----	---

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	94		70-130
Toluene-d8	91		70-130
4-Bromofluorobenzene	96		70-130
Dibromofluoromethane	93		70-130

**Project Name:** RIVER WALK**Lab Number:** L1408396**Project Number:** 183757**Report Date:** 05/06/14**SAMPLE RESULTS**

Lab ID: L1408396-05  
 Client ID: SB-1 (10')  
 Sample Location: 179 BRIDGE ST. LOWELL, MA  
 Matrix: Soil  
 Analytical Method: 97,8260C  
 Analytical Date: 05/02/14 10:40  
 Analyst: MV  
 Percent Solids: 86%

Date Collected: 04/21/14 15:55  
 Date Received: 04/22/14  
 Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
<b>MCP Volatile Organics by 8260/5035 - Westborough Lab</b>						
Methylene chloride	ND		ug/kg	880	--	1
1,1-Dichloroethane	ND		ug/kg	130	--	1
Chloroform	ND		ug/kg	130	--	1
Carbon tetrachloride	ND		ug/kg	88	--	1
1,2-Dichloropropane	ND		ug/kg	310	--	1
Dibromochloromethane	ND		ug/kg	88	--	1
1,1,2-Trichloroethane	ND		ug/kg	130	--	1
Tetrachloroethene	ND		ug/kg	88	--	1
Chlorobenzene	ND		ug/kg	88	--	1
Trichlorofluoromethane	ND		ug/kg	350	--	1
1,2-Dichloroethane	ND		ug/kg	88	--	1
1,1,1-Trichloroethane	ND		ug/kg	88	--	1
Bromodichloromethane	ND		ug/kg	88	--	1
trans-1,3-Dichloropropene	ND		ug/kg	88	--	1
cis-1,3-Dichloropropene	ND		ug/kg	88	--	1
1,1-Dichloropropene	ND		ug/kg	350	--	1
Bromoform	ND		ug/kg	350	--	1
1,1,2,2-Tetrachloroethane	ND		ug/kg	88	--	1
Benzene	200		ug/kg	88	--	1
Toluene	ND		ug/kg	130	--	1
Ethylbenzene	ND		ug/kg	88	--	1
Chloromethane	ND		ug/kg	350	--	1
Bromomethane	ND		ug/kg	180	--	1
Vinyl chloride	ND		ug/kg	180	--	1
Chloroethane	ND		ug/kg	180	--	1
1,1-Dichloroethene	ND		ug/kg	88	--	1
trans-1,2-Dichloroethene	ND		ug/kg	130	--	1
Trichloroethene	ND		ug/kg	88	--	1
1,2-Dichlorobenzene	ND		ug/kg	350	--	1
1,3-Dichlorobenzene	ND		ug/kg	350	--	1
1,4-Dichlorobenzene	ND		ug/kg	350	--	1

Project Name: RIVER WALK

Lab Number: L1408396

Project Number: 183757

Report Date: 05/06/14

## SAMPLE RESULTS

Lab ID: L1408396-05

Date Collected: 04/21/14 15:55

Client ID: SB-1 (10')

Date Received: 04/22/14

Sample Location: 179 BRIDGE ST. LOWELL, MA

Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
MCP Volatile Organics by 8260/5035 - Westborough Lab						
Methyl tert butyl ether	ND		ug/kg	180	--	1
p/m-Xylene	ND		ug/kg	180	--	1
o-Xylene	ND		ug/kg	180	--	1
cis-1,2-Dichloroethene	ND		ug/kg	88	--	1
Dibromomethane	ND		ug/kg	350	--	1
1,2,3-Trichloropropane	ND		ug/kg	350	--	1
Styrene	ND		ug/kg	180	--	1
Dichlorodifluoromethane	ND		ug/kg	880	--	1
Acetone	ND		ug/kg	3200	--	1
Carbon disulfide	ND		ug/kg	350	--	1
Methyl ethyl ketone	ND		ug/kg	880	--	1
Methyl isobutyl ketone	ND		ug/kg	880	--	1
2-Hexanone	ND		ug/kg	880	--	1
Bromochloromethane	ND		ug/kg	350	--	1
Tetrahydrofuran	ND		ug/kg	350	--	1
2,2-Dichloropropane	ND		ug/kg	440	--	1
1,2-Dibromoethane	ND		ug/kg	350	--	1
1,3-Dichloropropane	ND		ug/kg	350	--	1
1,1,1,2-Tetrachloroethane	ND		ug/kg	88	--	1
Bromobenzene	ND		ug/kg	440	--	1
n-Butylbenzene	ND		ug/kg	88	--	1
sec-Butylbenzene	ND		ug/kg	88	--	1
tert-Butylbenzene	ND		ug/kg	350	--	1
o-Chlorotoluene	ND		ug/kg	350	--	1
p-Chlorotoluene	ND		ug/kg	350	--	1
1,2-Dibromo-3-chloropropane	ND		ug/kg	350	--	1
Hexachlorobutadiene	ND		ug/kg	350	--	1
Isopropylbenzene	ND		ug/kg	88	--	1
p-Isopropyltoluene	ND		ug/kg	88	--	1
Naphthalene	1600		ug/kg	350	--	1
n-Propylbenzene	ND		ug/kg	88	--	1
1,2,3-Trichlorobenzene	ND		ug/kg	350	--	1
1,2,4-Trichlorobenzene	ND		ug/kg	350	--	1
1,3,5-Trimethylbenzene	ND		ug/kg	350	--	1
1,2,4-Trimethylbenzene	ND		ug/kg	350	--	1
Diethyl ether	ND		ug/kg	440	--	1
Diisopropyl Ether	ND		ug/kg	350	--	1
Ethyl-Tert-Butyl-Ether	ND		ug/kg	350	--	1
Tertiary-Amyl Methyl Ether	ND		ug/kg	350	--	1

**Project Name:** RIVER WALK**Lab Number:** L1408396**Project Number:** 183757**Report Date:** 05/06/14**SAMPLE RESULTS**

Lab ID: L1408396-05

Date Collected: 04/21/14 15:55

Client ID: SB-1 (10')

Date Received: 04/22/14

Sample Location: 179 BRIDGE ST. LOWELL, MA

Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
-----------	--------	-----------	-------	----	-----	-----------------

## MCP Volatile Organics by 8260/5035 - Westborough Lab

1,4-Dioxane	ND		ug/kg	8800	--	1
-------------	----	--	-------	------	----	---

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	93		70-130
Toluene-d8	91		70-130
4-Bromofluorobenzene	96		70-130
Dibromofluoromethane	94		70-130

**Project Name:** RIVER WALK  
**Project Number:** 183757

**Lab Number:** L1408396  
**Report Date:** 05/06/14

**Method Blank Analysis**  
**Batch Quality Control**

Analytical Method: 97,8260C  
Analytical Date: 05/02/14 08:57  
Analyst: MV

Parameter	Result	Qualifier	Units	RL	MDL
MCP Volatile Organics by 8260/5035 - Westborough Lab for sample(s): 03,05 Batch: WG687160-3					
Methylene chloride	ND		ug/kg	500	--
1,1-Dichloroethane	ND		ug/kg	75	--
Chloroform	ND		ug/kg	75	--
Carbon tetrachloride	ND		ug/kg	50	--
1,2-Dichloropropane	ND		ug/kg	180	--
Dibromochloromethane	ND		ug/kg	50	--
1,1,2-Trichloroethane	ND		ug/kg	75	--
Tetrachloroethene	ND		ug/kg	50	--
Chlorobenzene	ND		ug/kg	50	--
Trichlorofluoromethane	ND		ug/kg	200	--
1,2-Dichloroethane	ND		ug/kg	50	--
1,1,1-Trichloroethane	ND		ug/kg	50	--
Bromodichloromethane	ND		ug/kg	50	--
trans-1,3-Dichloropropene	ND		ug/kg	50	--
cis-1,3-Dichloropropene	ND		ug/kg	50	--
1,1-Dichloropropene	ND		ug/kg	200	--
Bromoform	ND		ug/kg	200	--
1,1,2,2-Tetrachloroethane	ND		ug/kg	50	--
Benzene	ND		ug/kg	50	--
Toluene	ND		ug/kg	75	--
Ethylbenzene	ND		ug/kg	50	--
Chloromethane	ND		ug/kg	200	--
Bromomethane	ND		ug/kg	100	--
Vinyl chloride	ND		ug/kg	100	--
Chloroethane	ND		ug/kg	100	--
1,1-Dichloroethene	ND		ug/kg	50	--
trans-1,2-Dichloroethene	ND		ug/kg	75	--
Trichloroethene	ND		ug/kg	50	--
1,2-Dichlorobenzene	ND		ug/kg	200	--
1,3-Dichlorobenzene	ND		ug/kg	200	--
1,4-Dichlorobenzene	ND		ug/kg	200	--



**Project Name:** RIVER WALK  
**Project Number:** 183757

**Lab Number:** L1408396  
**Report Date:** 05/06/14

**Method Blank Analysis**  
**Batch Quality Control**

Analytical Method: 97,8260C  
Analytical Date: 05/02/14 08:57  
Analyst: MV

Parameter	Result	Qualifier	Units	RL	MDL
MCP Volatile Organics by 8260/5035 - Westborough Lab for sample(s): 03,05 Batch: WG687160-3					
Methyl tert butyl ether	ND		ug/kg	100	--
p/m-Xylene	ND		ug/kg	100	--
o-Xylene	ND		ug/kg	100	--
cis-1,2-Dichloroethene	ND		ug/kg	50	--
Dibromomethane	ND		ug/kg	200	--
1,2,3-Trichloropropane	ND		ug/kg	200	--
Styrene	ND		ug/kg	100	--
Dichlorodifluoromethane	ND		ug/kg	500	--
Acetone	ND		ug/kg	1800	--
Carbon disulfide	ND		ug/kg	200	--
Methyl ethyl ketone	ND		ug/kg	500	--
Methyl isobutyl ketone	ND		ug/kg	500	--
2-Hexanone	ND		ug/kg	500	--
Bromochloromethane	ND		ug/kg	200	--
Tetrahydrofuran	ND		ug/kg	200	--
2,2-Dichloropropane	ND		ug/kg	250	--
1,2-Dibromoethane	ND		ug/kg	200	--
1,3-Dichloropropane	ND		ug/kg	200	--
1,1,1,2-Tetrachloroethane	ND		ug/kg	50	--
Bromobenzene	ND		ug/kg	250	--
n-Butylbenzene	ND		ug/kg	50	--
sec-Butylbenzene	ND		ug/kg	50	--
tert-Butylbenzene	ND		ug/kg	200	--
o-Chlorotoluene	ND		ug/kg	200	--
p-Chlorotoluene	ND		ug/kg	200	--
1,2-Dibromo-3-chloropropane	ND		ug/kg	200	--
Hexachlorobutadiene	ND		ug/kg	200	--
Isopropylbenzene	ND		ug/kg	50	--
p-Isopropyltoluene	ND		ug/kg	50	--
Naphthalene	ND		ug/kg	200	--
n-Propylbenzene	ND		ug/kg	50	--



**Project Name:** RIVER WALK  
**Project Number:** 183757

**Lab Number:** L1408396  
**Report Date:** 05/06/14

**Method Blank Analysis  
Batch Quality Control**

Analytical Method: 97,8260C  
Analytical Date: 05/02/14 08:57  
Analyst: MV

Parameter	Result	Qualifier	Units	RL	MDL
MCP Volatile Organics by 8260/5035 - Westborough Lab for sample(s): 03,05 Batch: WG687160-3					
1,2,3-Trichlorobenzene	ND		ug/kg	200	--
1,2,4-Trichlorobenzene	ND		ug/kg	200	--
1,3,5-Trimethylbenzene	ND		ug/kg	200	--
1,2,4-Trimethylbenzene	ND		ug/kg	200	--
Diethyl ether	ND		ug/kg	250	--
Diisopropyl Ether	ND		ug/kg	200	--
Ethyl-Tert-Butyl-Ether	ND		ug/kg	200	--
Tertiary-Amyl Methyl Ether	ND		ug/kg	200	--
1,4-Dioxane	ND		ug/kg	5000	--

Surrogate	%Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	93		70-130
Toluene-d8	90		70-130
4-Bromofluorobenzene	96		70-130
Dibromofluoromethane	91		70-130

**Project Name:** RIVER WALK  
**Project Number:** 183757

**Lab Number:** L1408396  
**Report Date:** 05/06/14

**Method Blank Analysis**  
**Batch Quality Control**

Analytical Method: 97,8260C  
Analytical Date: 05/02/14 08:57  
Analyst: MV

Parameter	Result	Qualifier	Units	RL	MDL
MCP Volatile Organics by 8260/5035 - Westborough Lab for sample(s): 01 Batch: WG687161-3					
Methylene chloride	ND		ug/kg	10	--
1,1-Dichloroethane	ND		ug/kg	1.5	--
Chloroform	ND		ug/kg	1.5	--
Carbon tetrachloride	ND		ug/kg	1.0	--
1,2-Dichloropropane	ND		ug/kg	3.5	--
Dibromochloromethane	ND		ug/kg	1.0	--
1,1,2-Trichloroethane	ND		ug/kg	1.5	--
Tetrachloroethene	ND		ug/kg	1.0	--
Chlorobenzene	ND		ug/kg	1.0	--
Trichlorofluoromethane	ND		ug/kg	4.0	--
1,2-Dichloroethane	ND		ug/kg	1.0	--
1,1,1-Trichloroethane	ND		ug/kg	1.0	--
Bromodichloromethane	ND		ug/kg	1.0	--
trans-1,3-Dichloropropene	ND		ug/kg	1.0	--
cis-1,3-Dichloropropene	ND		ug/kg	1.0	--
1,1-Dichloropropene	ND		ug/kg	4.0	--
Bromoform	ND		ug/kg	4.0	--
1,1,2,2-Tetrachloroethane	ND		ug/kg	1.0	--
Benzene	ND		ug/kg	1.0	--
Toluene	ND		ug/kg	1.5	--
Ethylbenzene	ND		ug/kg	1.0	--
Chloromethane	ND		ug/kg	4.0	--
Bromomethane	ND		ug/kg	2.0	--
Vinyl chloride	ND		ug/kg	2.0	--
Chloroethane	ND		ug/kg	2.0	--
1,1-Dichloroethene	ND		ug/kg	1.0	--
trans-1,2-Dichloroethene	ND		ug/kg	1.5	--
Trichloroethene	ND		ug/kg	1.0	--
1,2-Dichlorobenzene	ND		ug/kg	4.0	--
1,3-Dichlorobenzene	ND		ug/kg	4.0	--
1,4-Dichlorobenzene	ND		ug/kg	4.0	--



**Project Name:** RIVER WALK  
**Project Number:** 183757

**Lab Number:** L1408396  
**Report Date:** 05/06/14

**Method Blank Analysis**  
**Batch Quality Control**

Analytical Method: 97,8260C  
Analytical Date: 05/02/14 08:57  
Analyst: MV

Parameter	Result	Qualifier	Units	RL	MDL
MCP Volatile Organics by 8260/5035 - Westborough Lab for sample(s): 01 Batch: WG687161-3					
Methyl tert butyl ether	ND		ug/kg	2.0	--
p/m-Xylene	ND		ug/kg	2.0	--
o-Xylene	ND		ug/kg	2.0	--
cis-1,2-Dichloroethene	ND		ug/kg	1.0	--
Dibromomethane	ND		ug/kg	4.0	--
1,2,3-Trichloropropane	ND		ug/kg	4.0	--
Styrene	ND		ug/kg	2.0	--
Dichlorodifluoromethane	ND		ug/kg	10	--
Acetone	ND		ug/kg	36	--
Carbon disulfide	ND		ug/kg	4.0	--
Methyl ethyl ketone	ND		ug/kg	10	--
Methyl isobutyl ketone	ND		ug/kg	10	--
2-Hexanone	ND		ug/kg	10	--
Bromochloromethane	ND		ug/kg	4.0	--
Tetrahydrofuran	ND		ug/kg	4.0	--
2,2-Dichloropropane	ND		ug/kg	5.0	--
1,2-Dibromoethane	ND		ug/kg	4.0	--
1,3-Dichloropropane	ND		ug/kg	4.0	--
1,1,1,2-Tetrachloroethane	ND		ug/kg	1.0	--
Bromobenzene	ND		ug/kg	5.0	--
n-Butylbenzene	ND		ug/kg	1.0	--
sec-Butylbenzene	ND		ug/kg	1.0	--
tert-Butylbenzene	ND		ug/kg	4.0	--
o-Chlorotoluene	ND		ug/kg	4.0	--
p-Chlorotoluene	ND		ug/kg	4.0	--
1,2-Dibromo-3-chloropropane	ND		ug/kg	4.0	--
Hexachlorobutadiene	ND		ug/kg	4.0	--
Isopropylbenzene	ND		ug/kg	1.0	--
p-Isopropyltoluene	ND		ug/kg	1.0	--
Naphthalene	ND		ug/kg	4.0	--
n-Propylbenzene	ND		ug/kg	1.0	--



**Project Name:** RIVER WALK  
**Project Number:** 183757

**Lab Number:** L1408396  
**Report Date:** 05/06/14

**Method Blank Analysis**  
**Batch Quality Control**

Analytical Method: 97,8260C  
 Analytical Date: 05/02/14 08:57  
 Analyst: MV

Parameter	Result	Qualifier	Units	RL	MDL
MCP Volatile Organics by 8260/5035 - Westborough Lab for sample(s): 01 Batch: WG687161-3					
1,2,3-Trichlorobenzene	ND		ug/kg	4.0	--
1,2,4-Trichlorobenzene	ND		ug/kg	4.0	--
1,3,5-Trimethylbenzene	ND		ug/kg	4.0	--
1,2,4-Trimethylbenzene	ND		ug/kg	4.0	--
Diethyl ether	ND		ug/kg	5.0	--
Diisopropyl Ether	ND		ug/kg	4.0	--
Ethyl-Tert-Butyl-Ether	ND		ug/kg	4.0	--
Tertiary-Amyl Methyl Ether	ND		ug/kg	4.0	--
1,4-Dioxane	ND		ug/kg	40	--

Surrogate	%Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	93		70-130
Toluene-d8	90		70-130
4-Bromofluorobenzene	96		70-130
Dibromofluoromethane	91		70-130

## Lab Control Sample Analysis

### Batch Quality Control

Project Name: RIVER WALK

Lab Number: L1408396

Project Number: 183757

Report Date: 05/06/14

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
MCP Volatile Organics by 8260/5035 - Westborough Lab Associated sample(s): 03,05 Batch: WG687160-1 WG687160-2								
Methylene chloride	108		113		70-130	5		20
1,1-Dichloroethane	101		108		70-130	7		20
Chloroform	100		107		70-130	7		20
Carbon tetrachloride	95		102		70-130	7		20
1,2-Dichloropropane	105		114		70-130	8		20
Dibromochloromethane	82		89		70-130	8		20
1,1,2-Trichloroethane	92		97		70-130	5		20
Tetrachloroethene	83		86		70-130	4		20
Chlorobenzene	87		91		70-130	4		20
Trichlorofluoromethane	97		100		70-130	3		20
1,2-Dichloroethane	98		105		70-130	7		20
1,1,1-Trichloroethane	97		103		70-130	6		20
Bromodichloromethane	96		105		70-130	9		20
trans-1,3-Dichloropropene	88		93		70-130	6		20
cis-1,3-Dichloropropene	102		111		70-130	8		20
1,1-Dichloropropene	100		106		70-130	6		20
Bromoform	77		82		70-130	6		20
1,1,2,2-Tetrachloroethane	87		91		70-130	4		20
Benzene	104		111		70-130	7		20
Toluene	86		90		70-130	5		20
Ethylbenzene	87		92		70-130	6		20

## Lab Control Sample Analysis

### Batch Quality Control

Project Name: RIVER WALK

Project Number: 183757

Lab Number: L1408396

Report Date: 05/06/14

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
MCP Volatile Organics by 8260/5035 - Westborough Lab Associated sample(s): 03,05 Batch: WG687160-1 WG687160-2								
Chloromethane	94		100		70-130	6		20
Bromomethane	103		113		70-130	9		20
Vinyl chloride	89		95		70-130	7		20
Chloroethane	92		103		70-130	11		20
1,1-Dichloroethene	98		104		70-130	6		20
trans-1,2-Dichloroethene	100		105		70-130	5		20
Trichloroethene	100		106		70-130	6		20
1,2-Dichlorobenzene	83		87		70-130	5		20
1,3-Dichlorobenzene	84		88		70-130	5		20
1,4-Dichlorobenzene	83		87		70-130	5		20
Methyl tert butyl ether	94		99		70-130	5		20
p/m-Xylene	88		93		70-130	6		20
o-Xylene	88		94		70-130	7		20
cis-1,2-Dichloroethene	102		108		70-130	6		20
Dibromomethane	100		106		70-130	6		20
1,2,3-Trichloropropane	87		91		70-130	4		20
Styrene	91		97		70-130	6		20
Dichlorodifluoromethane	87		93		70-130	7		20
Acetone	106		110		70-130	4		20
Carbon disulfide	97		103		70-130	6		20
Methyl ethyl ketone	91		99		70-130	8		20

## Lab Control Sample Analysis

### Batch Quality Control

Project Name: RIVER WALK

Lab Number: L1408396

Project Number: 183757

Report Date: 05/06/14

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
MCP Volatile Organics by 8260/5035 - Westborough Lab Associated sample(s): 03,05 Batch: WG687160-1 WG687160-2								
Methyl isobutyl ketone	92		98		70-130	6		20
2-Hexanone	74		80		70-130	8		20
Bromochloromethane	107		112		70-130	5		20
Tetrahydrofuran	100		97		70-130	3		20
2,2-Dichloropropane	95		100		70-130	5		20
1,2-Dibromoethane	88		92		70-130	4		20
1,3-Dichloropropane	90		95		70-130	5		20
1,1,1,2-Tetrachloroethane	87		92		70-130	6		20
Bromobenzene	82		86		70-130	5		20
n-Butylbenzene	86		91		70-130	6		20
sec-Butylbenzene	84		89		70-130	6		20
tert-Butylbenzene	82		86		70-130	5		20
o-Chlorotoluene	85		89		70-130	5		20
p-Chlorotoluene	85		89		70-130	5		20
1,2-Dibromo-3-chloropropane	68	Q	74		70-130	8		20
Hexachlorobutadiene	75		80		70-130	6		20
Isopropylbenzene	83		87		70-130	5		20
p-Isopropyltoluene	84		88		70-130	5		20
Naphthalene	81		87		70-130	7		20
n-Propylbenzene	85		90		70-130	6		20
1,2,3-Trichlorobenzene	81		86		70-130	6		20

## Lab Control Sample Analysis

### Batch Quality Control

Project Name: RIVER WALK

Project Number: 183757

Lab Number: L1408396

Report Date: 05/06/14

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
MCP Volatile Organics by 8260/5035 - Westborough Lab Associated sample(s): 03,05 Batch: WG687160-1 WG687160-2								
1,2,4-Trichlorobenzene	82		86		70-130	5		20
1,3,5-Trimethylbenzene	85		89		70-130	5		20
1,2,4-Trimethylbenzene	85		90		70-130	6		20
Diethyl ether	94		98		70-130	4		20
Diisopropyl Ether	103		112		70-130	8		20
Ethyl-Tert-Butyl-Ether	102		110		70-130	8		20
Tertiary-Amyl Methyl Ether	99		107		70-130	8		20
1,4-Dioxane	100		106		70-130	6		20

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
1,2-Dichloroethane-d4	92		92		70-130
Toluene-d8	92		91		70-130
4-Bromofluorobenzene	100		100		70-130
Dibromofluoromethane	101		101		70-130

## Lab Control Sample Analysis

### Batch Quality Control

Project Name: RIVER WALK

Lab Number: L1408396

Project Number: 183757

Report Date: 05/06/14

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
MCP Volatile Organics by 8260/5035 - Westborough Lab Associated sample(s): 01 Batch: WG687161-1 WG687161-2								
Methylene chloride	108		113		70-130	5		20
1,1-Dichloroethane	101		108		70-130	7		20
Chloroform	100		107		70-130	7		20
Carbon tetrachloride	95		102		70-130	7		20
1,2-Dichloropropane	105		114		70-130	8		20
Dibromochloromethane	82		89		70-130	8		20
1,1,2-Trichloroethane	92		97		70-130	5		20
Tetrachloroethene	83		86		70-130	4		20
Chlorobenzene	87		91		70-130	4		20
Trichlorofluoromethane	97		100		70-130	3		20
1,2-Dichloroethane	98		105		70-130	7		20
1,1,1-Trichloroethane	97		103		70-130	6		20
Bromodichloromethane	96		105		70-130	9		20
trans-1,3-Dichloropropene	88		93		70-130	6		20
cis-1,3-Dichloropropene	102		111		70-130	8		20
1,1-Dichloropropene	100		106		70-130	6		20
Bromoform	77		82		70-130	6		20
1,1,2,2-Tetrachloroethane	87		91		70-130	4		20
Benzene	104		111		70-130	7		20
Toluene	86		90		70-130	5		20
Ethylbenzene	87		92		70-130	6		20

## Lab Control Sample Analysis

### Batch Quality Control

Project Name: RIVER WALK

Project Number: 183757

Lab Number: L1408396

Report Date: 05/06/14

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
MCP Volatile Organics by 8260/5035 - Westborough Lab Associated sample(s): 01 Batch: WG687161-1 WG687161-2								
Chloromethane	94		100		70-130	6		20
Bromomethane	103		113		70-130	9		20
Vinyl chloride	89		95		70-130	7		20
Chloroethane	92		103		70-130	11		20
1,1-Dichloroethene	98		104		70-130	6		20
trans-1,2-Dichloroethene	100		105		70-130	5		20
Trichloroethene	100		106		70-130	6		20
1,2-Dichlorobenzene	83		87		70-130	5		20
1,3-Dichlorobenzene	84		88		70-130	5		20
1,4-Dichlorobenzene	83		87		70-130	5		20
Methyl tert butyl ether	94		99		70-130	5		20
p/m-Xylene	88		93		70-130	6		20
o-Xylene	88		94		70-130	7		20
cis-1,2-Dichloroethene	102		108		70-130	6		20
Dibromomethane	100		106		70-130	6		20
1,2,3-Trichloropropane	87		91		70-130	4		20
Styrene	91		97		70-130	6		20
Dichlorodifluoromethane	87		93		70-130	7		20
Acetone	106		110		70-130	4		20
Carbon disulfide	97		103		70-130	6		20
Methyl ethyl ketone	91		99		70-130	8		20

## Lab Control Sample Analysis

### Batch Quality Control

Project Name: RIVER WALK

Lab Number: L1408396

Project Number: 183757

Report Date: 05/06/14

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
MCP Volatile Organics by 8260/5035 - Westborough Lab Associated sample(s): 01 Batch: WG687161-1 WG687161-2								
Methyl isobutyl ketone	92		98		70-130	6		20
2-Hexanone	74		80		70-130	8		20
Bromochloromethane	107		112		70-130	5		20
Tetrahydrofuran	100		97		70-130	3		20
2,2-Dichloropropane	95		100		70-130	5		20
1,2-Dibromoethane	88		92		70-130	4		20
1,3-Dichloropropane	90		95		70-130	5		20
1,1,1,2-Tetrachloroethane	87		92		70-130	6		20
Bromobenzene	82		86		70-130	5		20
n-Butylbenzene	86		91		70-130	6		20
sec-Butylbenzene	84		89		70-130	6		20
tert-Butylbenzene	82		86		70-130	5		20
o-Chlorotoluene	85		89		70-130	5		20
p-Chlorotoluene	85		89		70-130	5		20
1,2-Dibromo-3-chloropropane	68	Q	74		70-130	8		20
Hexachlorobutadiene	75		80		70-130	6		20
Isopropylbenzene	83		87		70-130	5		20
p-Isopropyltoluene	84		88		70-130	5		20
Naphthalene	81		87		70-130	7		20
n-Propylbenzene	85		90		70-130	6		20
1,2,3-Trichlorobenzene	81		86		70-130	6		20

## Lab Control Sample Analysis

### Batch Quality Control

**Project Name:** RIVER WALK  
**Project Number:** 183757

**Lab Number:** L1408396  
**Report Date:** 05/06/14

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
MCP Volatile Organics by 8260/5035 - Westborough Lab Associated sample(s): 01 Batch: WG687161-1 WG687161-2								
1,2,4-Trichlorobenzene	82		86		70-130	5		20
1,3,5-Trimethylbenzene	85		89		70-130	5		20
1,2,4-Trimethylbenzene	85		90		70-130	6		20
Diethyl ether	94		98		70-130	4		20
Diisopropyl Ether	103		112		70-130	8		20
Ethyl-Tert-Butyl-Ether	102		110		70-130	8		20
Tertiary-Amyl Methyl Ether	99		107		70-130	8		20
1,4-Dioxane	100		106		70-130	6		20

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
1,2-Dichloroethane-d4	92		92		70-130
Toluene-d8	92		91		70-130
4-Bromofluorobenzene	100		99		70-130
Dibromofluoromethane	101		101		70-130

# SEMIVOLATILES

**Project Name:** RIVER WALK**Lab Number:** L1408396**Project Number:** 183757**Report Date:** 05/06/14**SAMPLE RESULTS**

Lab ID: L1408396-02  
 Client ID: SB-1 (0-3')  
 Sample Location: 179 BRIDGE ST. LOWELL, MA  
 Matrix: Soil  
 Analytical Method: 97,8270D  
 Analytical Date: 04/29/14 02:36  
 Analyst: JC  
 Percent Solids: 93%

Date Collected: 04/21/14 09:10  
 Date Received: 04/22/14  
 Field Prep: Not Specified  
 Extraction Method: EPA 3546  
 Extraction Date: 04/23/14 01:44

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
<b>MCP Semivolatile Organics - Westborough Lab</b>						
Acenaphthene	ND		ug/kg	140	--	1
1,2,4-Trichlorobenzene	ND		ug/kg	180	--	1
Hexachlorobenzene	ND		ug/kg	100	--	1
Bis(2-chloroethyl)ether	ND		ug/kg	160	--	1
2-Chloronaphthalene	ND		ug/kg	180	--	1
1,2-Dichlorobenzene	ND		ug/kg	180	--	1
1,3-Dichlorobenzene	ND		ug/kg	180	--	1
1,4-Dichlorobenzene	ND		ug/kg	180	--	1
3,3'-Dichlorobenzidine	ND		ug/kg	180	--	1
2,4-Dinitrotoluene	ND		ug/kg	180	--	1
2,6-Dinitrotoluene	ND		ug/kg	180	--	1
Azobenzene	ND		ug/kg	180	--	1
Fluoranthene	160		ug/kg	100	--	1
4-Bromophenyl phenyl ether	ND		ug/kg	180	--	1
Bis(2-chloroisopropyl)ether	ND		ug/kg	210	--	1
Bis(2-chloroethoxy)methane	ND		ug/kg	190	--	1
Hexachlorobutadiene	ND		ug/kg	180	--	1
Hexachloroethane	ND		ug/kg	140	--	1
Isophorone	ND		ug/kg	160	--	1
Naphthalene	ND		ug/kg	180	--	1
Nitrobenzene	ND		ug/kg	160	--	1
Bis(2-Ethylhexyl)phthalate	ND		ug/kg	180	--	1
Butyl benzyl phthalate	ND		ug/kg	180	--	1
Di-n-butylphthalate	ND		ug/kg	180	--	1
Di-n-octylphthalate	ND		ug/kg	180	--	1
Diethyl phthalate	ND		ug/kg	180	--	1
Dimethyl phthalate	ND		ug/kg	180	--	1
Benzo(a)anthracene	ND		ug/kg	100	--	1
Benzo(a)pyrene	ND		ug/kg	140	--	1
Benzo(b)fluoranthene	ND		ug/kg	100	--	1
Benzo(k)fluoranthene	ND		ug/kg	100	--	1

**Project Name:** RIVER WALK**Lab Number:** L1408396**Project Number:** 183757**Report Date:** 05/06/14**SAMPLE RESULTS**

Lab ID: L1408396-02  
 Client ID: SB-1 (0-3')  
 Sample Location: 179 BRIDGE ST. LOWELL, MA

Date Collected: 04/21/14 09:10  
 Date Received: 04/22/14  
 Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
<b>MCP Semivolatile Organics - Westborough Lab</b>						
Chrysene	ND		ug/kg	100	--	1
Acenaphthylene	ND		ug/kg	140	--	1
Anthracene	ND		ug/kg	100	--	1
Benzo(ghi)perylene	ND		ug/kg	140	--	1
Fluorene	ND		ug/kg	180	--	1
Phenanthrene	100		ug/kg	100	--	1
Dibenzo(a,h)anthracene	ND		ug/kg	100	--	1
Indeno(1,2,3-cd)Pyrene	ND		ug/kg	140	--	1
Pyrene	140		ug/kg	100	--	1
Aniline	ND		ug/kg	210	--	1
4-Chloroaniline	ND		ug/kg	180	--	1
Dibenzofuran	ND		ug/kg	180	--	1
2-Methylnaphthalene	ND		ug/kg	210	--	1
Acetophenone	ND		ug/kg	180	--	1
2,4,6-Trichlorophenol	ND		ug/kg	100	--	1
2-Chlorophenol	ND		ug/kg	180	--	1
2,4-Dichlorophenol	ND		ug/kg	160	--	1
2,4-Dimethylphenol	ND		ug/kg	180	--	1
2-Nitrophenol	ND		ug/kg	380	--	1
4-Nitrophenol	ND		ug/kg	250	--	1
2,4-Dinitrophenol	ND		ug/kg	840	--	1
Pentachlorophenol	ND		ug/kg	350	--	1
Phenol	ND		ug/kg	180	--	1
2-Methylphenol	ND		ug/kg	180	--	1
3-Methylphenol/4-Methylphenol	ND		ug/kg	250	--	1
2,4,5-Trichlorophenol	ND		ug/kg	180	--	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
2-Fluorophenol	58		30-130
Phenol-d6	59		30-130
Nitrobenzene-d5	63		30-130
2-Fluorobiphenyl	63		30-130
2,4,6-Tribromophenol	65		30-130
4-Terphenyl-d14	73		30-130

**Project Name:** RIVER WALK**Lab Number:** L1408396**Project Number:** 183757**Report Date:** 05/06/14**SAMPLE RESULTS**

Lab ID: L1408396-04 D  
 Client ID: SB-2 (0-14')  
 Sample Location: 179 BRIDGE ST. LOWELL, MA  
 Matrix: Soil  
 Analytical Method: 97,8270D  
 Analytical Date: 05/02/14 02:00  
 Analyst: JC  
 Percent Solids: 78%

Date Collected: 04/21/14 11:10  
 Date Received: 04/22/14  
 Field Prep: Not Specified  
 Extraction Method: EPA 3546  
 Extraction Date: 04/23/14 01:44

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
<b>MCP Semivolatile Organics - Westborough Lab</b>						
Acenaphthene	4400		ug/kg	4200	--	25
1,2,4-Trichlorobenzene	ND		ug/kg	5200	--	25
Hexachlorobenzene	ND		ug/kg	3100	--	25
Bis(2-chloroethyl)ether	ND		ug/kg	4700	--	25
2-Chloronaphthalene	ND		ug/kg	5200	--	25
1,2-Dichlorobenzene	ND		ug/kg	5200	--	25
1,3-Dichlorobenzene	ND		ug/kg	5200	--	25
1,4-Dichlorobenzene	ND		ug/kg	5200	--	25
3,3'-Dichlorobenzidine	ND		ug/kg	5200	--	25
2,4-Dinitrotoluene	ND		ug/kg	5200	--	25
2,6-Dinitrotoluene	ND		ug/kg	5200	--	25
Azobenzene	ND		ug/kg	5200	--	25
Fluoranthene	86000		ug/kg	3100	--	25
4-Bromophenyl phenyl ether	ND		ug/kg	5200	--	25
Bis(2-chloroisopropyl)ether	ND		ug/kg	6300	--	25
Bis(2-chloroethoxy)methane	ND		ug/kg	5600	--	25
Hexachlorobutadiene	ND		ug/kg	5200	--	25
Hexachloroethane	ND		ug/kg	4200	--	25
Isophorone	ND		ug/kg	4700	--	25
Naphthalene	ND		ug/kg	5200	--	25
Nitrobenzene	ND		ug/kg	4700	--	25
Bis(2-Ethylhexyl)phthalate	ND		ug/kg	5200	--	25
Butyl benzyl phthalate	ND		ug/kg	5200	--	25
Di-n-butylphthalate	ND		ug/kg	5200	--	25
Di-n-octylphthalate	ND		ug/kg	5200	--	25
Diethyl phthalate	ND		ug/kg	5200	--	25
Dimethyl phthalate	ND		ug/kg	5200	--	25
Benzo(a)anthracene	33000		ug/kg	3100	--	25
Benzo(a)pyrene	29000		ug/kg	4200	--	25
Benzo(b)fluoranthene	35000		ug/kg	3100	--	25
Benzo(k)fluoranthene	14000		ug/kg	3100	--	25

Project Name: RIVER WALK

Lab Number: L1408396

Project Number: 183757

Report Date: 05/06/14

## SAMPLE RESULTS

Lab ID: L1408396-04 D  
 Client ID: SB-2 (0-14')  
 Sample Location: 179 BRIDGE ST. LOWELL, MA

Date Collected: 04/21/14 11:10  
 Date Received: 04/22/14  
 Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
<b>MCP Semivolatile Organics - Westborough Lab</b>						
Chrysene	32000		ug/kg	3100	--	25
Acenaphthylene	6000		ug/kg	4200	--	25
Anthracene	17000		ug/kg	3100	--	25
Benzo(ghi)perylene	16000		ug/kg	4200	--	25
Fluorene	6000		ug/kg	5200	--	25
Phenanthrene	72000		ug/kg	3100	--	25
Dibenzo(a,h)anthracene	3800		ug/kg	3100	--	25
Indeno(1,2,3-cd)Pyrene	18000		ug/kg	4200	--	25
Pyrene	70000		ug/kg	3100	--	25
Aniline	ND		ug/kg	6300	--	25
4-Chloroaniline	ND		ug/kg	5200	--	25
Dibenzofuran	5600		ug/kg	5200	--	25
2-Methylnaphthalene	ND		ug/kg	6300	--	25
Acetophenone	ND		ug/kg	5200	--	25
2,4,6-Trichlorophenol	ND		ug/kg	3100	--	25
2-Chlorophenol	ND		ug/kg	5200	--	25
2,4-Dichlorophenol	ND		ug/kg	4700	--	25
2,4-Dimethylphenol	ND		ug/kg	5200	--	25
2-Nitrophenol	ND		ug/kg	11000	--	25
4-Nitrophenol	ND		ug/kg	7300	--	25
2,4-Dinitrophenol	ND		ug/kg	25000	--	25
Pentachlorophenol	ND		ug/kg	10000	--	25
Phenol	ND		ug/kg	5200	--	25
2-Methylphenol	ND		ug/kg	5200	--	25
3-Methylphenol/4-Methylphenol	ND		ug/kg	7500	--	25
2,4,5-Trichlorophenol	ND		ug/kg	5200	--	25

Surrogate	% Recovery	Qualifier	Acceptance Criteria
2-Fluorophenol	0	Q	30-130
Phenol-d6	0	Q	30-130
Nitrobenzene-d5	0	Q	30-130
2-Fluorobiphenyl	0	Q	30-130
2,4,6-Tribromophenol	0	Q	30-130
4-Terphenyl-d14	0	Q	30-130

**Project Name:** RIVER WALK**Lab Number:** L1408396**Project Number:** 183757**Report Date:** 05/06/14**SAMPLE RESULTS**

**Lab ID:** L1408396-06  
**Client ID:** SB-1 (3-14.5')  
**Sample Location:** 179 BRIDGE ST. LOWELL, MA  
**Matrix:** Soil  
**Analytical Method:** 97,8270D  
**Analytical Date:** 04/29/14 23:47  
**Analyst:** JC  
**Percent Solids:** 91%

**Date Collected:** 04/21/14 16:00  
**Date Received:** 04/22/14  
**Field Prep:** Not Specified  
**Extraction Method:** EPA 3546  
**Extraction Date:** 04/23/14 01:44

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
<b>MCP Semivolatile Organics - Westborough Lab</b>						
Acenaphthene	900		ug/kg	140	--	1
1,2,4-Trichlorobenzene	ND		ug/kg	180	--	1
Hexachlorobenzene	ND		ug/kg	110	--	1
Bis(2-chloroethyl)ether	ND		ug/kg	160	--	1
2-Chloronaphthalene	ND		ug/kg	180	--	1
1,2-Dichlorobenzene	ND		ug/kg	180	--	1
1,3-Dichlorobenzene	ND		ug/kg	180	--	1
1,4-Dichlorobenzene	ND		ug/kg	180	--	1
3,3'-Dichlorobenzidine	ND		ug/kg	180	--	1
2,4-Dinitrotoluene	ND		ug/kg	180	--	1
2,6-Dinitrotoluene	ND		ug/kg	180	--	1
Azobenzene	ND		ug/kg	180	--	1
Fluoranthene	24000	E	ug/kg	110	--	1
4-Bromophenyl phenyl ether	ND		ug/kg	180	--	1
Bis(2-chloroisopropyl)ether	ND		ug/kg	220	--	1
Bis(2-chloroethoxy)methane	ND		ug/kg	190	--	1
Hexachlorobutadiene	ND		ug/kg	180	--	1
Hexachloroethane	ND		ug/kg	140	--	1
Isophorone	ND		ug/kg	160	--	1
Naphthalene	1800		ug/kg	180	--	1
Nitrobenzene	ND		ug/kg	160	--	1
Bis(2-Ethylhexyl)phthalate	ND		ug/kg	180	--	1
Butyl benzyl phthalate	ND		ug/kg	180	--	1
Di-n-butylphthalate	ND		ug/kg	180	--	1
Di-n-octylphthalate	ND		ug/kg	180	--	1
Diethyl phthalate	ND		ug/kg	180	--	1
Dimethyl phthalate	ND		ug/kg	180	--	1
Benzo(a)anthracene	15000	E	ug/kg	110	--	1
Benzo(a)pyrene	13000	E	ug/kg	140	--	1
Benzo(b)fluoranthene	17000	E	ug/kg	110	--	1
Benzo(k)fluoranthene	5300		ug/kg	110	--	1

Project Name: RIVER WALK

Lab Number: L1408396

Project Number: 183757

Report Date: 05/06/14

## SAMPLE RESULTS

Lab ID: L1408396-06  
 Client ID: SB-1 (3-14.5')  
 Sample Location: 179 BRIDGE ST. LOWELL, MA

Date Collected: 04/21/14 16:00  
 Date Received: 04/22/14  
 Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
<b>MCP Semivolatile Organics - Westborough Lab</b>						
Chrysene	13000	E	ug/kg	110	--	1
Acenaphthylene	6700		ug/kg	140	--	1
Anthracene	7200		ug/kg	110	--	1
Benzo(ghi)perylene	10000	E	ug/kg	140	--	1
Fluorene	4100		ug/kg	180	--	1
Phenanthrene	21000	E	ug/kg	110	--	1
Dibenzo(a,h)anthracene	2000		ug/kg	110	--	1
Indeno(1,2,3-cd)Pyrene	11000	E	ug/kg	140	--	1
Pyrene	22000	E	ug/kg	110	--	1
Aniline	ND		ug/kg	220	--	1
4-Chloroaniline	ND		ug/kg	180	--	1
Dibenzofuran	2700		ug/kg	180	--	1
2-Methylnaphthalene	600		ug/kg	220	--	1
Acetophenone	ND		ug/kg	180	--	1
2,4,6-Trichlorophenol	ND		ug/kg	110	--	1
2-Chlorophenol	ND		ug/kg	180	--	1
2,4-Dichlorophenol	ND		ug/kg	160	--	1
2,4-Dimethylphenol	ND		ug/kg	180	--	1
2-Nitrophenol	ND		ug/kg	390	--	1
4-Nitrophenol	ND		ug/kg	250	--	1
2,4-Dinitrophenol	ND		ug/kg	870	--	1
Pentachlorophenol	ND		ug/kg	360	--	1
Phenol	230		ug/kg	180	--	1
2-Methylphenol	ND		ug/kg	180	--	1
3-Methylphenol/4-Methylphenol	420		ug/kg	260	--	1
2,4,5-Trichlorophenol	ND		ug/kg	180	--	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
2-Fluorophenol	76		30-130
Phenol-d6	88		30-130
Nitrobenzene-d5	78		30-130
2-Fluorobiphenyl	87		30-130
2,4,6-Tribromophenol	112		30-130
4-Terphenyl-d14	95		30-130

**Project Name:** RIVER WALK**Lab Number:** L1408396**Project Number:** 183757**Report Date:** 05/06/14**SAMPLE RESULTS**

**Lab ID:** L1408396-06      D  
**Client ID:** SB-1 (3-14.5')  
**Sample Location:** 179 BRIDGE ST. LOWELL, MA  
**Matrix:** Soil  
**Analytical Method:** 97,8270D  
**Analytical Date:** 05/02/14 12:50  
**Analyst:** JC  
**Percent Solids:** 91%

**Date Collected:** 04/21/14 16:00  
**Date Received:** 04/22/14  
**Field Prep:** Not Specified  
**Extraction Method:** EPA 3546  
**Extraction Date:** 04/23/14 01:44

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
<b>MCP Semivolatile Organics - Westborough Lab</b>						
Fluoranthene	42000		ug/kg	1100	--	10
Benzo(a)anthracene	13000		ug/kg	1100	--	10
Benzo(a)pyrene	12000		ug/kg	1400	--	10
Benzo(b)fluoranthene	12000		ug/kg	1100	--	10
Chrysene	11000		ug/kg	1100	--	10
Benzo(ghi)perylene	8400		ug/kg	1400	--	10
Phenanthrene	37000		ug/kg	1100	--	10
Indeno(1,2,3-cd)Pyrene	9100		ug/kg	1400	--	10
Pyrene	34000		ug/kg	1100	--	10

**Project Name:** RIVER WALK  
**Project Number:** 183757

**Lab Number:** L1408396  
**Report Date:** 05/06/14

**Method Blank Analysis**  
**Batch Quality Control**

Analytical Method: 97,8270D  
Analytical Date: 04/25/14 20:26  
Analyst: JC

Extraction Method: EPA 3546  
Extraction Date: 04/23/14 01:44

Parameter	Result	Qualifier	Units	RL	MDL
MCP Semivolatile Organics - Westborough Lab for sample(s): 02,04,06 Batch: WG684326-1					
Acenaphthene	ND		ug/kg	130	--
1,2,4-Trichlorobenzene	ND		ug/kg	160	--
Hexachlorobenzene	ND		ug/kg	99	--
Bis(2-chloroethyl)ether	ND		ug/kg	150	--
2-Chloronaphthalene	ND		ug/kg	160	--
1,2-Dichlorobenzene	ND		ug/kg	160	--
1,3-Dichlorobenzene	ND		ug/kg	160	--
1,4-Dichlorobenzene	ND		ug/kg	160	--
3,3'-Dichlorobenzidine	ND		ug/kg	160	--
2,4-Dinitrotoluene	ND		ug/kg	160	--
2,6-Dinitrotoluene	ND		ug/kg	160	--
Azobenzene	ND		ug/kg	160	--
Fluoranthene	ND		ug/kg	99	--
4-Bromophenyl phenyl ether	ND		ug/kg	160	--
Bis(2-chloroisopropyl)ether	ND		ug/kg	200	--
Bis(2-chloroethoxy)methane	ND		ug/kg	180	--
Hexachlorobutadiene	ND		ug/kg	160	--
Hexachloroethane	ND		ug/kg	130	--
Isophorone	ND		ug/kg	150	--
Naphthalene	ND		ug/kg	160	--
Nitrobenzene	ND		ug/kg	150	--
Bis(2-Ethylhexyl)phthalate	ND		ug/kg	160	--
Butyl benzyl phthalate	ND		ug/kg	160	--
Di-n-butylphthalate	ND		ug/kg	160	--
Di-n-octylphthalate	ND		ug/kg	160	--
Diethyl phthalate	ND		ug/kg	160	--
Dimethyl phthalate	ND		ug/kg	160	--
Benzo(a)anthracene	ND		ug/kg	99	--
Benzo(a)pyrene	ND		ug/kg	130	--
Benzo(b)fluoranthene	ND		ug/kg	99	--
Benzo(k)fluoranthene	ND		ug/kg	99	--



**Project Name:** RIVER WALK  
**Project Number:** 183757

**Lab Number:** L1408396  
**Report Date:** 05/06/14

**Method Blank Analysis**  
**Batch Quality Control**

**Analytical Method:** 97,8270D  
**Analytical Date:** 04/25/14 20:26  
**Analyst:** JC

**Extraction Method:** EPA 3546  
**Extraction Date:** 04/23/14 01:44

Parameter	Result	Qualifier	Units	RL	MDL
MCP Semivolatile Organics - Westborough Lab for sample(s): 02,04,06 Batch: WG684326-1					
Chrysene	ND		ug/kg	99	--
Acenaphthylene	ND		ug/kg	130	--
Anthracene	ND		ug/kg	99	--
Benzo(ghi)perylene	ND		ug/kg	130	--
Fluorene	ND		ug/kg	160	--
Phenanthrene	ND		ug/kg	99	--
Dibenzo(a,h)anthracene	ND		ug/kg	99	--
Indeno(1,2,3-cd)Pyrene	ND		ug/kg	130	--
Pyrene	ND		ug/kg	99	--
Aniline	ND		ug/kg	200	--
4-Chloroaniline	ND		ug/kg	160	--
Dibenzofuran	ND		ug/kg	160	--
2-Methylnaphthalene	ND		ug/kg	200	--
Acetophenone	ND		ug/kg	160	--
2,4,6-Trichlorophenol	ND		ug/kg	99	--
2-Chlorophenol	ND		ug/kg	160	--
2,4-Dichlorophenol	ND		ug/kg	150	--
2,4-Dimethylphenol	ND		ug/kg	160	--
2-Nitrophenol	ND		ug/kg	360	--
4-Nitrophenol	ND		ug/kg	230	--
2,4-Dinitrophenol	ND		ug/kg	790	--
Pentachlorophenol	ND		ug/kg	330	--
Phenol	ND		ug/kg	160	--
2-Methylphenol	ND		ug/kg	160	--
3-Methylphenol/4-Methylphenol	ND		ug/kg	240	--
2,4,5-Trichlorophenol	ND		ug/kg	160	--

Project Name: RIVER WALK

Lab Number: L1408396

Project Number: 183757

Report Date: 05/06/14

**Method Blank Analysis  
Batch Quality Control**

Analytical Method: 97,8270D  
 Analytical Date: 04/25/14 20:26  
 Analyst: JC

Extraction Method: EPA 3546  
 Extraction Date: 04/23/14 01:44

Parameter	Result	Qualifier	Units	RL	MDL
MCP Semivolatile Organics - Westborough Lab for sample(s): 02,04,06 Batch: WG684326-1					

Surrogate	%Recovery	Qualifier	Acceptance Criteria
2-Fluorophenol	70		30-130
Phenol-d6	67		30-130
Nitrobenzene-d5	70		30-130
2-Fluorobiphenyl	72		30-130
2,4,6-Tribromophenol	70		30-130
4-Terphenyl-d14	91		30-130

## Lab Control Sample Analysis

### Batch Quality Control

Project Name: RIVER WALK

Project Number: 183757

Lab Number: L1408396

Report Date: 05/06/14

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
MCP Semivolatile Organics - Westborough Lab Associated sample(s): 02,04,06 Batch: WG684326-2 WG684326-3								
Acenaphthene	80		84		40-140	5		30
1,2,4-Trichlorobenzene	69		72		40-140	4		30
Hexachlorobenzene	88		93		40-140	6		30
Bis(2-chloroethyl)ether	71		74		40-140	4		30
2-Chloronaphthalene	80		81		40-140	1		30
1,2-Dichlorobenzene	67		72		40-140	7		30
1,3-Dichlorobenzene	66		71		40-140	7		30
1,4-Dichlorobenzene	67		71		40-140	6		30
3,3'-Dichlorobenzidine	71		77		40-140	8		30
2,4-Dinitrotoluene	93		99		40-140	6		30
2,6-Dinitrotoluene	92		93		40-140	1		30
Azobenzene	93		99		40-140	6		30
Fluoranthene	89		96		40-140	8		30
4-Bromophenyl phenyl ether	90		94		40-140	4		30
Bis(2-chloroisopropyl)ether	76		77		40-140	1		30
Bis(2-chloroethoxy)methane	77		78		40-140	1		30
Hexachlorobutadiene	71		74		40-140	4		30
Hexachloroethane	68		73		40-140	7		30
Isophorone	79		80		40-140	1		30
Naphthalene	72		75		40-140	4		30
Nitrobenzene	75		77		40-140	3		30

## Lab Control Sample Analysis

### Batch Quality Control

Project Name: RIVER WALK

Lab Number: L1408396

Project Number: 183757

Report Date: 05/06/14

Parameter	LCS		LCSD		%Recovery Limits	RPD	Qual	RPD Limits
	%Recovery	Qual	%Recovery	Qual				
MCP Semivolatile Organics - Westborough Lab Associated sample(s): 02,04,06 Batch: WG684326-2 WG684326-3								
Bis(2-Ethylhexyl)phthalate	100		108		40-140	8		30
Butyl benzyl phthalate	96		101		40-140	5		30
Di-n-butylphthalate	93		100		40-140	7		30
Di-n-octylphthalate	105		111		40-140	6		30
Diethyl phthalate	91		99		40-140	8		30
Dimethyl phthalate	88		94		40-140	7		30
Benzo(a)anthracene	91		97		40-140	6		30
Benzo(a)pyrene	91		98		40-140	7		30
Benzo(b)fluoranthene	87		90		40-140	3		30
Benzo(k)fluoranthene	95		107		40-140	12		30
Chrysene	89		96		40-140	8		30
Acenaphthylene	85		85		40-140	0		30
Anthracene	86		95		40-140	10		30
Benzo(ghi)perylene	88		90		40-140	2		30
Fluorene	86		91		40-140	6		30
Phenanthrene	90		95		40-140	5		30
Dibenzo(a,h)anthracene	90		95		40-140	5		30
Indeno(1,2,3-cd)Pyrene	92		99		40-140	7		30
Pyrene	87		93		40-140	7		30
Aniline	47		52		40-140	10		30
4-Chloroaniline	70		71		40-140	1		30

## Lab Control Sample Analysis

### Batch Quality Control

Project Name: RIVER WALK

Project Number: 183757

Lab Number: L1408396

Report Date: 05/06/14

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
MCP Semivolatile Organics - Westborough Lab Associated sample(s): 02,04,06 Batch: WG684326-2 WG684326-3								
Dibenzofuran	83		86		40-140	4		30
2-Methylnaphthalene	111		112		40-140	1		30
Acetophenone	78		80		40-140	3		30
2,4,6-Trichlorophenol	86		88		30-130	2		30
2-Chlorophenol	75		78		30-130	4		30
2,4-Dichlorophenol	80		82		30-130	2		30
2,4-Dimethylphenol	76		83		30-130	9		30
2-Nitrophenol	76		78		30-130	3		30
4-Nitrophenol	96		104		30-130	8		30
2,4-Dinitrophenol	76		86		30-130	12		30
Pentachlorophenol	78		93		30-130	18		30
Phenol	78		79		30-130	1		30
2-Methylphenol	78		79		30-130	1		30
3-Methylphenol/4-Methylphenol	85		87		30-130	2		30
2,4,5-Trichlorophenol	93		95		30-130	2		30

## Lab Control Sample Analysis

### Batch Quality Control

Project Name: RIVER WALK

Lab Number: L1408396

Project Number: 183757

Report Date: 05/06/14

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
-----------	------------------	------	-------------------	------	---------------------	-----	------	---------------

MCP Semivolatile Organics - Westborough Lab Associated sample(s): 02,04,06 Batch: WG684326-2 WG684326-3

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
2-Fluorophenol	74		77		30-130
Phenol-d6	77		78		30-130
Nitrobenzene-d5	75		76		30-130
2-Fluorobiphenyl	79		78		30-130
2,4,6-Tribromophenol	87		96		30-130
4-Terphenyl-d14	88		94		30-130

# PETROLEUM HYDROCARBONS

**Project Name:** RIVER WALK**Lab Number:** L1408396**Project Number:** 183757**Report Date:** 05/06/14**SAMPLE RESULTS**

**Lab ID:** L1408396-02  
**Client ID:** SB-1 (0-3')  
**Sample Location:** 179 BRIDGE ST. LOWELL, MA  
**Matrix:** Soil  
**Analytical Method:** 1,8015C(M)  
**Analytical Date:** 04/24/14 21:04  
**Analyst:** JT  
**Percent Solids:** 93%

**Date Collected:** 04/21/14 09:10  
**Date Received:** 04/22/14  
**Field Prep:** Not Specified  
**Extraction Method:** EPA 3546  
**Extraction Date:** 04/23/14 02:24

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
-----------	--------	-----------	-------	----	-----	-----------------

Petroleum Hydrocarbon Quantitation - Westborough Lab						
--	--	--	--	--	--	--

TPH	ND		ug/kg	34300	--	1
-----	----	--	-------	-------	----	---

Surrogate	% Recovery	Qualifier	Acceptance Criteria
o-Terphenyl	93		40-140

**Project Name:** RIVER WALK**Lab Number:** L1408396**Project Number:** 183757**Report Date:** 05/06/14**SAMPLE RESULTS**

**Lab ID:** L1408396-04      **D**  
**Client ID:** SB-2 (0-14')  
**Sample Location:** 179 BRIDGE ST. LOWELL, MA  
**Matrix:** Soil  
**Analytical Method:** 1,8015C(M)  
**Analytical Date:** 04/24/14 23:06  
**Analyst:** JT  
**Percent Solids:** 78%

**Date Collected:** 04/21/14 11:10  
**Date Received:** 04/22/14  
**Field Prep:** Not Specified  
**Extraction Method:** EPA 3546  
**Extraction Date:** 04/23/14 02:24

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
-----------	--------	-----------	-------	----	-----	-----------------

Petroleum Hydrocarbon Quantitation - Westborough Lab						
--	--	--	--	--	--	--

TPH	2160000		ug/kg	204000	--	5
-----	---------	--	-------	--------	----	---

Surrogate	% Recovery	Qualifier	Acceptance Criteria
o-Terphenyl	97		40-140

**Project Name:** RIVER WALK**Lab Number:** L1408396**Project Number:** 183757**Report Date:** 05/06/14**SAMPLE RESULTS**

**Lab ID:** L1408396-06      D  
**Client ID:** SB-1 (3-14.5')  
**Sample Location:** 179 BRIDGE ST. LOWELL, MA  
**Matrix:** Soil  
**Analytical Method:** 1,8015C(M)  
**Analytical Date:** 04/24/14 22:05  
**Analyst:** JT  
**Percent Solids:** 91%

**Date Collected:** 04/21/14 16:00  
**Date Received:** 04/22/14  
**Field Prep:** Not Specified  
**Extraction Method:** EPA 3546  
**Extraction Date:** 04/23/14 02:24

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
-----------	--------	-----------	-------	----	-----	-----------------

Petroleum Hydrocarbon Quantitation - Westborough Lab						
--	--	--	--	--	--	--

TPH	524000		ug/kg	71300	--	2
-----	--------	--	-------	-------	----	---

Surrogate	% Recovery	Qualifier	Acceptance Criteria
o-Terphenyl	108		40-140

**Project Name:** RIVER WALK  
**Project Number:** 183757

**Lab Number:** L1408396  
**Report Date:** 05/06/14

**Method Blank Analysis**  
**Batch Quality Control**

**Analytical Method:** 1,8015C(M)  
**Analytical Date:** 04/24/14 19:31  
**Analyst:** JT

**Extraction Method:** EPA 3546  
**Extraction Date:** 04/23/14 02:24

Parameter	Result	Qualifier	Units	RL	MDL
Petroleum Hydrocarbon Quantitation - Westborough Lab for sample(s): 02,04,06 Batch: WG684334-1					
TPH	ND		ug/kg	33100	--

Surrogate	%Recovery	Qualifier	Acceptance Criteria
o-Terphenyl	94		40-140

### Lab Control Sample Analysis Batch Quality Control

**Project Name:** RIVER WALK  
**Project Number:** 183757

**Lab Number:** L1408396  
**Report Date:** 05/06/14

<b>Parameter</b>	<b>LCS %Recovery</b>	<b>Qual</b>	<b>LCSD %Recovery</b>	<b>Qual</b>	<b>%Recovery Limits</b>	<b>RPD</b>	<b>Qual</b>	<b>RPD Limits</b>
Petroleum Hydrocarbon Quantitation - Westborough Lab Associated sample(s): 02,04,06 Batch: WG684334-2								
TPH	92		-		40-140	-		40

<b>Surrogate</b>	<b>LCS %Recovery</b>	<b>Qual</b>	<b>LCSD %Recovery</b>	<b>Qual</b>	<b>Acceptance Criteria</b>
o-Terphenyl	92				40-140



**Lab Duplicate Analysis**  
Batch Quality Control

**Project Name:** RIVER WALK

**Project Number:** 183757

**Lab Number:** L1408396

**Report Date:** 05/06/14

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Petroleum Hydrocarbon Quantitation - Westborough Lab Associated sample(s): 02,04,06 QC Batch ID: WG684334-3 QC Sample: L1408396-02 Client ID: SB-1 (0-3')						
TPH	ND	ND	ug/kg	NC		40

Surrogate	%Recovery	Qualifier	%Recovery	Qualifier	Acceptance Criteria
o-Terphenyl	93		92		40-140



# PCBS

Project Name: RIVER WALK

Lab Number: L1408396

Project Number: 183757

Report Date: 05/06/14

## SAMPLE RESULTS

Lab ID: L1408396-02  
 Client ID: SB-1 (0-3')  
 Sample Location: 179 BRIDGE ST. LOWELL, MA  
 Matrix: Soil  
 Analytical Method: 97,8082  
 Analytical Date: 04/24/14 12:38  
 Analyst: JW  
 Percent Solids: 93%

Date Collected: 04/21/14 09:10  
 Date Received: 04/22/14  
 Field Prep: Not Specified  
 Extraction Method: EPA 3546  
 Extraction Date: 04/23/14 00:51  
 Cleanup Method1: EPA 3665A  
 Cleanup Date1: 04/24/14  
 Cleanup Method2: EPA 3660B  
 Cleanup Date2: 04/24/14

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Column
MCP Polychlorinated Biphenyls - Westborough Lab							
Aroclor 1016	ND		ug/kg	34.7	--	1	A
Aroclor 1221	ND		ug/kg	34.7	--	1	A
Aroclor 1232	ND		ug/kg	34.7	--	1	A
Aroclor 1242	ND		ug/kg	34.7	--	1	A
Aroclor 1248	ND		ug/kg	34.7	--	1	A
Aroclor 1254	ND		ug/kg	34.7	--	1	A
Aroclor 1260	ND		ug/kg	34.7	--	1	A
Aroclor 1262	ND		ug/kg	34.7	--	1	A
Aroclor 1268	ND		ug/kg	34.7	--	1	A
PCBs, Total	ND		ug/kg	34.7	--	1	A

Surrogate	% Recovery	Qualifier	Acceptance Criteria	Column
2,4,5,6-Tetrachloro-m-xylene	67		30-150	A
Decachlorobiphenyl	58		30-150	A
2,4,5,6-Tetrachloro-m-xylene	73		30-150	B
Decachlorobiphenyl	64		30-150	B

**Project Name:** RIVER WALK**Lab Number:** L1408396**Project Number:** 183757**Report Date:** 05/06/14**SAMPLE RESULTS**

**Lab ID:** L1408396-04  
**Client ID:** SB-2 (0-14')  
**Sample Location:** 179 BRIDGE ST. LOWELL, MA  
**Matrix:** Soil  
**Analytical Method:** 97,8082  
**Analytical Date:** 04/24/14 12:50  
**Analyst:** JW  
**Percent Solids:** 78%

**Date Collected:** 04/21/14 11:10  
**Date Received:** 04/22/14  
**Field Prep:** Not Specified  
**Extraction Method:** EPA 3546  
**Extraction Date:** 04/23/14 00:51  
**Cleanup Method1:** EPA 3665A  
**Cleanup Date1:** 04/24/14  
**Cleanup Method2:** EPA 3660B  
**Cleanup Date2:** 04/24/14

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Column
<b>MCP Polychlorinated Biphenyls - Westborough Lab</b>							
Aroclor 1016	ND		ug/kg	42.0	--	1	A
Aroclor 1221	ND		ug/kg	42.0	--	1	A
Aroclor 1232	ND		ug/kg	42.0	--	1	A
Aroclor 1242	ND		ug/kg	42.0	--	1	A
Aroclor 1248	ND		ug/kg	42.0	--	1	A
Aroclor 1254	ND		ug/kg	42.0	--	1	A
Aroclor 1260	ND		ug/kg	42.0	--	1	A
Aroclor 1262	ND		ug/kg	42.0	--	1	A
Aroclor 1268	ND		ug/kg	42.0	--	1	A
PCBs, Total	ND		ug/kg	42.0	--	1	A

Surrogate	% Recovery	Qualifier	Acceptance Criteria	Column
2,4,5,6-Tetrachloro-m-xylene	53		30-150	A
Decachlorobiphenyl	53		30-150	A
2,4,5,6-Tetrachloro-m-xylene	52		30-150	B
Decachlorobiphenyl	61		30-150	B

**Project Name:** RIVER WALK**Lab Number:** L1408396**Project Number:** 183757**Report Date:** 05/06/14**SAMPLE RESULTS**

**Lab ID:** L1408396-06  
**Client ID:** SB-1 (3-14.5')  
**Sample Location:** 179 BRIDGE ST. LOWELL, MA  
**Matrix:** Soil  
**Analytical Method:** 97,8082  
**Analytical Date:** 04/24/14 13:02  
**Analyst:** JW  
**Percent Solids:** 91%

**Date Collected:** 04/21/14 16:00  
**Date Received:** 04/22/14  
**Field Prep:** Not Specified  
**Extraction Method:** EPA 3546  
**Extraction Date:** 04/23/14 00:51  
**Cleanup Method1:** EPA 3665A  
**Cleanup Date1:** 04/24/14  
**Cleanup Method2:** EPA 3660B  
**Cleanup Date2:** 04/24/14

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Column
<b>MCP Polychlorinated Biphenyls - Westborough Lab</b>							
Aroclor 1016	ND		ug/kg	35.1	--	1	A
Aroclor 1221	ND		ug/kg	35.1	--	1	A
Aroclor 1232	ND		ug/kg	35.1	--	1	A
Aroclor 1242	ND		ug/kg	35.1	--	1	A
Aroclor 1248	ND		ug/kg	35.1	--	1	A
Aroclor 1254	ND		ug/kg	35.1	--	1	A
Aroclor 1260	ND		ug/kg	35.1	--	1	A
Aroclor 1262	ND		ug/kg	35.1	--	1	A
Aroclor 1268	ND		ug/kg	35.1	--	1	A
PCBs, Total	ND		ug/kg	35.1	--	1	A

Surrogate	% Recovery	Qualifier	Acceptance Criteria	Column
2,4,5,6-Tetrachloro-m-xylene	45		30-150	A
Decachlorobiphenyl	41		30-150	A
2,4,5,6-Tetrachloro-m-xylene	46		30-150	B
Decachlorobiphenyl	50		30-150	B

**Project Name:** RIVER WALK  
**Project Number:** 183757

**Lab Number:** L1408396  
**Report Date:** 05/06/14

**Method Blank Analysis  
 Batch Quality Control**

Analytical Method: 97,8082  
 Analytical Date: 04/23/14 09:22  
 Analyst: JW

Extraction Method: EPA 3546  
 Extraction Date: 04/23/14 00:51  
 Cleanup Method1: EPA 3665A  
 Cleanup Date1: 04/23/14  
 Cleanup Method2: EPA 3660B  
 Cleanup Date2: 04/23/14

Parameter	Result	Qualifier	Units	RL	MDL	Column
MCP Polychlorinated Biphenyls - Westborough Lab for sample(s): 02,04,06 Batch: WG684318-1						
Aroclor 1016	ND		ug/kg	33.0	--	A
Aroclor 1221	ND		ug/kg	33.0	--	A
Aroclor 1232	ND		ug/kg	33.0	--	A
Aroclor 1242	ND		ug/kg	33.0	--	A
Aroclor 1248	ND		ug/kg	33.0	--	A
Aroclor 1254	ND		ug/kg	33.0	--	A
Aroclor 1260	ND		ug/kg	33.0	--	A
Aroclor 1262	ND		ug/kg	33.0	--	A
Aroclor 1268	ND		ug/kg	33.0	--	A

Surrogate	%Recovery	Qualifier	Acceptance Criteria	Column
2,4,5,6-Tetrachloro-m-xylene	59		30-150	B
2,4,5,6-Tetrachloro-m-xylene	45		30-150	A
Decachlorobiphenyl	61		30-150	A
Decachlorobiphenyl	94		30-150	B



## Lab Control Sample Analysis

### Batch Quality Control

Project Name: RIVER WALK

Lab Number: L1408396

Project Number: 183757

Report Date: 05/06/14

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits	Column
MCP Polychlorinated Biphenyls - Westborough Lab Associated sample(s): 02,04,06 Batch: WG684318-2 WG684318-3									
Aroclor 1016	49		61		40-140	22		30	A
Aroclor 1260	43		49		40-140	13		30	A

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria	Column
2,4,5,6-Tetrachloro-m-xylene	55		80		30-150	A
Decachlorobiphenyl	51		62		30-150	A
2,4,5,6-Tetrachloro-m-xylene	66		79		30-150	B
Decachlorobiphenyl	72		85		30-150	B

## METALS

**Project Name:** RIVER WALK  
**Project Number:** 183757

**Lab Number:** L1408396  
**Report Date:** 05/06/14

**SAMPLE RESULTS**

Lab ID: L1408396-02  
 Client ID: SB-1 (0-3')  
 Sample Location: 179 BRIDGE ST. LOWELL, MA  
 Matrix: Soil  
 Percent Solids: 93%

Date Collected: 04/21/14 09:10  
 Date Received: 04/22/14  
 Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>MCP Total Metals - Westborough Lab</b>											
Arsenic, Total	9.9		mg/kg	0.42	--	1	05/05/14 09:02	05/05/14 13:28	EPA 3050B	97,6010C	MG
Barium, Total	28		mg/kg	0.42	--	1	05/05/14 09:02	05/05/14 13:28	EPA 3050B	97,6010C	MG
Cadmium, Total	ND		mg/kg	0.42	--	1	05/05/14 09:02	05/05/14 13:28	EPA 3050B	97,6010C	MG
Chromium, Total	20		mg/kg	0.42	--	1	05/05/14 09:02	05/05/14 13:28	EPA 3050B	97,6010C	MG
Lead, Total	6.7		mg/kg	2.1	--	1	05/05/14 09:02	05/05/14 13:28	EPA 3050B	97,6010C	MG
Mercury, Total	ND		mg/kg	0.073	--	1	05/02/14 11:51	05/02/14 15:05	EPA 7471B	97,7471B	MC
Selenium, Total	ND		mg/kg	2.1	--	1	05/05/14 09:02	05/05/14 13:28	EPA 3050B	97,6010C	MG
Silver, Total	ND		mg/kg	0.42	--	1	05/05/14 09:02	05/05/14 13:28	EPA 3050B	97,6010C	MG



**Project Name:** RIVER WALK  
**Project Number:** 183757

**Lab Number:** L1408396  
**Report Date:** 05/06/14

**SAMPLE RESULTS**

Lab ID: L1408396-04  
 Client ID: SB-2 (0-14')  
 Sample Location: 179 BRIDGE ST. LOWELL, MA  
 Matrix: Soil  
 Percent Solids: 78%

Date Collected: 04/21/14 11:10  
 Date Received: 04/22/14  
 Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>MCP Total Metals - Westborough Lab</b>											
Arsenic, Total	7.6		mg/kg	0.48	--	1	05/05/14 09:02	05/05/14 14:59	EPA 3050B	97,6010C	MG
Barium, Total	81		mg/kg	0.48	--	1	05/05/14 09:02	05/05/14 14:59	EPA 3050B	97,6010C	MG
Cadmium, Total	ND		mg/kg	0.48	--	1	05/05/14 09:02	05/05/14 14:59	EPA 3050B	97,6010C	MG
Chromium, Total	18		mg/kg	0.48	--	1	05/05/14 09:02	05/05/14 14:59	EPA 3050B	97,6010C	MG
Lead, Total	45		mg/kg	2.4	--	1	05/05/14 09:02	05/05/14 14:59	EPA 3050B	97,6010C	MG
Mercury, Total	0.102		mg/kg	0.095	--	1	04/29/14 08:53	04/29/14 13:00	EPA 7471B	97,7471B	MC
Selenium, Total	ND		mg/kg	2.4	--	1	05/05/14 09:02	05/05/14 14:59	EPA 3050B	97,6010C	MG
Silver, Total	ND		mg/kg	0.48	--	1	05/05/14 09:02	05/05/14 14:59	EPA 3050B	97,6010C	MG



Project Name: RIVER WALK

Lab Number: L1408396

Project Number: 183757

Report Date: 05/06/14

## SAMPLE RESULTS

Lab ID: L1408396-06

Date Collected: 04/21/14 16:00

Client ID: SB-1 (3-14.5')

Date Received: 04/22/14

Sample Location: 179 BRIDGE ST. LOWELL, MA

Field Prep: Not Specified

Matrix: Soil

Percent Solids: 91%

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
MCP Total Metals - Westborough Lab											
Arsenic, Total	5.7		mg/kg	0.43	--	1	05/05/14 09:02	05/05/14 15:03	EPA 3050B	97,6010C	MG
Barium, Total	22		mg/kg	0.43	--	1	05/05/14 09:02	05/05/14 15:03	EPA 3050B	97,6010C	MG
Cadmium, Total	ND		mg/kg	0.43	--	1	05/05/14 09:02	05/05/14 15:03	EPA 3050B	97,6010C	MG
Chromium, Total	10		mg/kg	0.43	--	1	05/05/14 09:02	05/05/14 15:03	EPA 3050B	97,6010C	MG
Lead, Total	33		mg/kg	2.1	--	1	05/05/14 09:02	05/05/14 15:03	EPA 3050B	97,6010C	MG
Mercury, Total	ND		mg/kg	0.081	--	1	04/29/14 08:53	04/29/14 13:02	EPA 7471B	97,7471B	MC
Selenium, Total	ND		mg/kg	2.1	--	1	05/05/14 09:02	05/05/14 15:03	EPA 3050B	97,6010C	MG
Silver, Total	ND		mg/kg	0.43	--	1	05/05/14 09:02	05/05/14 15:03	EPA 3050B	97,6010C	MG



**Project Name:** RIVER WALK  
**Project Number:** 183757

**Lab Number:** L1408396  
**Report Date:** 05/06/14

## Method Blank Analysis Batch Quality Control

Parameter	Result Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
MCP Total Metals - Westborough Lab for sample(s): 04,06 Batch: WG685611-1									
Mercury, Total	ND	mg/kg	0.083	--	1	04/29/14 08:53	04/29/14 12:49	97,7471B	MC

### Prep Information

Digestion Method: EPA 7471B

Parameter	Result Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
MCP Total Metals - Westborough Lab for sample(s): 02 Batch: WG686625-1									
Mercury, Total	ND	mg/kg	0.083	--	1	05/02/14 11:51	05/02/14 14:56	97,7471B	MC

### Prep Information

Digestion Method: EPA 7471B

Parameter	Result Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
MCP Total Metals - Westborough Lab for sample(s): 02,04,06 Batch: WG687190-1									
Arsenic, Total	ND	mg/kg	0.40	--	1	05/05/14 09:02	05/05/14 13:36	97,6010C	MG
Barium, Total	ND	mg/kg	0.40	--	1	05/05/14 09:02	05/05/14 13:36	97,6010C	MG
Cadmium, Total	ND	mg/kg	0.40	--	1	05/05/14 09:02	05/05/14 13:36	97,6010C	MG
Chromium, Total	ND	mg/kg	0.40	--	1	05/05/14 09:02	05/05/14 13:36	97,6010C	MG
Lead, Total	ND	mg/kg	2.0	--	1	05/05/14 09:02	05/05/14 13:36	97,6010C	MG
Selenium, Total	ND	mg/kg	2.0	--	1	05/05/14 09:02	05/05/14 13:36	97,6010C	MG
Silver, Total	ND	mg/kg	0.40	--	1	05/05/14 09:02	05/05/14 13:36	97,6010C	MG

### Prep Information

Digestion Method: EPA 3050B



## Lab Control Sample Analysis

### Batch Quality Control

Project Name: RIVER WALK

Lab Number: L1408396

Project Number: 183757

Report Date: 05/06/14

Parameter	LCS		LCSD		%Recovery Limits	RPD	Qual	RPD Limits
	%Recovery	Qual	%Recovery	Qual				
MCP Total Metals - Westborough Lab Associated sample(s): 04,06 Batch: WG685611-2 WG685611-3 SRM Lot Number: 0518-10-02								
Mercury, Total	110		113		67-133	3		30
MCP Total Metals - Westborough Lab Associated sample(s): 02 Batch: WG686625-2 WG686625-3 SRM Lot Number: 0518-10-02								
Mercury, Total	95		96		67-133	1		30
MCP Total Metals - Westborough Lab Associated sample(s): 02,04,06 Batch: WG687190-2 WG687190-3 SRM Lot Number: 0518-10-02								
Arsenic, Total	100		100		81-119	0		30
Barium, Total	92		92		83-118	0		30
Cadmium, Total	98		94		82-117	4		30
Chromium, Total	97		92		80-119	5		30
Lead, Total	92		90		80-120	2		30
Selenium, Total	98		98		80-120	0		30
Silver, Total	98		101		66-134	3		30

### Matrix Spike Analysis Batch Quality Control

Project Name: RIVER WALK

Lab Number: L1408396

Project Number: 183757

Report Date: 05/06/14

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	MSD Qual	MSD Found	MSD %Recovery	MSD Qual	Recovery Limits	RPD	RPD Qual	RPD Limits
MCP Total Metals - Westborough Lab Associated sample(s): 02 QC Batch ID: WG686625-4 QC Sample: L1408396-02 Client ID: SB-1 (0-3')												
Mercury, Total	ND	0.148	0.128	86	-	-	-	-	75-125	-	-	35
MCP Total Metals - Westborough Lab Associated sample(s): 02,04,06 QC Batch ID: WG687190-4 QC Sample: L1408396-02 Client ID: SB-1 (0-3')												
Arsenic, Total	9.9	10	18	81	-	-	-	-	75-125	-	-	35
Barium, Total	28	167	170	85	-	-	-	-	75-125	-	-	35
Cadmium, Total	ND	4.27	3.8	89	-	-	-	-	75-125	-	-	35
Chromium, Total	20	16.7	40	119	-	-	-	-	75-125	-	-	35
Lead, Total	6.7	42.7	45	90	-	-	-	-	75-125	-	-	35
Selenium, Total	ND	10	9.5	94	-	-	-	-	75-125	-	-	35
Silver, Total	ND	25.1	23	92	-	-	-	-	75-125	-	-	35

Project Name: RIVER WALK

Project Number: 183757

**Lab Serial Dilution  
Analysis  
Batch Quality Control**

Lab Number: L1408396

Report Date: 05/06/14

Parameter	Native Sample	Serial Dilution	Units	% D	Qual	RPD Limits
MCP Total Metals - Westborough Lab Associated sample(s): 02,04,06 QC Batch ID: WG687190-6 QC Sample: L1408396-02 Client ID: SB-1 (0-3')						
Barium, Total	28	30	mg/kg	7		10

# **INORGANICS & MISCELLANEOUS**

**Project Name:** RIVER WALK**Project Number:** 183757**Lab Number:** L1408396**Report Date:** 05/06/14**SAMPLE RESULTS**

Lab ID: L1408396-02  
 Client ID: SB-1 (0-3')  
 Sample Location: 179 BRIDGE ST. LOWELL, MA  
 Matrix: Soil

Date Collected: 04/21/14 09:10  
 Date Received: 04/22/14  
 Field Prep: Not Specified

**Test Material Information**

Source of Material: Unknown  
 Description of Material: Non-Metallic - Dry Soil  
 Particle Size: Medium  
 Preliminary Burning Time (sec): 120

Parameter	Result	Date Analyzed	Analytical Method	Analyst
Ignitability of Solids - Westborough Lab				
Ignitability	NI	04/23/14 16:32	1,1030	SB



**Project Name:** RIVER WALK**Project Number:** 183757**Lab Number:** L1408396**Report Date:** 05/06/14**SAMPLE RESULTS**

Lab ID: L1408396-04  
 Client ID: SB-2 (0-14')  
 Sample Location: 179 BRIDGE ST. LOWELL, MA  
 Matrix: Soil

Date Collected: 04/21/14 11:10  
 Date Received: 04/22/14  
 Field Prep: Not Specified

**Test Material Information**

Source of Material: Unknown  
 Description of Material: Non-Metallic - Wet Soil  
 Particle Size: Medium  
 Preliminary Burning Time (sec): 120

Parameter	Result	Date Analyzed	Analytical Method	Analyst
Ignitability of Solids - Westborough Lab				
Ignitability	NI	04/23/14 16:32	1,1030	SB



**Project Name:** RIVER WALK**Project Number:** 183757**Lab Number:** L1408396**Report Date:** 05/06/14**SAMPLE RESULTS**

Lab ID: L1408396-06  
 Client ID: SB-1 (3-14.5')  
 Sample Location: 179 BRIDGE ST. LOWELL, MA  
 Matrix: Soil

Date Collected: 04/21/14 16:00  
 Date Received: 04/22/14  
 Field Prep: Not Specified

**Test Material Information**

Source of Material: Unknown  
 Description of Material: Non-Metallic - Dry Soil  
 Particle Size: Medium  
 Preliminary Burning Time (sec): 120

Parameter	Result	Date Analyzed	Analytical Method	Analyst
Ignitability of Solids - Westborough Lab				
Ignitability	NI	04/23/14 16:32	1,1030	SB



Project Name: RIVER WALK

Lab Number: L1408396

Project Number: 183757

Report Date: 05/06/14

## SAMPLE RESULTS

Lab ID: L1408396-01  
 Client ID: SB-1 (3')  
 Sample Location: 179 BRIDGE ST. LOWELL, MA  
 Matrix: Soil

Date Collected: 04/21/14 09:15  
 Date Received: 04/22/14  
 Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total	93.1		%	0.100	NA	1	-	04/22/14 21:13	30,2540G	RT



Project Name: RIVER WALK

Lab Number: L1408396

Project Number: 183757

Report Date: 05/06/14

## SAMPLE RESULTS

Lab ID: L1408396-02  
 Client ID: SB-1 (0-3')  
 Sample Location: 179 BRIDGE ST. LOWELL, MA  
 Matrix: Soil

Date Collected: 04/21/14 09:10  
 Date Received: 04/22/14  
 Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total	93.3		%	0.100	NA	1	-	04/22/14 21:13	30,2540G	RT
pH (H)	7.8		SU	-	NA	1	-	04/22/14 20:24	1,9045D	JA
Cyanide, Reactive	ND		mg/kg	10	--	1	05/01/14 19:15	05/01/14 22:07	1,7.3	TL
Sulfide, Reactive	ND		mg/kg	10	--	1	05/01/14 19:15	05/01/14 22:00	1,7.3	TL



**Project Name:** RIVER WALK**Lab Number:** L1408396**Project Number:** 183757**Report Date:** 05/06/14**SAMPLE RESULTS**

**Lab ID:** L1408396-03  
**Client ID:** SB-2 (12')  
**Sample Location:** 179 BRIDGE ST. LOWELL, MA  
**Matrix:** Soil

**Date Collected:** 04/21/14 11:05  
**Date Received:** 04/22/14  
**Field Prep:** Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total	91.6		%	0.100	NA	1	-	04/22/14 21:13	30,2540G	RT



Project Name: RIVER WALK

Lab Number: L1408396

Project Number: 183757

Report Date: 05/06/14

## SAMPLE RESULTS

Lab ID: L1408396-04  
 Client ID: SB-2 (0-14')  
 Sample Location: 179 BRIDGE ST. LOWELL, MA  
 Matrix: Soil

Date Collected: 04/21/14 11:10  
 Date Received: 04/22/14  
 Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total	77.8		%	0.100	NA	1	-	04/22/14 21:13	30,2540G	RT
pH (H)	8.4		SU	-	NA	1	-	04/22/14 20:24	1,9045D	JA
Cyanide, Reactive	ND		mg/kg	10	--	1	05/01/14 19:15	05/01/14 22:07	1,7.3	TL
Sulfide, Reactive	ND		mg/kg	10	--	1	05/01/14 19:15	05/01/14 22:00	1,7.3	TL



**Project Name:** RIVER WALK**Lab Number:** L1408396**Project Number:** 183757**Report Date:** 05/06/14**SAMPLE RESULTS**

**Lab ID:** L1408396-05  
**Client ID:** SB-1 (10')  
**Sample Location:** 179 BRIDGE ST. LOWELL, MA  
**Matrix:** Soil

**Date Collected:** 04/21/14 15:55  
**Date Received:** 04/22/14  
**Field Prep:** Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total	86.0		%	0.100	NA	1	-	04/22/14 21:13	30,2540G	RT



Project Name: RIVER WALK

Lab Number: L1408396

Project Number: 183757

Report Date: 05/06/14

## SAMPLE RESULTS

Lab ID: L1408396-06  
 Client ID: SB-1 (3-14.5')  
 Sample Location: 179 BRIDGE ST. LOWELL, MA  
 Matrix: Soil

Date Collected: 04/21/14 16:00  
 Date Received: 04/22/14  
 Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total	90.5		%	0.100	NA	1	-	04/22/14 21:13	30,2540G	RT
pH (H)	7.4		SU	-	NA	1	-	04/22/14 20:24	1,9045D	JA
Cyanide, Reactive	ND		mg/kg	10	--	1	05/01/14 19:15	05/01/14 22:07	1,7.3	TL
Sulfide, Reactive	ND		mg/kg	10	--	1	05/01/14 19:15	05/01/14 22:00	1,7.3	TL



Project Name: RIVER WALK

Lab Number: L1408396

Project Number: 183757

Report Date: 05/06/14

**Method Blank Analysis**  
**Batch Quality Control**

Parameter	Result Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab for sample(s): 02,04,06 Batch: WG686673-1									
Cyanide, Reactive	ND	mg/kg	10	--	1	05/01/14 19:15	05/01/14 22:07	1,7.3	TL
General Chemistry - Westborough Lab for sample(s): 02,04,06 Batch: WG686675-1									
Sulfide, Reactive	ND	mg/kg	10	--	1	05/01/14 19:15	05/01/14 21:59	1,7.3	TL

## Lab Control Sample Analysis

Batch Quality Control

**Project Name:** RIVER WALK  
**Project Number:** 183757

**Lab Number:** L1408396  
**Report Date:** 05/06/14

Parameter	LCS		LCSD		%Recovery Limits	RPD	Qual	RPD Limits
	%Recovery	Qual	%Recovery	Qual				
General Chemistry - Westborough Lab Associated sample(s): 02,04,06 Batch: WG684287-1								
pH	100		-		99-101	-		
General Chemistry - Westborough Lab Associated sample(s): 02,04,06 Batch: WG686673-2								
Cyanide, Reactive	85		-		30-125	-		40
General Chemistry - Westborough Lab Associated sample(s): 02,04,06 Batch: WG686675-2								
Sulfide, Reactive	112		-		60-125	-		40

## Lab Duplicate Analysis

Batch Quality Control

Project Name: RIVER WALK

Project Number: 183757

Lab Number: L1408396

Report Date: 05/06/14

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 02,04,06 QC Batch ID: WG684287-2 QC Sample: L1408419-01 Client ID: DUP Sample						
pH	6.8	6.7	SU	1		5
General Chemistry - Westborough Lab Associated sample(s): 01-06 QC Batch ID: WG684302-1 QC Sample: L1408419-01 Client ID: DUP Sample						
Solids, Total	86.7	84.9	%	2		20
General Chemistry - Westborough Lab Associated sample(s): 02,04,06 QC Batch ID: WG686673-3 QC Sample: L1409073-01 Client ID: DUP Sample						
Cyanide, Reactive	ND	ND	mg/kg	NC		40
General Chemistry - Westborough Lab Associated sample(s): 02,04,06 QC Batch ID: WG686675-3 QC Sample: L1409073-01 Client ID: DUP Sample						
Sulfide, Reactive	ND	ND	mg/kg	NC		40

Project Name: RIVER WALK

Lab Number: L1408396

Project Number: 183757

Report Date: 05/06/14

## Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Reagent H2O Preserved Vials Frozen on: 04/22/2014 17:37

## Cooler Information Custody Seal

## Cooler

A Absent

## Container Information

Container ID	Container Type	Cooler	pH	Temp deg C	Pres	Seal	Analysis(*)
L1408396-01A	Vial MeOH preserved	A	N/A	5.0	Y	Absent	MCP-8260HLW-10(14)
L1408396-01B	Vial water preserved	A	N/A	5.0	Y	Absent	MCP-8260HLW-10(14)
L1408396-01C	Vial water preserved	A	N/A	5.0	Y	Absent	MCP-8260HLW-10(14)
L1408396-01D	Plastic 2oz unpreserved for TS	A	N/A	5.0	Y	Absent	TS(7)
L1408396-02A	Amber 250ml unpreserved	A	N/A	5.0	Y	Absent	IGNIT-1030(14),MCP-8082-10(365),MCP-CR-6010T-10(180),REACTS(14),MCP-8270-10(14),MCP-AS-6010T-10(180),MCP-7471T-10(28),MCP-CD-6010T-10(180),TS(7),MCP-AG-6010T-10(180),PH-9045(1),MCP-SE-6010T-10(180),MCP-BA-6010T-10(180),REACTCN(14),TPH-DRO-D(14),MCP-PB-6010T-10(180)
L1408396-02B	Amber 250ml unpreserved	A	N/A	5.0	Y	Absent	IGNIT-1030(14),MCP-8082-10(365),MCP-CR-6010T-10(180),REACTS(14),MCP-8270-10(14),MCP-AS-6010T-10(180),MCP-7471T-10(28),MCP-CD-6010T-10(180),TS(7),MCP-AG-6010T-10(180),PH-9045(1),MCP-SE-6010T-10(180),MCP-BA-6010T-10(180),REACTCN(14),TPH-DRO-D(14),MCP-PB-6010T-10(180)
L1408396-02C	Amber 250ml unpreserved	A	N/A	5.0	Y	Absent	IGNIT-1030(14),MCP-8082-10(365),MCP-CR-6010T-10(180),REACTS(14),MCP-8270-10(14),MCP-AS-6010T-10(180),MCP-7471T-10(28),MCP-CD-6010T-10(180),TS(7),MCP-AG-6010T-10(180),PH-9045(1),MCP-SE-6010T-10(180),MCP-BA-6010T-10(180),REACTCN(14),TPH-DRO-D(14),MCP-PB-6010T-10(180)

\*Values in parentheses indicate holding time in days



Project Name: RIVER WALK

Project Number: 183757

Lab Number: L1408396

Report Date: 05/06/14

**Container Information**

Container ID	Container Type	Cooler	pH	Temp deg C	Pres	Seal	Analysis(*)
L1408396-03A	Vial MeOH preserved	A	N/A	5.0	Y	Absent	MCP-8260HLW-10(14)
L1408396-03B	Vial water preserved	A	N/A	5.0	Y	Absent	MCP-8260HLW-10(14)
L1408396-03C	Vial water preserved	A	N/A	5.0	Y	Absent	MCP-8260HLW-10(14)
L1408396-03D	Plastic 2oz unpreserved for TS	A	N/A	5.0	Y	Absent	TS(7)
L1408396-04A	Amber 250ml unpreserved	A	N/A	5.0	Y	Absent	IGNIT-1030(14),MCP-8082-10(365),MCP-CR-6010T-10(180),REACTS(14),MCP-8270-10(14),MCP-AS-6010T-10(180),MCP-7471T-10(28),MCP-CD-6010T-10(180),TS(7),MCP-AG-6010T-10(180),PH-9045(1),MCP-SE-6010T-10(180),MCP-BA-6010T-10(180),REACTCN(14),TPH-DRO-D(14),MCP-PB-6010T-10(180)
L1408396-04B	Amber 250ml unpreserved	A	N/A	5.0	Y	Absent	IGNIT-1030(14),MCP-8082-10(365),MCP-CR-6010T-10(180),REACTS(14),MCP-8270-10(14),MCP-AS-6010T-10(180),MCP-7471T-10(28),MCP-CD-6010T-10(180),TS(7),MCP-AG-6010T-10(180),PH-9045(1),MCP-SE-6010T-10(180),MCP-BA-6010T-10(180),REACTCN(14),TPH-DRO-D(14),MCP-PB-6010T-10(180)
L1408396-04C	Amber 250ml unpreserved	A	N/A	5.0	Y	Absent	IGNIT-1030(14),MCP-8082-10(365),MCP-CR-6010T-10(180),REACTS(14),MCP-8270-10(14),MCP-AS-6010T-10(180),MCP-7471T-10(28),MCP-CD-6010T-10(180),TS(7),MCP-AG-6010T-10(180),PH-9045(1),MCP-SE-6010T-10(180),MCP-BA-6010T-10(180),REACTCN(14),TPH-DRO-D(14),MCP-PB-6010T-10(180)
L1408396-05A	Vial MeOH preserved	A	N/A	5.0	Y	Absent	MCP-8260HLW-10(14)
L1408396-05B	Vial water preserved	A	N/A	5.0	Y	Absent	MCP-8260HLW-10(14)
L1408396-05C	Vial water preserved	A	N/A	5.0	Y	Absent	MCP-8260HLW-10(14)
L1408396-05D	Plastic 2oz unpreserved for TS	A	N/A	5.0	Y	Absent	TS(7)

\*Values in parentheses indicate holding time in days



Project Name: RIVER WALK

Project Number: 183757

Lab Number: L1408396

Report Date: 05/06/14

**Container Information**

Container ID	Container Type	Cooler	pH	Temp deg C	Pres	Seal	Analysis(*)
L1408396-06A	Amber 250ml unpreserved	A	N/A	5.0	Y	Absent	IGNIT-1030(14),MCP-8082-10(365),MCP-CR-6010T-10(180),REACTS(14),MCP-8270-10(14),MCP-AS-6010T-10(180),MCP-7471T-10(28),MCP-CD-6010T-10(180),TS(7),MCP-AG-6010T-10(180),PH-9045(1),MCP-SE-6010T-10(180),MCP-BA-6010T-10(180),REACTCN(14),TPH-DRO-D(14),MCP-PB-6010T-10(180)
L1408396-06B	Amber 250ml unpreserved	A	N/A	5.0	Y	Absent	IGNIT-1030(14),MCP-8082-10(365),MCP-CR-6010T-10(180),REACTS(14),MCP-8270-10(14),MCP-AS-6010T-10(180),MCP-7471T-10(28),MCP-CD-6010T-10(180),TS(7),MCP-AG-6010T-10(180),PH-9045(1),MCP-SE-6010T-10(180),MCP-BA-6010T-10(180),REACTCN(14),TPH-DRO-D(14),MCP-PB-6010T-10(180)
L1408396-06C	Amber 250ml unpreserved	A	N/A	5.0	Y	Absent	IGNIT-1030(14),MCP-8082-10(365),MCP-CR-6010T-10(180),REACTS(14),MCP-8270-10(14),MCP-AS-6010T-10(180),MCP-7471T-10(28),MCP-CD-6010T-10(180),TS(7),MCP-AG-6010T-10(180),PH-9045(1),MCP-SE-6010T-10(180),MCP-BA-6010T-10(180),REACTCN(14),TPH-DRO-D(14),MCP-PB-6010T-10(180)

**Container Comments**

L1408396-02B

\*Values in parentheses indicate holding time in days



**Project Name:** RIVER WALK  
**Project Number:** 183757

**Lab Number:** L1408396  
**Report Date:** 05/06/14

## GLOSSARY

### Acronyms

EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NI	- Not Ignitable.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.

### Footnotes

- 1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

### Terms

**Analytical Method:** Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

### Data Qualifiers

- A** - Spectra identified as "Aldol Condensation Product".
- B** - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit.
- C** - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.
- D** - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.
- E** - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.
- G** - The concentration may be biased high due to matrix interferences (i.e. co-elution) with non-target compound(s). The result should be considered estimated.
- H** - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.
- I** - The lower value for the two columns has been reported due to obvious interference.

**Report Format:** Data Usability Report



**Project Name:** RIVER WALK  
**Project Number:** 183757

**Lab Number:** L1408396  
**Report Date:** 05/06/14

**Data Qualifiers**

- M** - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.
- NJ** - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.
- P** - The RPD between the results for the two columns exceeds the method-specified criteria.
- Q** - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)
- R** - Analytical results are from sample re-analysis.
- RE** - Analytical results are from sample re-extraction.
- S** - Analytical results are from modified screening analysis.
- J** - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).
- ND** - Not detected at the reporting limit (RL) for the sample.

**Project Name:** RIVER WALK  
**Project Number:** 183757

**Lab Number:** L1408396  
**Report Date:** 05/06/14

## REFERENCES

- 1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - IV, 2007.
- 30 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WPCF. 18th Edition. 1992.
- 97 EPA Test Methods (SW-846) with QC Requirements & Performance Standards for the Analysis of EPA SW-846 Methods under the Massachusetts Contingency Plan, WSC-CAM-IIA, IIB, IIIA, IIIB, IIIC, IIID, VA, VB, VC, VIA, VIB, VIIIA and VIIIB, July 2010.

## LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.



## Certification Information

Last revised April 15, 2014

---

**The following analytes are not included in our NELAP Scope of Accreditation:**

### Westborough Facility

**EPA 524.2:** Acetone, 2-Butanone (Methyl ethyl ketone (MEK)), Tert-butyl alcohol, 2-Hexanone, Tetrahydrofuran, 1,3,5-Trichlorobenzene, 4-Methyl-2-pentanone (MIBK), Carbon disulfide, Diethyl ether.

**EPA 8260C:** 1,2,4,5-Tetramethylbenzene, 4-Ethyltoluene, Iodomethane (methyl iodide), Methyl methacrylate, Azobenzene.

**EPA 8330A/B:** PETN, Picric Acid, Nitroglycerine, 2,6-DANT, 2,4-DANT.

**EPA 8270D:** 1-Methylnaphthalene, Dimethylnaphthalene, 1,4-Diphenylhydrazine.

**EPA 625:** 4-Chloroaniline, 4-Methylphenol.

**SM4500:** Soil: Total Phosphorus, TKN, NO<sub>2</sub>, NO<sub>3</sub>.

**EPA 9071:** Total Petroleum Hydrocarbons, Oil & Grease.

### Mansfield Facility

**EPA 8270D:** Biphenyl.

**EPA 2540D:** TSS

**EPA TO-15:** Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.

---

**The following analytes are included in our Massachusetts DEP Scope of Accreditation, Westborough Facility:**

### Drinking Water

**EPA 200.8:** Sb,As,Ba,Be,Cd,Cr,Cu,Pb,Ni,Se,Tl; **EPA 200.7:** Ba,Be,Ca,Cd,Cr,Cu,Na; **EPA 245.1:** Mercury;

**EPA 300.0:** Nitrate-N, Fluoride, Sulfate; **EPA 353.2:** Nitrate-N, Nitrite-N; **SM4500NO3-F:** Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500CI-D, SM2320B, SM2540C, SM4500H-B**

**EPA 332:** Perchlorate.

**Microbiology:** **SM9215B; SM9223-P/A, SM9223B-Colilert-QT, Enterolert-QT.**

### Non-Potable Water

**EPA 200.8:** Al,Sb,As,Be,Cd,Cr,Cu,Pb,Mn,Ni,Se,Ag,Tl,Zn;

**EPA 200.7:** Al,Sb,As,Be,Cd,Ca,Cr,Co,Cu,Fe,Pb,Mg,Mn,Mo,Ni,K,Se,Ag,Na,Sr,Ti,Tl,V,Zn;

**EPA 245.1, SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2340B, SM2320B, SM4500CL-E, SM4500F-BC, SM426C, SM4500NH3-BH, EPA 350.1:** Ammonia-N, **LACHAT 10-107-06-1-B:** Ammonia-N, **SM4500NO3-F,**

**EPA 353.2:** Nitrate-N, **SM4500NH3-BC-NES, EPA 351.1, SM4500P-E, SM4500P-B, E, SM5220D, EPA 410.4,**

**SM5210B, SM5310C, SM4500CL-D, EPA 1664, SM14 510AC, EPA 420.1, SM4500-CN-CE, SM2540D.**

**EPA 624:** Volatile Halocarbons & Aromatics,

**EPA 608:** Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs

**EPA 625:** SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045:** PCB-Oil.

**Microbiology:** **SM9223B-Colilert-QT; Enterolert-QT, SM9222D-MF.**

---

For a complete listing of analytes and methods, please contact your Alpha Project Manager.



# CHAIN OF CUSTODY

PAGE 1 OF 1

WESTBORO, MA  
TEL: 508-898-9220  
FAX: 508-898-9193

MANSFIELD, MA  
TEL: 508-822-9300  
FAX: 508-822-3288

### Project Information

Project Name: River Walk  
Project Location: 179 Bridge St, Lowell, MA  
Project #: 183757  
Project Manager: Matt Robbins  
ALPHA Quote #:

Date Rec'd In Lab: 4/22/14

### Report Information - Data Deliverables

FAX  EMAIL  
 ADEx  Add'l Deliverables

### Billing Information

Same as Client info PO #:

### Client Information

Client: TRC  
Address: 650 Suffolk St  
Lowell, MA 01854  
Phone: 978-970-5600  
Fax:

### Turn-Around Time

Standard (10-day)  RUSH (only confirmed if pre-approved)  
Date Due: 5/6/14 Time:

### Regulatory Requirements/Report Limits

State /Fed Program MCP Criteria 51

### MA MCP PRESUMPTIVE CERTAINTY --- CT REASONABLE CONFIDENCE PROTO

Yes  No Are MCP Analytical Methods Required?  
 Yes  No Is Matrix Spike (MS) Required on this SDG? (If yes see note in Comments)  
 Yes  No Are CT RCP (Reasonable Confidence Protocols) Required?

Email: mrobbins@trcsolutions.com

These samples have been previously analyzed by Alpha

### Other Project Specific Requirements/Comments/Detection Limits:

If MS is required, indicate in Sample Specific Comments which samples and what tests MS to be performed.  
(Note: All CAM methods for inorganic analyses require MS every 20 soil samples)

ANALYSIS  
VOCs via 8060  
SVOC via 8270  
PCBS via 8082  
TPH-DRO-D  
RCRA Metals  
Pb/Inorganic  
Residuals

### SAMPLE HANDLING

Filtration \_\_\_\_\_  
 Done  
 Not needed  
Preservation  
 Lab to do  
 Lab to do  
(Please specify below)

TOTAL # BOTTLES

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection		Sample Matrix	Sampler's Initials	ANALYSIS										Sample Specific Comments	TOTAL # BOTTLES		
		Date	Time			VOCs	SVOCs	PCBS	TPH	DRO-D	RCRA	Metals	Pb/Inorganic	Residuals	MS				
08396-01	SB-1 (3')	4/21/14	915	Soil	JPS	X													4
02	SB-1 (0-3')		910			X	X	X	X	X	X								3
03	SB-2 (12')		1105			X													4
04	SB-2 (0-14')		1110			X	X	X	X	X	X								3
05	SB-1 (16')		1555			X													
06	SB-1 (3-14.5')		1600			X	X	X	X	X	X								

PLEASE ANSWER QUESTIONS ABOVE!

IS YOUR PROJECT  
MA MCP or CT RCP?

Container Type V A A A A A A A  
Preservative NO A A A A A A A

Relinquished By:	Date/Time	Received By:	Date/Time
<u>Jamie Stodart</u>	<u>4/22/14 1000</u>	<u>Joe</u>	<u>4/22/14 1630</u>
<u>John Allen</u>	<u>4/22/14</u>	<u>Rachel</u>	<u>4/22/14 1630</u>

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.

7A  
CONTINUING CALIBRATION CHECK

Lab Name: Alpha Analytical Labs

SDG No.: L1408396

Instrument ID: Voall1.i      Calibration Date: 02-MAY-2014      Time: 07:15

Lab File ID: 0502A01      Init. Calib. Date(s): 03-APR-2      04-APR-2

Sample No: 8260 CCAL      Init. Calib. Times : 14:52      16:17

Compound	RRF	RRF	MIN RRF	%D	MAX %D	
=====	=====	=====	=====	=====	=====	
dichlorodifluoromethane	.21188	.18478	.1	-13	20	
chloromethane	.27241	.25549	.1	-6	20	
vinyl chloride	.21104	.18715	.1	-11	20	
bromomethane	.08805	.09106	.1	3	20	F
chloroethane	.1082	.0991	.1	-8	20	
trichlorofluoromethane	.35034	.3379	.1	-4	20	
ethyl ether	.12929	.12206	.05	-6	20	
Freon 113	-----	.22946	.1	---	20	F
acetone	100	106	.1	6	20	
1,1,-dichloroethene	.22801	.22407	.1	-2	20	
carbon disulfide	.77631	.75343	.1	-3	20	
methylene chloride	.28557	.30779	.1	8	20	
acrylonitrile	-----	.06142	.05	---	20	F
methyl tert butyl ether	.6183	.58134	.1	-6	20	
trans-1,2-dichloroethene	.27439	.27401	.1	0	20	
Diisopropyl Ether	.70389	.72847	.05	3	20	
1,1-dichloroethane	.45153	.45584	.2	1	20	
Ethyl-Tert-Butyl-Ether	.74174	.76022	.05	2	20	
2-butanone	.07345	.06714	.1	-9	20	F
2,2-dichloropropane	.36634	.34649	.05	-5	20	
cis-1,2-dichloroethene	.29058	.29788	.1	3	20	
chloroform	.44273	.44414	.2	0	20	
bromochloromethane	.12012	.12842	.05	7	20	
tetrahydrofuran	.06033	.06007	.05	0	20	
1,1,1-trichloroethane	.37429	.36179	.1	-3	20	
1,1-dichloropropene	.34035	.34069	.05	0	20	
carbontetrachloride	.30535	.29071	.1	-5	20	
Tertiary-Amyl Methyl Ether	.6616	.65482	.05	-1	20	
1,2-dichloroethane	.28416	.2781	.1	-2	20	
benzene	1.0630	1.1078	.5	4	20	
trichloroethene	.26673	.2666	.2	0	20	
1,2-dichloropropane	.24971	.26164	.1	5	20	
bromodichloromethane	.31859	.30722	.2	-4	20	
1,4-dioxane	.00246	-----	.05	---	20	F
dibromomethane	.13502	.13508	.05	0	20	
4-methyl-2-pentanone	.06785	.06214	.1	-8	20	F
cis-1,3-dichloropropene	.39661	.40647	.2	2	20	
toluene	.99318	.85859	.4	-14	20	

FORM VII MCP-8260HLW-10

7A  
CONTINUING CALIBRATION CHECK

Lab Name: Alpha Analytical Labs

SDG No.: L1408396

Instrument ID: Voall11.i      Calibration Date: 02-MAY-2014      Time: 07:15

Lab File ID: 0502A01      Init. Calib. Date(s): 03-APR-2      04-APR-2

Sample No: 8260 CCAL      Init. Calib. Times : 14:52      16:17

Compound	RRF	RRF	MIN RRF	%D	MAX %D
trans-1,3-dichloropropene	.48086	.42151	.1	-12	20
1,1,2-trichloroethane	.24225	.22288	.1	-8	20
2-hexanone	.14412	.10698	.1	-26	20
1,3-dichloropropane	.51117	.45999	.05	-10	20
tetrachloroethene	.35591	.29441	.2	-17	20
chlorodibromomethane	.30747	.25336	.1	-18	20
1,2-dibromoethane	.27244	.23915	.1	-12	20
chlorobenzene	1.0284	.89544	.5	-13	20
1,1,1,2-tetrachloroethane	.32848	.28493	.05	-13	20
ethyl benzene	1.7478	1.5257	.1	-13	20
p/m xylene	.66591	.58788	.1	-12	20
o xylene	.62478	.55267	.3	-12	20
styrene	.94318	.86343	.3	-8	20
bromoform	.37266	.28709	.1	-23	20
isopropylbenzene	3.6816	3.0477	.1	-17	20
1,1,2,2,-tetrachloroethane	.7668	.6646	.3	-13	20
1,2,3-trichloropropane	.57661	.50582	.05	-12	20
n-propylbenzene	4.2702	3.6377	.05	-15	20
bromobenzene	.86903	.71291	.05	-18	20
trans-1,4-dichloro-2-butene	-----	.15437	.05	---	20
1,3,5-trimethybenzene	3.0075	2.5468	.05	-15	20
2-chlorotoluene	3.0252	2.5714	.05	-15	20
4-chorotoluene	2.6900	2.2806	.05	-15	20
tert-butylbenzene	2.5806	2.1093	.05	-18	20
1,2,4-trimethylbenzene	3.0431	2.5930	.05	-15	20
sec-butylbenzene	3.8293	3.2352	.05	-16	20
p-isopropyltoluene	3.1808	2.6632	.05	-16	20
1,3-dichlorobenzene	1.6899	1.4181	.6	-16	20
1,4-dichlorobenzene	1.7141	1.4222	.5	-17	20
n-butylbenzene	2.9357	2.5250	.05	-14	20
1,2-dichlorobenzene	1.5563	1.2982	.4	-17	20
1,2-dibromo-3-chloropropane	.10057	.06847	.05	-32	20
1,2,4-trichlorobenzene	1.0572	.86344	.2	-18	20
hexachlorobutadiene	.49515	.3715	.05	-25	20
naphthalene	2.5351	2.0426	.05	-19	20
1,2,3-trichlorobenzene	.98349	.79446	.05	-19	20
=====	=====	=====	=====	=====	=====
dibromofluoromethane	.22346	.22517	.05	1	30

FORM VII MCP-8260HLW-10





## ANALYTICAL REPORT

Lab Number:	L1408495
Client:	TRC Environmental Consultants Wannalancit Mills 650 Suffolk Street Lowell, MA 01854
ATTN:	Matt Robbins
Phone:	(978) 656-3549
Project Name:	RIVERWALK
Project Number:	183757
Report Date:	05/08/14

The original project report/data package is held by Alpha Analytical. This report/data package is paginated and should be reproduced only in its entirety. Alpha Analytical holds no responsibility for results and/or data that are not consistent with the original.

Certifications & Approvals: MA (M-MA086), NY (11148), CT (PH-0574), NH (2003), NJ NELAP (MA935), RI (LAO00065), ME (MA00086), PA (68-03671), USDA (Permit #P-330-11-00240), NC (666), TX (T104704476), DOD (L2217), US Army Corps of Engineers.

---

Eight Walkup Drive, Westborough, MA 01581-1019  
508-898-9220 (Fax) 508-898-9193 800-624-9220 - [www.alphalab.com](http://www.alphalab.com)



**Project Name:** RIVERWALK  
**Project Number:** 183757

**Lab Number:** L1408495  
**Report Date:** 05/08/14

<b>Alpha Sample ID</b>	<b>Client ID</b>	<b>Sample Location</b>	<b>Collection Date/Time</b>
L1408495-01	SB-3 (7')	179 BRIDGE ST., LOWELL, MA	04/22/14 13:30
L1408495-02	SB-3 (0-14')	179 BRIDGE ST., LOWELL, MA	04/22/14 13:40
L1408495-03	SB-3 (14-18')	179 BRIDGE ST., LOWELL, MA	04/23/14 08:10

Project Name: RIVERWALK

Lab Number: L1408495

Project Number: 183757

Report Date: 05/08/14

**MADEP MCP Response Action Analytical Report Certification**

**This form provides certifications for all samples performed by MCP methods. Please refer to the Sample Results and Container Information sections of this report for specification of MCP methods used for each analysis. The following questions pertain only to MCP Analytical Methods.**

<b>An affirmative response to questions A through F is required for "Presumptive Certainty" status</b>		
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
B	Were the analytical method(s) and all associated QC requirements specified in the selected CAM protocol(s) followed?	YES
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
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data?"	YES
E a.	VPH, EPH, and APH Methods only: Was each method conducted without significant modification(s)? (Refer to the individual method(s) for a list of significant modifications).	N/A
E b.	APH and TO-15 Methods only: Was the complete analyte list reported for each method?	N/A
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
<b>A response to questions G, H and I is required for "Presumptive Certainty" status</b>		
G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)?	NO
H	Were all QC performance standards specified in the CAM protocol(s) achieved?	NO
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?	NO
<b>For any questions answered "No", please refer to the case narrative section on the following page(s).</b>		

**Please note that sample matrix information is located in the Sample Results section of this report.**



**Project Name:** RIVERWALK  
**Project Number:** 183757

**Lab Number:** L1408495  
**Report Date:** 05/08/14

### Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet all of the requirements of NELAC, for all NELAC accredited parameters. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. Performance criteria for CAM and RCP methods allow for some LCS compound failures to occur and still be within method compliance. In these instances, the specific failures are not narrated but are noted in the associated QC table. This information is also incorporated in the Data Usability format for our Data Merger tool where it can be reviewed along with any associated usability implications. Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances the specific failure is not narrated but noted in the associated QC table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

#### HOLD POLICY

For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Client Service Representative and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Client Services at 800-624-9220 with any questions.

---

**Project Name:** RIVERWALK  
**Project Number:** 183757

**Lab Number:** L1408495  
**Report Date:** 05/08/14

### Case Narrative (continued)

#### MCP Related Narratives

##### Volatile Organics

L1408495-01 has elevated detection limits due to the dilution required by the elevated concentrations of target compounds in the sample.

In reference to question G:

L1408495-01: None of the target analytes achieved the requested CAM reporting limits.

In reference to question H:

The WG685804-1/-2 LCS/LCSD recoveries, associated with L1408495-01, are above the individual acceptance criteria for bromomethane (139%/140%) and acetone (138%/134%), but within the overall method allowances. The results of the associated sample are reported; however, all positive detects are considered to have a potentially high bias for these compounds.

The initial calibration, associated with L1408495-01, did not meet the method required minimum response factor on the lowest calibration standard for 1,4-dioxane (0.00170), as well as the average response factor for 1,4-dioxane. The initial calibration verification was outside acceptance criteria for dichlorodifluoromethane (133%) and bromomethane (132%), but within overall method criteria.

The continuing calibration standard, associated with L1408495-01, is outside the acceptance criteria for several compounds; however, it is within overall method allowances. A copy of the continuing calibration standard is included as an addendum to this report.

##### Semivolatile Organics

L1408495-02 has elevated detection limits due to the dilution required by matrix interferences encountered during the concentration of the sample.

L1408495-02 was re-analyzed on dilution in order to quantify the sample within the calibration range. The results should be considered estimated, and are qualified with an E flag, for any compounds that exceeded the calibration range in the initial analysis. The re-analysis was performed only for the compounds that exceeded the calibration range.

In reference to question H:

The surrogate recovery for L1408495-02 is below the individual acceptance criteria for 2,4,6-tribromophenol

**Project Name:** RIVERWALK  
**Project Number:** 183757

**Lab Number:** L1408495  
**Report Date:** 05/08/14

### Case Narrative (continued)

(19%), but within the overall method allowances. The results of the original analysis are reported; however, all associated compounds are considered to have a potentially low bias.

#### Total Metals

In reference to question H:

The WG686619-8 MS recovery, performed on L1408495-03, is above the acceptance criteria for mercury (153%). Re-analysis of the MS yielded an unacceptable recovery in the range of 30-74% or >125%. The LCS/LCSD recoveries were within acceptance criteria; therefore, no further action was taken.

The WG687870-4 MS recoveries, performed on L1408495-03, are below the acceptance criteria for barium (64%) and lead (30%). Re-analysis of the MS yielded unacceptable recoveries in the range of 30-74% or >125%. The LCS/LCSD recoveries were within acceptance criteria; therefore, no further action was taken.

In reference to question I:

All samples were analyzed for a subset of MCP elements per the Chain of Custody.

#### Non-MCP Related Narratives

##### Petroleum Hydrocarbon Quantitation

L1408495-02 and the WG684657-3 Laboratory Duplicate have elevated detection limits due to the dilutions required by the elevated concentrations of the target analyte in the samples.

The WG684657-3 Laboratory Duplicate RPD (65%), performed on L1408495-02, is outside the acceptance criteria. The elevated RPD has been attributed to the non-homogeneous nature of the sample utilized for the laboratory duplicate.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature:

 Kelly Stenstrom

Title: Technical Director/Representative

Date: 05/08/14

# ORGANICS

# VOLATILES

**Project Name:** RIVERWALK**Lab Number:** L1408495**Project Number:** 183757**Report Date:** 05/08/14**SAMPLE RESULTS**

Lab ID: L1408495-01 D  
 Client ID: SB-3 (7')  
 Sample Location: 179 BRIDGE ST., LOWELL, MA  
 Matrix: Soil  
 Analytical Method: 97,8260C  
 Analytical Date: 04/28/14 10:30  
 Analyst: BN  
 Percent Solids: 93%

Date Collected: 04/22/14 13:30  
 Date Received: 04/23/14  
 Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
<b>MCP Volatile Organics by 8260/5035 - Westborough Lab</b>						
Methylene chloride	ND		ug/kg	2100	--	5
1,1-Dichloroethane	ND		ug/kg	310	--	5
Chloroform	ND		ug/kg	310	--	5
Carbon tetrachloride	ND		ug/kg	210	--	5
1,2-Dichloropropane	ND		ug/kg	730	--	5
Dibromochloromethane	ND		ug/kg	210	--	5
1,1,2-Trichloroethane	ND		ug/kg	310	--	5
Tetrachloroethene	ND		ug/kg	210	--	5
Chlorobenzene	ND		ug/kg	210	--	5
Trichlorofluoromethane	ND		ug/kg	840	--	5
1,2-Dichloroethane	ND		ug/kg	210	--	5
1,1,1-Trichloroethane	ND		ug/kg	210	--	5
Bromodichloromethane	ND		ug/kg	210	--	5
trans-1,3-Dichloropropene	ND		ug/kg	210	--	5
cis-1,3-Dichloropropene	ND		ug/kg	210	--	5
1,1-Dichloropropene	ND		ug/kg	840	--	5
Bromoform	ND		ug/kg	840	--	5
1,1,2,2-Tetrachloroethane	ND		ug/kg	210	--	5
Benzene	ND		ug/kg	210	--	5
Toluene	ND		ug/kg	310	--	5
Ethylbenzene	ND		ug/kg	210	--	5
Chloromethane	ND		ug/kg	840	--	5
Bromomethane	ND		ug/kg	420	--	5
Vinyl chloride	ND		ug/kg	420	--	5
Chloroethane	ND		ug/kg	420	--	5
1,1-Dichloroethene	ND		ug/kg	210	--	5
trans-1,2-Dichloroethene	ND		ug/kg	310	--	5
Trichloroethene	ND		ug/kg	210	--	5
1,2-Dichlorobenzene	ND		ug/kg	840	--	5
1,3-Dichlorobenzene	ND		ug/kg	840	--	5
1,4-Dichlorobenzene	ND		ug/kg	840	--	5

Project Name: RIVERWALK

Lab Number: L1408495

Project Number: 183757

Report Date: 05/08/14

## SAMPLE RESULTS

Lab ID: L1408495-01 D  
 Client ID: SB-3 (7')  
 Sample Location: 179 BRIDGE ST., LOWELL, MA

Date Collected: 04/22/14 13:30  
 Date Received: 04/23/14  
 Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
MCP Volatile Organics by 8260/5035 - Westborough Lab						
Methyl tert butyl ether	ND		ug/kg	420	--	5
p/m-Xylene	ND		ug/kg	420	--	5
o-Xylene	ND		ug/kg	420	--	5
cis-1,2-Dichloroethene	ND		ug/kg	210	--	5
Dibromomethane	ND		ug/kg	840	--	5
1,2,3-Trichloropropane	ND		ug/kg	840	--	5
Styrene	ND		ug/kg	420	--	5
Dichlorodifluoromethane	ND		ug/kg	2100	--	5
Acetone	ND		ug/kg	7500	--	5
Carbon disulfide	ND		ug/kg	840	--	5
Methyl ethyl ketone	ND		ug/kg	2100	--	5
Methyl isobutyl ketone	ND		ug/kg	2100	--	5
2-Hexanone	ND		ug/kg	2100	--	5
Bromochloromethane	ND		ug/kg	840	--	5
Tetrahydrofuran	ND		ug/kg	840	--	5
2,2-Dichloropropane	ND		ug/kg	1000	--	5
1,2-Dibromoethane	ND		ug/kg	840	--	5
1,3-Dichloropropane	ND		ug/kg	840	--	5
1,1,1,2-Tetrachloroethane	ND		ug/kg	210	--	5
Bromobenzene	ND		ug/kg	1000	--	5
n-Butylbenzene	ND		ug/kg	210	--	5
sec-Butylbenzene	ND		ug/kg	210	--	5
tert-Butylbenzene	ND		ug/kg	840	--	5
o-Chlorotoluene	ND		ug/kg	840	--	5
p-Chlorotoluene	ND		ug/kg	840	--	5
1,2-Dibromo-3-chloropropane	ND		ug/kg	840	--	5
Hexachlorobutadiene	ND		ug/kg	840	--	5
Isopropylbenzene	ND		ug/kg	210	--	5
p-Isopropyltoluene	ND		ug/kg	210	--	5
Naphthalene	33000		ug/kg	840	--	5
n-Propylbenzene	ND		ug/kg	210	--	5
1,2,3-Trichlorobenzene	ND		ug/kg	840	--	5
1,2,4-Trichlorobenzene	ND		ug/kg	840	--	5
1,3,5-Trimethylbenzene	ND		ug/kg	840	--	5
1,2,4-Trimethylbenzene	ND		ug/kg	840	--	5
Diethyl ether	ND		ug/kg	1000	--	5
Diisopropyl Ether	ND		ug/kg	840	--	5
Ethyl-Tert-Butyl-Ether	ND		ug/kg	840	--	5
Tertiary-Amyl Methyl Ether	ND		ug/kg	840	--	5

**Project Name:** RIVERWALK**Lab Number:** L1408495**Project Number:** 183757**Report Date:** 05/08/14**SAMPLE RESULTS**

Lab ID: L1408495-01 D  
 Client ID: SB-3 (7')  
 Sample Location: 179 BRIDGE ST., LOWELL, MA

Date Collected: 04/22/14 13:30  
 Date Received: 04/23/14  
 Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
MCP Volatile Organics by 8260/5035 - Westborough Lab						
1,4-Dioxane	ND		ug/kg	21000	--	5

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	95		70-130
Toluene-d8	91		70-130
4-Bromofluorobenzene	93		70-130
Dibromofluoromethane	101		70-130

**Project Name:** RIVERWALK  
**Project Number:** 183757

**Lab Number:** L1408495  
**Report Date:** 05/08/14

**Method Blank Analysis**  
**Batch Quality Control**

Analytical Method: 97,8260C  
Analytical Date: 04/28/14 08:41  
Analyst: BN

Parameter	Result	Qualifier	Units	RL	MDL
MCP Volatile Organics by 8260/5035 - Westborough Lab for sample(s): 01 Batch: WG685804-3					
Methylene chloride	ND		ug/kg	500	--
1,1-Dichloroethane	ND		ug/kg	75	--
Chloroform	ND		ug/kg	75	--
Carbon tetrachloride	ND		ug/kg	50	--
1,2-Dichloropropane	ND		ug/kg	180	--
Dibromochloromethane	ND		ug/kg	50	--
1,1,2-Trichloroethane	ND		ug/kg	75	--
Tetrachloroethene	ND		ug/kg	50	--
Chlorobenzene	ND		ug/kg	50	--
Trichlorofluoromethane	ND		ug/kg	200	--
1,2-Dichloroethane	ND		ug/kg	50	--
1,1,1-Trichloroethane	ND		ug/kg	50	--
Bromodichloromethane	ND		ug/kg	50	--
trans-1,3-Dichloropropene	ND		ug/kg	50	--
cis-1,3-Dichloropropene	ND		ug/kg	50	--
1,1-Dichloropropene	ND		ug/kg	200	--
Bromoform	ND		ug/kg	200	--
1,1,2,2-Tetrachloroethane	ND		ug/kg	50	--
Benzene	ND		ug/kg	50	--
Toluene	ND		ug/kg	75	--
Ethylbenzene	ND		ug/kg	50	--
Chloromethane	ND		ug/kg	200	--
Bromomethane	ND		ug/kg	100	--
Vinyl chloride	ND		ug/kg	100	--
Chloroethane	ND		ug/kg	100	--
1,1-Dichloroethene	ND		ug/kg	50	--
trans-1,2-Dichloroethene	ND		ug/kg	75	--
Trichloroethene	ND		ug/kg	50	--
1,2-Dichlorobenzene	ND		ug/kg	200	--
1,3-Dichlorobenzene	ND		ug/kg	200	--
1,4-Dichlorobenzene	ND		ug/kg	200	--



**Project Name:** RIVERWALK  
**Project Number:** 183757

**Lab Number:** L1408495  
**Report Date:** 05/08/14

**Method Blank Analysis**  
**Batch Quality Control**

Analytical Method: 97,8260C  
Analytical Date: 04/28/14 08:41  
Analyst: BN

Parameter	Result	Qualifier	Units	RL	MDL
MCP Volatile Organics by 8260/5035 - Westborough Lab for sample(s): 01 Batch: WG685804-3					
Methyl tert butyl ether	ND		ug/kg	100	--
p/m-Xylene	ND		ug/kg	100	--
o-Xylene	ND		ug/kg	100	--
cis-1,2-Dichloroethene	ND		ug/kg	50	--
Dibromomethane	ND		ug/kg	200	--
1,2,3-Trichloropropane	ND		ug/kg	200	--
Styrene	ND		ug/kg	100	--
Dichlorodifluoromethane	ND		ug/kg	500	--
Acetone	ND		ug/kg	1800	--
Carbon disulfide	ND		ug/kg	200	--
Methyl ethyl ketone	ND		ug/kg	500	--
Methyl isobutyl ketone	ND		ug/kg	500	--
2-Hexanone	ND		ug/kg	500	--
Bromochloromethane	ND		ug/kg	200	--
Tetrahydrofuran	ND		ug/kg	200	--
2,2-Dichloropropane	ND		ug/kg	250	--
1,2-Dibromoethane	ND		ug/kg	200	--
1,3-Dichloropropane	ND		ug/kg	200	--
1,1,1,2-Tetrachloroethane	ND		ug/kg	50	--
Bromobenzene	ND		ug/kg	250	--
n-Butylbenzene	ND		ug/kg	50	--
sec-Butylbenzene	ND		ug/kg	50	--
tert-Butylbenzene	ND		ug/kg	200	--
o-Chlorotoluene	ND		ug/kg	200	--
p-Chlorotoluene	ND		ug/kg	200	--
1,2-Dibromo-3-chloropropane	ND		ug/kg	200	--
Hexachlorobutadiene	ND		ug/kg	200	--
Isopropylbenzene	ND		ug/kg	50	--
p-Isopropyltoluene	ND		ug/kg	50	--
Naphthalene	ND		ug/kg	200	--
n-Propylbenzene	ND		ug/kg	50	--

**Project Name:** RIVERWALK  
**Project Number:** 183757

**Lab Number:** L1408495  
**Report Date:** 05/08/14

**Method Blank Analysis**  
**Batch Quality Control**

Analytical Method: 97,8260C  
 Analytical Date: 04/28/14 08:41  
 Analyst: BN

Parameter	Result	Qualifier	Units	RL	MDL
MCP Volatile Organics by 8260/5035 - Westborough Lab for sample(s): 01 Batch: WG685804-3					
1,2,3-Trichlorobenzene	ND		ug/kg	200	--
1,2,4-Trichlorobenzene	ND		ug/kg	200	--
1,3,5-Trimethylbenzene	ND		ug/kg	200	--
1,2,4-Trimethylbenzene	ND		ug/kg	200	--
Diethyl ether	ND		ug/kg	250	--
Diisopropyl Ether	ND		ug/kg	200	--
Ethyl-Tert-Butyl-Ether	ND		ug/kg	200	--
Tertiary-Amyl Methyl Ether	ND		ug/kg	200	--
1,4-Dioxane	ND		ug/kg	5000	--

Surrogate	%Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	92		70-130
Toluene-d8	91		70-130
4-Bromofluorobenzene	92		70-130
Dibromofluoromethane	95		70-130

## Lab Control Sample Analysis

### Batch Quality Control

**Project Name:** RIVERWALK  
**Project Number:** 183757

**Lab Number:** L1408495  
**Report Date:** 05/08/14

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
MCP Volatile Organics by 8260/5035 - Westborough Lab Associated sample(s): 01 Batch: WG685804-1 WG685804-2								
Methylene chloride	116		115		70-130	1		20
1,1-Dichloroethane	111		109		70-130	2		20
Chloroform	112		112		70-130	0		20
Carbon tetrachloride	118		113		70-130	4		20
1,2-Dichloropropane	114		114		70-130	0		20
Dibromochloromethane	100		101		70-130	1		20
1,1,2-Trichloroethane	101		102		70-130	1		20
Tetrachloroethene	104		100		70-130	4		20
Chlorobenzene	102		100		70-130	2		20
Trichlorofluoromethane	122		115		70-130	6		20
1,2-Dichloroethane	109		111		70-130	2		20
1,1,1-Trichloroethane	114		110		70-130	4		20
Bromodichloromethane	114		114		70-130	0		20
trans-1,3-Dichloropropene	97		98		70-130	1		20
cis-1,3-Dichloropropene	114		114		70-130	0		20
1,1-Dichloropropene	116		110		70-130	5		20
Bromoform	95		96		70-130	1		20
1,1,2,2-Tetrachloroethane	94		96		70-130	2		20
Benzene	114		111		70-130	3		20
Toluene	98		96		70-130	2		20
Ethylbenzene	100		98		70-130	2		20

## Lab Control Sample Analysis

### Batch Quality Control

**Project Name:** RIVERWALK  
**Project Number:** 183757

**Lab Number:** L1408495  
**Report Date:** 05/08/14

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
MCP Volatile Organics by 8260/5035 - Westborough Lab Associated sample(s): 01 Batch: WG685804-1 WG685804-2								
Chloromethane	103		102		70-130	1		20
Bromomethane	139	Q	140	Q	70-130	1		20
Vinyl chloride	109		104		70-130	5		20
Chloroethane	105		102		70-130	3		20
1,1-Dichloroethene	116		110		70-130	5		20
trans-1,2-Dichloroethene	115		110		70-130	4		20
Trichloroethene	115		112		70-130	3		20
1,2-Dichlorobenzene	98		97		70-130	1		20
1,3-Dichlorobenzene	98		97		70-130	1		20
1,4-Dichlorobenzene	99		97		70-130	2		20
Methyl tert butyl ether	105		107		70-130	2		20
p/m-Xylene	101		100		70-130	1		20
o-Xylene	102		101		70-130	1		20
cis-1,2-Dichloroethene	116		114		70-130	2		20
Dibromomethane	115		117		70-130	2		20
1,2,3-Trichloropropane	91		92		70-130	1		20
Styrene	103		103		70-130	0		20
Dichlorodifluoromethane	118		110		70-130	7		20
Acetone	138	Q	134	Q	70-130	3		20
Carbon disulfide	106		101		70-130	5		20
Methyl ethyl ketone	103		117		70-130	13		20

## Lab Control Sample Analysis

### Batch Quality Control

Project Name: RIVERWALK

Lab Number: L1408495

Project Number: 183757

Report Date: 05/08/14

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
MCP Volatile Organics by 8260/5035 - Westborough Lab Associated sample(s): 01 Batch: WG685804-1 WG685804-2								
Methyl isobutyl ketone	113		116		70-130	3		20
2-Hexanone	91		95		70-130	4		20
Bromochloromethane	122		122		70-130	0		20
Tetrahydrofuran	106		110		70-130	4		20
2,2-Dichloropropane	114		108		70-130	5		20
1,2-Dibromoethane	100		102		70-130	2		20
1,3-Dichloropropane	98		100		70-130	2		20
1,1,1,2-Tetrachloroethane	101		101		70-130	0		20
Bromobenzene	96		95		70-130	1		20
n-Butylbenzene	98		94		70-130	4		20
sec-Butylbenzene	98		95		70-130	3		20
tert-Butylbenzene	96		93		70-130	3		20
o-Chlorotoluene	93		91		70-130	2		20
p-Chlorotoluene	94		92		70-130	2		20
1,2-Dibromo-3-chloropropane	94		96		70-130	2		20
Hexachlorobutadiene	102		97		70-130	5		20
Isopropylbenzene	94		91		70-130	3		20
p-Isopropyltoluene	98		95		70-130	3		20
Naphthalene	97		97		70-130	0		20
n-Propylbenzene	95		92		70-130	3		20
1,2,3-Trichlorobenzene	100		98		70-130	2		20

## Lab Control Sample Analysis

### Batch Quality Control

**Project Name:** RIVERWALK  
**Project Number:** 183757

**Lab Number:** L1408495  
**Report Date:** 05/08/14

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
MCP Volatile Organics by 8260/5035 - Westborough Lab Associated sample(s): 01 Batch: WG685804-1 WG685804-2								
1,2,4-Trichlorobenzene	102		100		70-130	2		20
1,3,5-Trimethylbenzene	95		93		70-130	2		20
1,2,4-Trimethylbenzene	95		94		70-130	1		20
Diethyl ether	98		97		70-130	1		20
Diisopropyl Ether	110		111		70-130	1		20
Ethyl-Tert-Butyl-Ether	113		114		70-130	1		20
Tertiary-Amyl Methyl Ether	114		115		70-130	1		20
1,4-Dioxane	121		127		70-130	5		20

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
1,2-Dichloroethane-d4	91		92		70-130
Toluene-d8	91		91		70-130
4-Bromofluorobenzene	95		96		70-130
Dibromofluoromethane	101		101		70-130

# SEMIVOLATILES

**Project Name:** RIVERWALK**Lab Number:** L1408495**Project Number:** 183757**Report Date:** 05/08/14**SAMPLE RESULTS**

**Lab ID:** L1408495-02  
**Client ID:** SB-3 (0-14')  
**Sample Location:** 179 BRIDGE ST., LOWELL, MA  
**Matrix:** Soil  
**Analytical Method:** 97,8270D  
**Analytical Date:** 05/06/14 21:44  
**Analyst:** PS  
**Percent Solids:** 90%

**Date Collected:** 04/22/14 13:40  
**Date Received:** 04/23/14  
**Field Prep:** Not Specified  
**Extraction Method:** EPA 3546  
**Extraction Date:** 05/02/14 09:07

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
<b>MCP Semivolatile Organics - Westborough Lab</b>						
Acenaphthene	2400		ug/kg	290	--	2
1,2,4-Trichlorobenzene	ND		ug/kg	370	--	2
Hexachlorobenzene	ND		ug/kg	220	--	2
Bis(2-chloroethyl)ether	ND		ug/kg	330	--	2
2-Chloronaphthalene	ND		ug/kg	370	--	2
1,2-Dichlorobenzene	ND		ug/kg	370	--	2
1,3-Dichlorobenzene	ND		ug/kg	370	--	2
1,4-Dichlorobenzene	ND		ug/kg	370	--	2
3,3'-Dichlorobenzidine	ND		ug/kg	370	--	2
2,4-Dinitrotoluene	ND		ug/kg	370	--	2
2,6-Dinitrotoluene	ND		ug/kg	370	--	2
Azobenzene	ND		ug/kg	370	--	2
Fluoranthene	42000	E	ug/kg	220	--	2
4-Bromophenyl phenyl ether	ND		ug/kg	370	--	2
Bis(2-chloroisopropyl)ether	ND		ug/kg	440	--	2
Bis(2-chloroethoxy)methane	ND		ug/kg	400	--	2
Hexachlorobutadiene	ND		ug/kg	370	--	2
Hexachloroethane	ND		ug/kg	290	--	2
Isophorone	ND		ug/kg	330	--	2
Naphthalene	7700		ug/kg	370	--	2
Nitrobenzene	ND		ug/kg	330	--	2
Bis(2-Ethylhexyl)phthalate	ND		ug/kg	370	--	2
Butyl benzyl phthalate	ND		ug/kg	370	--	2
Di-n-butylphthalate	ND		ug/kg	370	--	2
Di-n-octylphthalate	ND		ug/kg	370	--	2
Diethyl phthalate	ND		ug/kg	370	--	2
Dimethyl phthalate	ND		ug/kg	370	--	2
Benzo(a)anthracene	20000	E	ug/kg	220	--	2
Benzo(a)pyrene	16000	E	ug/kg	290	--	2
Benzo(b)fluoranthene	20000	E	ug/kg	220	--	2
Benzo(k)fluoranthene	6800		ug/kg	220	--	2

Project Name: RIVERWALK

Lab Number: L1408495

Project Number: 183757

Report Date: 05/08/14

## SAMPLE RESULTS

Lab ID: L1408495-02  
 Client ID: SB-3 (0-14')  
 Sample Location: 179 BRIDGE ST., LOWELL, MA

Date Collected: 04/22/14 13:40  
 Date Received: 04/23/14  
 Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
<b>MCP Semivolatile Organics - Westborough Lab</b>						
Chrysene	18000	E	ug/kg	220	--	2
Acenaphthylene	7200		ug/kg	290	--	2
Anthracene	13000		ug/kg	220	--	2
Benzo(ghi)perylene	9200		ug/kg	290	--	2
Fluorene	6000		ug/kg	370	--	2
Phenanthrene	40000	E	ug/kg	220	--	2
Dibenzo(a,h)anthracene	2500		ug/kg	220	--	2
Indeno(1,2,3-cd)Pyrene	11000		ug/kg	290	--	2
Pyrene	36000	E	ug/kg	220	--	2
Aniline	ND		ug/kg	440	--	2
4-Chloroaniline	ND		ug/kg	370	--	2
Dibenzofuran	4800		ug/kg	370	--	2
2-Methylnaphthalene	2700		ug/kg	440	--	2
Acetophenone	ND		ug/kg	370	--	2
2,4,6-Trichlorophenol	ND		ug/kg	220	--	2
2-Chlorophenol	ND		ug/kg	370	--	2
2,4-Dichlorophenol	ND		ug/kg	330	--	2
2,4-Dimethylphenol	ND		ug/kg	370	--	2
2-Nitrophenol	ND		ug/kg	790	--	2
4-Nitrophenol	ND		ug/kg	510	--	2
2,4-Dinitrophenol	ND		ug/kg	1800	--	2
Pentachlorophenol	ND		ug/kg	730	--	2
Phenol	ND		ug/kg	370	--	2
2-Methylphenol	ND		ug/kg	370	--	2
3-Methylphenol/4-Methylphenol	ND		ug/kg	530	--	2
2,4,5-Trichlorophenol	ND		ug/kg	370	--	2

Surrogate	% Recovery	Qualifier	Acceptance Criteria
2-Fluorophenol	35		30-130
Phenol-d6	60		30-130
Nitrobenzene-d5	65		30-130
2-Fluorobiphenyl	72		30-130
2,4,6-Tribromophenol	19	Q	30-130
4-Terphenyl-d14	67		30-130

**Project Name:** RIVERWALK**Lab Number:** L1408495**Project Number:** 183757**Report Date:** 05/08/14**SAMPLE RESULTS**

**Lab ID:** L1408495-02      D  
**Client ID:** SB-3 (0-14')  
**Sample Location:** 179 BRIDGE ST., LOWELL, MA  
**Matrix:** Soil  
**Analytical Method:** 97,8270D  
**Analytical Date:** 05/07/14 11:44  
**Analyst:** PS  
**Percent Solids:** 90%

**Date Collected:** 04/22/14 13:40  
**Date Received:** 04/23/14  
**Field Prep:** Not Specified  
**Extraction Method:** EPA 3546  
**Extraction Date:** 05/02/14 09:07

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
<b>MCP Semivolatile Organics - Westborough Lab</b>						
Fluoranthene	43000		ug/kg	1100	--	10
Benzo(a)anthracene	19000		ug/kg	1100	--	10
Benzo(a)pyrene	16000		ug/kg	1500	--	10
Benzo(b)fluoranthene	20000		ug/kg	1100	--	10
Chrysene	18000		ug/kg	1100	--	10
Phenanthrene	42000		ug/kg	1100	--	10
Pyrene	36000		ug/kg	1100	--	10

**Project Name:** RIVERWALK  
**Project Number:** 183757

**Lab Number:** L1408495  
**Report Date:** 05/08/14

**Method Blank Analysis**  
**Batch Quality Control**

**Analytical Method:** 97,8270D  
**Analytical Date:** 05/06/14 19:56  
**Analyst:** PS

**Extraction Method:** EPA 3546  
**Extraction Date:** 05/02/14 09:07

Parameter	Result	Qualifier	Units	RL	MDL
MCP Semivolatile Organics - Westborough Lab for sample(s): 02 Batch: WG686800-1					
Acenaphthene	ND		ug/kg	130	--
1,2,4-Trichlorobenzene	ND		ug/kg	160	--
Hexachlorobenzene	ND		ug/kg	99	--
Bis(2-chloroethyl)ether	ND		ug/kg	150	--
2-Chloronaphthalene	ND		ug/kg	160	--
1,2-Dichlorobenzene	ND		ug/kg	160	--
1,3-Dichlorobenzene	ND		ug/kg	160	--
1,4-Dichlorobenzene	ND		ug/kg	160	--
3,3'-Dichlorobenzidine	ND		ug/kg	160	--
2,4-Dinitrotoluene	ND		ug/kg	160	--
2,6-Dinitrotoluene	ND		ug/kg	160	--
Azobenzene	ND		ug/kg	160	--
Fluoranthene	ND		ug/kg	99	--
4-Bromophenyl phenyl ether	ND		ug/kg	160	--
Bis(2-chloroisopropyl)ether	ND		ug/kg	200	--
Bis(2-chloroethoxy)methane	ND		ug/kg	180	--
Hexachlorobutadiene	ND		ug/kg	160	--
Hexachloroethane	ND		ug/kg	130	--
Isophorone	ND		ug/kg	150	--
Naphthalene	ND		ug/kg	160	--
Nitrobenzene	ND		ug/kg	150	--
Bis(2-Ethylhexyl)phthalate	ND		ug/kg	160	--
Butyl benzyl phthalate	ND		ug/kg	160	--
Di-n-butylphthalate	ND		ug/kg	160	--
Di-n-octylphthalate	ND		ug/kg	160	--
Diethyl phthalate	ND		ug/kg	160	--
Dimethyl phthalate	ND		ug/kg	160	--
Benzo(a)anthracene	ND		ug/kg	99	--
Benzo(a)pyrene	ND		ug/kg	130	--
Benzo(b)fluoranthene	ND		ug/kg	99	--
Benzo(k)fluoranthene	ND		ug/kg	99	--

**Project Name:** RIVERWALK  
**Project Number:** 183757

**Lab Number:** L1408495  
**Report Date:** 05/08/14

**Method Blank Analysis  
Batch Quality Control**

Analytical Method: 97,8270D  
Analytical Date: 05/06/14 19:56  
Analyst: PS

Extraction Method: EPA 3546  
Extraction Date: 05/02/14 09:07

Parameter	Result	Qualifier	Units	RL	MDL
MCP Semivolatile Organics - Westborough Lab for sample(s): 02 Batch: WG686800-1					
Chrysene	ND		ug/kg	99	--
Acenaphthylene	ND		ug/kg	130	--
Anthracene	ND		ug/kg	99	--
Benzo(ghi)perylene	ND		ug/kg	130	--
Fluorene	ND		ug/kg	160	--
Phenanthrene	ND		ug/kg	99	--
Dibenzo(a,h)anthracene	ND		ug/kg	99	--
Indeno(1,2,3-cd)Pyrene	ND		ug/kg	130	--
Pyrene	ND		ug/kg	99	--
Aniline	ND		ug/kg	200	--
4-Chloroaniline	ND		ug/kg	160	--
Dibenzofuran	ND		ug/kg	160	--
2-Methylnaphthalene	ND		ug/kg	200	--
Acetophenone	ND		ug/kg	160	--
2,4,6-Trichlorophenol	ND		ug/kg	99	--
2-Chlorophenol	ND		ug/kg	160	--
2,4-Dichlorophenol	ND		ug/kg	150	--
2,4-Dimethylphenol	ND		ug/kg	160	--
2-Nitrophenol	ND		ug/kg	360	--
4-Nitrophenol	ND		ug/kg	230	--
2,4-Dinitrophenol	ND		ug/kg	790	--
Pentachlorophenol	ND		ug/kg	330	--
Phenol	ND		ug/kg	160	--
2-Methylphenol	ND		ug/kg	160	--
3-Methylphenol/4-Methylphenol	ND		ug/kg	240	--
2,4,5-Trichlorophenol	ND		ug/kg	160	--

Project Name: RIVERWALK

Lab Number: L1408495

Project Number: 183757

Report Date: 05/08/14

**Method Blank Analysis**  
**Batch Quality Control**

Analytical Method: 97,8270D  
 Analytical Date: 05/06/14 19:56  
 Analyst: PS

Extraction Method: EPA 3546  
 Extraction Date: 05/02/14 09:07

Parameter	Result	Qualifier	Units	RL	MDL
MCP Semivolatile Organics - Westborough Lab for sample(s): 02 Batch: WG686800-1					

Surrogate	%Recovery	Qualifier	Acceptance Criteria
2-Fluorophenol	79		30-130
Phenol-d6	73		30-130
Nitrobenzene-d5	77		30-130
2-Fluorobiphenyl	77		30-130
2,4,6-Tribromophenol	73		30-130
4-Terphenyl-d14	82		30-130

## Lab Control Sample Analysis

### Batch Quality Control

**Project Name:** RIVERWALK  
**Project Number:** 183757

**Lab Number:** L1408495  
**Report Date:** 05/08/14

Parameter	LCS		LCSD		%Recovery Limits	RPD	Qual	RPD Limits
	%Recovery	Qual	%Recovery	Qual				
MCP Semivolatile Organics - Westborough Lab Associated sample(s): 02 Batch: WG686800-2 WG686800-3								
Acenaphthene	85		85		40-140	0		30
1,2,4-Trichlorobenzene	78		76		40-140	3		30
Hexachlorobenzene	85		86		40-140	1		30
Bis(2-chloroethyl)ether	78		76		40-140	3		30
2-Chloronaphthalene	81		81		40-140	0		30
1,2-Dichlorobenzene	77		77		40-140	0		30
1,3-Dichlorobenzene	77		77		40-140	0		30
1,4-Dichlorobenzene	76		77		40-140	1		30
3,3'-Dichlorobenzidine	61		56		40-140	9		30
2,4-Dinitrotoluene	90		91		40-140	1		30
2,6-Dinitrotoluene	83		85		40-140	2		30
Azobenzene	98		101		40-140	3		30
Fluoranthene	87		87		40-140	0		30
4-Bromophenyl phenyl ether	85		87		40-140	2		30
Bis(2-chloroisopropyl)ether	82		82		40-140	0		30
Bis(2-chloroethoxy)methane	80		79		40-140	1		30
Hexachlorobutadiene	84		82		40-140	2		30
Hexachloroethane	81		82		40-140	1		30
Isophorone	81		81		40-140	0		30
Naphthalene	81		81		40-140	0		30
Nitrobenzene	97		91		40-140	6		30

## Lab Control Sample Analysis

### Batch Quality Control

**Project Name:** RIVERWALK  
**Project Number:** 183757

**Lab Number:** L1408495  
**Report Date:** 05/08/14

Parameter	LCS		LCSD		%Recovery Limits	RPD	Qual	RPD Limits
	%Recovery	Qual	%Recovery	Qual				
MCP Semivolatile Organics - Westborough Lab Associated sample(s): 02 Batch: WG686800-2 WG686800-3								
Bis(2-Ethylhexyl)phthalate	106		107		40-140	1		30
Butyl benzyl phthalate	94		94		40-140	0		30
Di-n-butylphthalate	97		97		40-140	0		30
Di-n-octylphthalate	108		109		40-140	1		30
Diethyl phthalate	92		96		40-140	4		30
Dimethyl phthalate	89		92		40-140	3		30
Benzo(a)anthracene	91		91		40-140	0		30
Benzo(a)pyrene	89		91		40-140	2		30
Benzo(b)fluoranthene	84		85		40-140	1		30
Benzo(k)fluoranthene	94		98		40-140	4		30
Chrysene	88		89		40-140	1		30
Acenaphthylene	84		84		40-140	0		30
Anthracene	91		90		40-140	1		30
Benzo(ghi)perylene	83		84		40-140	1		30
Fluorene	87		89		40-140	2		30
Phenanthrene	89		90		40-140	1		30
Dibenzo(a,h)anthracene	85		86		40-140	1		30
Indeno(1,2,3-cd)Pyrene	90		85		40-140	6		30
Pyrene	84		85		40-140	1		30
Aniline	52		49		40-140	6		30
4-Chloroaniline	86		84		40-140	2		30

## Lab Control Sample Analysis

### Batch Quality Control

**Project Name:** RIVERWALK  
**Project Number:** 183757

**Lab Number:** L1408495  
**Report Date:** 05/08/14

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
MCP Semivolatile Organics - Westborough Lab Associated sample(s): 02 Batch: WG686800-2 WG686800-3								
Dibenzofuran	86		87		40-140	1		30
2-Methylnaphthalene	115		115		40-140	0		30
Acetophenone	84		82		40-140	2		30
2,4,6-Trichlorophenol	81		82		30-130	1		30
2-Chlorophenol	80		81		30-130	1		30
2,4-Dichlorophenol	85		86		30-130	1		30
2,4-Dimethylphenol	85		81		30-130	5		30
2-Nitrophenol	79		79		30-130	0		30
4-Nitrophenol	87		88		30-130	1		30
2,4-Dinitrophenol	73		76		30-130	4		30
Pentachlorophenol	80		76		30-130	5		30
Phenol	80		79		30-130	1		30
2-Methylphenol	78		79		30-130	1		30
3-Methylphenol/4-Methylphenol	81		81		30-130	0		30
2,4,5-Trichlorophenol	83		83		30-130	0		30

## Lab Control Sample Analysis

Batch Quality Control

**Project Name:** RIVERWALK  
**Project Number:** 183757

**Lab Number:** L1408495  
**Report Date:** 05/08/14

Parameter	<i>LCS</i> %Recovery	<i>Qual</i>	<i>LCSD</i> %Recovery	<i>Qual</i>	<i>%Recovery</i> Limits	<i>RPD</i>	<i>Qual</i>	<i>RPD</i> Limits
-----------	-------------------------	-------------	--------------------------	-------------	----------------------------	------------	-------------	----------------------

MCP Semivolatile Organics - Westborough Lab Associated sample(s): 02 Batch: WG686800-2 WG686800-3

<i>Surrogate</i>	<i>LCS</i> %Recovery	<i>Qual</i>	<i>LCSD</i> %Recovery	<i>Qual</i>	<i>Acceptance</i> <i>Criteria</i>
2-Fluorophenol	79		79		30-130
Phenol-d6	80		78		30-130
Nitrobenzene-d5	83		80		30-130
2-Fluorobiphenyl	81		79		30-130
2,4,6-Tribromophenol	89		88		30-130
4-Terphenyl-d14	82		80		30-130



# PETROLEUM HYDROCARBONS

**Project Name:** RIVERWALK**Lab Number:** L1408495**Project Number:** 183757**Report Date:** 05/08/14**SAMPLE RESULTS**

**Lab ID:** L1408495-02      D  
**Client ID:** SB-3 (0-14')  
**Sample Location:** 179 BRIDGE ST., LOWELL, MA  
**Matrix:** Soil  
**Analytical Method:** 1,8015C(M)  
**Analytical Date:** 04/28/14 12:51  
**Analyst:** JT  
**Percent Solids:** 90%

**Date Collected:** 04/22/14 13:40  
**Date Received:** 04/23/14  
**Field Prep:** Not Specified  
**Extraction Method:** EPA 3546  
**Extraction Date:** 04/24/14 01:58

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Petroleum Hydrocarbon Quantitation - Westborough Lab						
TPH	2580000		ug/kg	360000	--	10

Surrogate	% Recovery	Qualifier	Acceptance Criteria
o-Terphenyl	94		40-140

**Project Name:** RIVERWALK  
**Project Number:** 183757

**Lab Number:** L1408495  
**Report Date:** 05/08/14

**Method Blank Analysis**  
**Batch Quality Control**

Analytical Method: 1,8015C(M)  
Analytical Date: 04/26/14 18:12  
Analyst: JT

Extraction Method: EPA 3546  
Extraction Date: 04/24/14 01:58

Parameter	Result	Qualifier	Units	RL	MDL
Petroleum Hydrocarbon Quantitation - Westborough Lab for sample(s): 02 Batch: WG684657-1					
TPH	ND		ug/kg	33000	--

Surrogate	%Recovery	Qualifier	Acceptance Criteria
o-Terphenyl	102		40-140

### Lab Control Sample Analysis Batch Quality Control

**Project Name:** RIVERWALK  
**Project Number:** 183757

**Lab Number:** L1408495  
**Report Date:** 05/08/14

<b>Parameter</b>	<b>LCS %Recovery</b>	<b>Qual</b>	<b>LCSD %Recovery</b>	<b>Qual</b>	<b>%Recovery Limits</b>	<b>RPD</b>	<b>Qual</b>	<b>RPD Limits</b>
Petroleum Hydrocarbon Quantitation - Westborough Lab Associated sample(s): 02 Batch: WG684657-2								
TPH	72		-		40-140	-		40

<b>Surrogate</b>	<b>LCS %Recovery</b>	<b>Qual</b>	<b>LCSD %Recovery</b>	<b>Qual</b>	<b>Acceptance Criteria</b>
o-Terphenyl	76				40-140

**Lab Duplicate Analysis**  
Batch Quality Control

**Project Name:** RIVERWALK  
**Project Number:** 183757

**Lab Number:** L1408495  
**Report Date:** 05/08/14

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Petroleum Hydrocarbon Quantitation - Westborough Lab Associated sample(s): 02 QC Batch ID: WG684657-3 QC Sample: L1408495-02 Client ID: SB-3 (0-14')						
TPH	2580000	1310000	ug/kg	65	Q	40

Surrogate	%Recovery	Qualifier	%Recovery	Qualifier	Acceptance Criteria
o-Terphenyl	94		109		40-140



# PCBS

**Project Name:** RIVERWALK**Lab Number:** L1408495**Project Number:** 183757**Report Date:** 05/08/14**SAMPLE RESULTS**

**Lab ID:** L1408495-02  
**Client ID:** SB-3 (0-14')  
**Sample Location:** 179 BRIDGE ST., LOWELL, MA  
**Matrix:** Soil  
**Analytical Method:** 97,8082  
**Analytical Date:** 04/25/14 09:27  
**Analyst:** JW  
**Percent Solids:** 90%

**Date Collected:** 04/22/14 13:40  
**Date Received:** 04/23/14  
**Field Prep:** Not Specified  
**Extraction Method:** EPA 3546  
**Extraction Date:** 04/24/14 14:09  
**Cleanup Method1:** EPA 3665A  
**Cleanup Date1:** 04/24/14  
**Cleanup Method2:** EPA 3660B  
**Cleanup Date2:** 04/24/14

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Column
<b>MCP Polychlorinated Biphenyls - Westborough Lab</b>							
Aroclor 1016	ND		ug/kg	36.1	--	1	A
Aroclor 1221	ND		ug/kg	36.1	--	1	A
Aroclor 1232	ND		ug/kg	36.1	--	1	A
Aroclor 1242	ND		ug/kg	36.1	--	1	A
Aroclor 1248	ND		ug/kg	36.1	--	1	A
Aroclor 1254	ND		ug/kg	36.1	--	1	A
Aroclor 1260	ND		ug/kg	36.1	--	1	A
Aroclor 1262	ND		ug/kg	36.1	--	1	A
Aroclor 1268	ND		ug/kg	36.1	--	1	A

Surrogate	% Recovery	Qualifier	Acceptance Criteria	Column
2,4,5,6-Tetrachloro-m-xylene	70		30-150	A
Decachlorobiphenyl	81		30-150	A
2,4,5,6-Tetrachloro-m-xylene	77		30-150	B
Decachlorobiphenyl	83		30-150	B

Project Name: RIVERWALK

Lab Number: L1408495

Project Number: 183757

Report Date: 05/08/14

**Method Blank Analysis  
Batch Quality Control**

Analytical Method: 97,8082  
Analytical Date: 04/25/14 10:28  
Analyst: JW

Extraction Method: EPA 3546  
Extraction Date: 04/24/14 14:09  
Cleanup Method1: EPA 3665A  
Cleanup Date1: 04/24/14  
Cleanup Method2: EPA 3660B  
Cleanup Date2: 04/24/14

Parameter	Result	Qualifier	Units	RL	MDL	Column
MCP Polychlorinated Biphenyls - Westborough Lab for sample(s): 02 Batch: WG684847-1						
Aroclor 1016	ND		ug/kg	31.8	--	A
Aroclor 1221	ND		ug/kg	31.8	--	A
Aroclor 1232	ND		ug/kg	31.8	--	A
Aroclor 1242	ND		ug/kg	31.8	--	A
Aroclor 1248	ND		ug/kg	31.8	--	A
Aroclor 1254	ND		ug/kg	31.8	--	A
Aroclor 1260	ND		ug/kg	31.8	--	A
Aroclor 1262	ND		ug/kg	31.8	--	A
Aroclor 1268	ND		ug/kg	31.8	--	A

Surrogate	%Recovery	Qualifier	Acceptance Criteria	Column
2,4,5,6-Tetrachloro-m-xylene	79		30-150	A
2,4,5,6-Tetrachloro-m-xylene	81		30-150	B
Decachlorobiphenyl	95		30-150	B
Decachlorobiphenyl	93		30-150	A

## Lab Control Sample Analysis

### Batch Quality Control

**Project Name:** RIVERWALK  
**Project Number:** 183757

**Lab Number:** L1408495  
**Report Date:** 05/08/14

<b>Parameter</b>	<b>LCS %Recovery</b>	<b>Qual</b>	<b>LCSD %Recovery</b>	<b>Qual</b>	<b>%Recovery Limits</b>	<b>RPD</b>	<b>Qual</b>	<b>RPD Limits</b>	<b>Column</b>
MCP Polychlorinated Biphenyls - Westborough Lab Associated sample(s): 02 Batch: WG684847-2 WG684847-3									
Aroclor 1016	66		88		40-140	29		30	A
Aroclor 1260	62		79		40-140	24		30	A

<b>Surrogate</b>	<b>LCS %Recovery</b>	<b>Qual</b>	<b>LCSD %Recovery</b>	<b>Qual</b>	<b>Acceptance Criteria</b>	<b>Column</b>
2,4,5,6-Tetrachloro-m-xylene	68		85		30-150	A
Decachlorobiphenyl	73		90		30-150	A
2,4,5,6-Tetrachloro-m-xylene	72		90		30-150	B
Decachlorobiphenyl	74		100		30-150	B

## METALS

**Project Name:** RIVERWALK  
**Project Number:** 183757

**Lab Number:** L1408495  
**Report Date:** 05/08/14

**SAMPLE RESULTS**

Lab ID: L1408495-02  
 Client ID: SB-3 (0-14')  
 Sample Location: 179 BRIDGE ST., LOWELL, MA  
 Matrix: Soil  
 Percent Solids: 90%

Date Collected: 04/22/14 13:40  
 Date Received: 04/23/14  
 Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>MCP Total Metals - Westborough Lab</b>											
Arsenic, Total	8.1		mg/kg	0.43	--	1	05/05/14 14:33	05/06/14 18:04	EPA 3050B	97,6010C	BC
Barium, Total	55		mg/kg	0.43	--	1	05/05/14 14:33	05/06/14 18:04	EPA 3050B	97,6010C	BC
Cadmium, Total	ND		mg/kg	0.43	--	1	05/05/14 14:33	05/06/14 18:04	EPA 3050B	97,6010C	BC
Chromium, Total	17		mg/kg	0.43	--	1	05/05/14 14:33	05/06/14 18:04	EPA 3050B	97,6010C	BC
Lead, Total	150		mg/kg	2.1	--	1	05/05/14 14:33	05/06/14 18:04	EPA 3050B	97,6010C	BC
Mercury, Total	0.523		mg/kg	0.080	--	1	04/29/14 08:53	04/29/14 13:04	EPA 7471B	97,7471B	MC
Selenium, Total	ND		mg/kg	2.1	--	1	05/05/14 14:33	05/06/14 18:04	EPA 3050B	97,6010C	BC
Silver, Total	ND		mg/kg	0.43	--	1	05/05/14 14:33	05/06/14 18:04	EPA 3050B	97,6010C	BC



**Project Name:** RIVERWALK  
**Project Number:** 183757

**Lab Number:** L1408495  
**Report Date:** 05/08/14

**SAMPLE RESULTS**

Lab ID: L1408495-03  
 Client ID: SB-3 (14-18')  
 Sample Location: 179 BRIDGE ST., LOWELL, MA  
 Matrix: Soil  
 Percent Solids: 89%

Date Collected: 04/23/14 08:10  
 Date Received: 04/23/14  
 Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
<b>MCP Total Metals - Westborough Lab</b>											
Arsenic, Total	8.8		mg/kg	0.43	--	1	05/07/14 09:57	05/07/14 12:01	EPA 3050B	97,6010C	JH
Barium, Total	260		mg/kg	0.43	--	1	05/07/14 09:57	05/07/14 12:01	EPA 3050B	97,6010C	JH
Cadmium, Total	ND		mg/kg	0.43	--	1	05/07/14 09:57	05/07/14 12:01	EPA 3050B	97,6010C	JH
Chromium, Total	9.8		mg/kg	0.43	--	1	05/07/14 09:57	05/07/14 12:01	EPA 3050B	97,6010C	JH
Lead, Total	97		mg/kg	2.1	--	1	05/07/14 09:57	05/07/14 12:01	EPA 3050B	97,6010C	JH
Mercury, Total	0.096		mg/kg	0.085	--	1	05/02/14 11:51	05/02/14 15:31	EPA 7471B	97,7471B	MC
Selenium, Total	ND		mg/kg	2.1	--	1	05/07/14 09:57	05/07/14 12:01	EPA 3050B	97,6010C	JH
Silver, Total	ND		mg/kg	0.43	--	1	05/07/14 09:57	05/07/14 12:01	EPA 3050B	97,6010C	JH



**Project Name:** RIVERWALK  
**Project Number:** 183757

**Lab Number:** L1408495  
**Report Date:** 05/08/14

## Method Blank Analysis Batch Quality Control

Parameter	Result Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
MCP Total Metals - Westborough Lab for sample(s): 02 Batch: WG685611-1									
Mercury, Total	ND	mg/kg	0.083	--	1	04/29/14 08:53	04/29/14 12:49	97,7471B	MC

### Prep Information

Digestion Method: EPA 7471B

Parameter	Result Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
MCP Total Metals - Westborough Lab for sample(s): 03 Batch: WG686619-5									
Mercury, Total	ND	mg/kg	0.083	--	1	05/02/14 11:51	05/02/14 15:26	97,7471B	MC

### Prep Information

Digestion Method: EPA 7471B

Parameter	Result Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
MCP Total Metals - Westborough Lab for sample(s): 02 Batch: WG687312-1									
Arsenic, Total	ND	mg/kg	0.40	--	1	05/05/14 14:33	05/06/14 16:51	97,6010C	BC
Barium, Total	ND	mg/kg	0.40	--	1	05/05/14 14:33	05/06/14 16:51	97,6010C	BC
Cadmium, Total	ND	mg/kg	0.40	--	1	05/05/14 14:33	05/06/14 16:51	97,6010C	BC
Chromium, Total	ND	mg/kg	0.40	--	1	05/05/14 14:33	05/06/14 16:51	97,6010C	BC
Lead, Total	ND	mg/kg	2.0	--	1	05/05/14 14:33	05/06/14 16:51	97,6010C	BC
Selenium, Total	ND	mg/kg	2.0	--	1	05/05/14 14:33	05/06/14 16:51	97,6010C	BC
Silver, Total	ND	mg/kg	0.40	--	1	05/05/14 14:33	05/06/14 16:51	97,6010C	BC

### Prep Information

Digestion Method: EPA 3050B



**Project Name:** RIVERWALK  
**Project Number:** 183757

**Lab Number:** L1408495  
**Report Date:** 05/08/14

## Method Blank Analysis Batch Quality Control

Parameter	Result Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
MCP Total Metals - Westborough Lab for sample(s): 03 Batch: WG687870-1									
Arsenic, Total	ND	mg/kg	0.40	--	1	05/07/14 09:57	05/07/14 11:50	97,6010C	JH
Barium, Total	ND	mg/kg	0.40	--	1	05/07/14 09:57	05/07/14 11:50	97,6010C	JH
Cadmium, Total	ND	mg/kg	0.40	--	1	05/07/14 09:57	05/07/14 11:50	97,6010C	JH
Chromium, Total	ND	mg/kg	0.40	--	1	05/07/14 09:57	05/07/14 11:50	97,6010C	JH
Lead, Total	ND	mg/kg	2.0	--	1	05/07/14 09:57	05/07/14 11:50	97,6010C	JH
Selenium, Total	ND	mg/kg	2.0	--	1	05/07/14 09:57	05/07/14 11:50	97,6010C	JH
Silver, Total	ND	mg/kg	0.40	--	1	05/07/14 09:57	05/07/14 11:50	97,6010C	JH

### Prep Information

Digestion Method: EPA 3050B

## Lab Control Sample Analysis

### Batch Quality Control

**Project Name:** RIVERWALK  
**Project Number:** 183757

**Lab Number:** L1408495  
**Report Date:** 05/08/14

Parameter	LCS		LCSD		%Recovery Limits	RPD	Qual	RPD Limits
	%Recovery	Qual	%Recovery	Qual				
MCP Total Metals - Westborough Lab Associated sample(s): 02 Batch: WG685611-2 WG685611-3 SRM Lot Number: 0518-10-02								
Mercury, Total	110		113		67-133	3		30
MCP Total Metals - Westborough Lab Associated sample(s): 03 Batch: WG686619-6 WG686619-7 SRM Lot Number: 0518-10-02								
Mercury, Total	95		92		67-133	3		30
MCP Total Metals - Westborough Lab Associated sample(s): 02 Batch: WG687312-2 WG687312-3 SRM Lot Number: 0518-10-02								
Arsenic, Total	100		100		81-119	0		30
Barium, Total	96		96		83-118	0		30
Cadmium, Total	94		94		82-117	0		30
Chromium, Total	92		92		80-119	0		30
Lead, Total	91		93		80-120	2		30
Selenium, Total	95		98		80-120	3		30
Silver, Total	101		102		66-134	1		30

## Lab Control Sample Analysis

### Batch Quality Control

**Project Name:** RIVERWALK  
**Project Number:** 183757

**Lab Number:** L1408495  
**Report Date:** 05/08/14

Parameter	LCS %Recovery	LCSD %Recovery	%Recovery Limits	RPD	RPD Limits
MCP Total Metals - Westborough Lab Associated sample(s): 03 Batch: WG687870-2 WG687870-3 SRM Lot Number: 0518-10-02					
Arsenic, Total	104	100	81-119	4	30
Barium, Total	96	92	83-118	4	30
Cadmium, Total	94	94	82-117	0	30
Chromium, Total	97	97	80-119	0	30
Lead, Total	92	92	80-120	0	30
Selenium, Total	102	102	80-120	0	30
Silver, Total	97	100	66-134	3	30

### Matrix Spike Analysis Batch Quality Control

Project Name: RIVERWALK

Lab Number: L1408495

Project Number: 183757

Report Date: 05/08/14

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	MSD Qual	MSD Found	MSD %Recovery	MSD Qual	Recovery Limits	RPD	RPD Qual	RPD Limits
MCP Total Metals - Westborough Lab Associated sample(s): 03 QC Batch ID: WG686619-8 QC Sample: L1408495-03 Client ID: SB-3 (14-18')												
Mercury, Total	0.096	0.153	0.330	153	Q	-	-		75-125	-		35
MCP Total Metals - Westborough Lab Associated sample(s): 03 QC Batch ID: WG687870-4 QC Sample: L1408495-03 Client ID: SB-3 (14-18')												
Arsenic, Total	8.8	10.3	21	118		-	-		75-125	-		35
Barium, Total	260	172	370	64	Q	-	-		75-125	-		35
Cadmium, Total	ND	4.38	4.4	100		-	-		75-125	-		35
Chromium, Total	9.8	17.2	27	100		-	-		75-125	-		35
Lead, Total	97	43.8	110	30	Q	-	-		75-125	-		35
Selenium, Total	ND	10.3	10	97		-	-		75-125	-		35
Silver, Total	ND	25.8	24	93		-	-		75-125	-		35

**Lab Serial Dilution  
Analysis  
Batch Quality Control**

**Project Name:** RIVERWALK  
**Project Number:** 183757

**Lab Number:** L1408495  
**Report Date:** 05/08/14

Parameter	Native Sample	Serial Dilution	Units	% D	Qual	RPD Limits
MCP Total Metals - Westborough Lab Associated sample(s): 03 QC Batch ID: WG687870-6 QC Sample: L1408495-03 Client ID: SB-3 (14-18')						
Barium, Total	260	270	mg/kg	4		10



# **INORGANICS & MISCELLANEOUS**

**Project Name:** RIVERWALK  
**Project Number:** 183757

**Lab Number:** L1408495  
**Report Date:** 05/08/14

### SAMPLE RESULTS

**Lab ID:** L1408495-02  
**Client ID:** SB-3 (0-14')  
**Sample Location:** 179 BRIDGE ST., LOWELL, MA  
**Matrix:** Soil

**Date Collected:** 04/22/14 13:40  
**Date Received:** 04/23/14  
**Field Prep:** Not Specified

### Test Material Information

**Source of Material:** Unknown  
**Description of Material:** Non-Metallic - Dry Soil  
**Particle Size:** Medium  
**Preliminary Burning Time (sec):** 120

Parameter	Result	Date Analyzed	Analytical Method	Analyst
Ignitability of Solids - Westborough Lab				
Ignitability	NI	04/24/14 17:36	1,1030	SB



**Project Name:** RIVERWALK  
**Project Number:** 183757

**Lab Number:** L1408495  
**Report Date:** 05/08/14

**SAMPLE RESULTS**

**Lab ID:** L1408495-01  
**Client ID:** SB-3 (7')  
**Sample Location:** 179 BRIDGE ST., LOWELL, MA  
**Matrix:** Soil

**Date Collected:** 04/22/14 13:30  
**Date Received:** 04/23/14  
**Field Prep:** Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total	92.8		%	0.100	NA	1	-	04/23/14 23:06	30,2540G	RT



Project Name: RIVERWALK

Lab Number: L1408495

Project Number: 183757

Report Date: 05/08/14

## SAMPLE RESULTS

Lab ID: L1408495-02  
 Client ID: SB-3 (0-14')  
 Sample Location: 179 BRIDGE ST., LOWELL, MA  
 Matrix: Soil

Date Collected: 04/22/14 13:40  
 Date Received: 04/23/14  
 Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total	90.1		%	0.100	NA	1	-	04/23/14 23:06	30,2540G	RT
pH (H)	10.3		SU	-	NA	1	-	04/24/14 00:30	1,9045D	JA
Cyanide, Reactive	ND		mg/kg	10	--	1	05/01/14 19:15	05/01/14 22:08	1,7.3	TL
Sulfide, Reactive	ND		mg/kg	10	--	1	05/01/14 19:15	05/01/14 22:00	1,7.3	TL



**Project Name:** RIVERWALK  
**Project Number:** 183757

**Lab Number:** L1408495  
**Report Date:** 05/08/14

**SAMPLE RESULTS**

**Lab ID:** L1408495-03  
**Client ID:** SB-3 (14-18')  
**Sample Location:** 179 BRIDGE ST., LOWELL, MA  
**Matrix:** Soil

**Date Collected:** 04/23/14 08:10  
**Date Received:** 04/23/14  
**Field Prep:** Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab										
Solids, Total	89.2		%	0.100	NA	1	-	04/23/14 23:06	30,2540G	RT



**Project Name:** RIVERWALK  
**Project Number:** 183757

**Lab Number:** L1408495  
**Report Date:** 05/08/14

**Method Blank Analysis**  
**Batch Quality Control**

Parameter	Result Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Westborough Lab for sample(s): 02 Batch: WG686673-1									
Cyanide, Reactive	ND	mg/kg	10	--	1	05/01/14 19:15	05/01/14 22:07	1,7.3	TL
General Chemistry - Westborough Lab for sample(s): 02 Batch: WG686675-1									
Sulfide, Reactive	ND	mg/kg	10	--	1	05/01/14 19:15	05/01/14 21:59	1,7.3	TL

### Lab Control Sample Analysis Batch Quality Control

**Project Name:** RIVERWALK  
**Project Number:** 183757

**Lab Number:** L1408495  
**Report Date:** 05/08/14

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 02 Batch: WG684644-1								
pH	99		-		99-101	-		
General Chemistry - Westborough Lab Associated sample(s): 02 Batch: WG686673-2								
Cyanide, Reactive	85		-		30-125	-		40
General Chemistry - Westborough Lab Associated sample(s): 02 Batch: WG686675-2								
Sulfide, Reactive	112		-		60-125	-		40



## Lab Duplicate Analysis

Batch Quality Control

**Project Name:** RIVERWALK  
**Project Number:** 183757

**Lab Number:** L1408495  
**Report Date:** 05/08/14

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG684638-1 QC Sample: L1408402-01 Client ID: DUP Sample						
Solids, Total	88.3	88.0	%	0		20
General Chemistry - Westborough Lab Associated sample(s): 02 QC Batch ID: WG684644-2 QC Sample: L1408495-02 Client ID: SB-3 (0-14')						
pH (H)	10.3	10.0	SU	3		5
General Chemistry - Westborough Lab Associated sample(s): 02 QC Batch ID: WG686673-3 QC Sample: L1409073-01 Client ID: DUP Sample						
Cyanide, Reactive	ND	ND	mg/kg	NC		40
General Chemistry - Westborough Lab Associated sample(s): 02 QC Batch ID: WG686675-3 QC Sample: L1409073-01 Client ID: DUP Sample						
Sulfide, Reactive	ND	ND	mg/kg	NC		40

**Project Name:** RIVERWALK  
**Project Number:** 183757

**Lab Number:** L1408495  
**Report Date:** 05/08/14

### Sample Receipt and Container Information

Were project specific reporting limits specified? YES

**Reagent H2O Preserved Vials Frozen on:** 04/23/2014 16:25

#### Cooler Information Custody Seal

##### Cooler

A Absent

#### Container Information

Container ID	Container Type	Cooler	pH	Temp deg C	Pres	Seal	Analysis(*)
L1408495-01A	Vial MeOH preserved	A	N/A	4.1	Y	Absent	MCP-8260HLW-10(14)
L1408495-01B	Vial water preserved	A	N/A	4.1	Y	Absent	MCP-8260HLW-10(14)
L1408495-01C	Vial water preserved	A	N/A	4.1	Y	Absent	MCP-8260HLW-10(14)
L1408495-01D	Plastic 2oz unpreserved for TS	A	N/A	4.1	Y	Absent	TS(7)
L1408495-02A	Amber 250ml unpreserved	A	N/A	4.1	Y	Absent	IGNIT-1030(14),MCP-8082-10(365),MCP-CR-6010T-10(180),REACTS(14),MCP-8270-10(14),MCP-AS-6010T-10(180),MCP-7471T-10(28),MCP-CD-6010T-10(180),TS(7),MCP-AG-6010T-10(180),PH-9045(1),MCP-SE-6010T-10(180),MCP-BA-6010T-10(180),REACTCN(14),TPH-DRO-D(14),MCP-PB-6010T-10(180)
L1408495-02B	Amber 250ml unpreserved	A	N/A	4.1	Y	Absent	IGNIT-1030(14),MCP-8082-10(365),MCP-CR-6010T-10(180),REACTS(14),MCP-8270-10(14),MCP-AS-6010T-10(180),MCP-7471T-10(28),MCP-CD-6010T-10(180),TS(7),MCP-AG-6010T-10(180),PH-9045(1),MCP-SE-6010T-10(180),MCP-BA-6010T-10(180),REACTCN(14),TPH-DRO-D(14),MCP-PB-6010T-10(180)
L1408495-02C	Amber 250ml unpreserved	A	N/A	4.1	Y	Absent	IGNIT-1030(14),MCP-8082-10(365),MCP-CR-6010T-10(180),REACTS(14),MCP-8270-10(14),MCP-AS-6010T-10(180),MCP-7471T-10(28),MCP-CD-6010T-10(180),TS(7),MCP-AG-6010T-10(180),PH-9045(1),MCP-SE-6010T-10(180),MCP-BA-6010T-10(180),REACTCN(14),TPH-DRO-D(14),MCP-PB-6010T-10(180)

\*Values in parentheses indicate holding time in days

**Project Name:** RIVERWALK**Project Number:** 183757**Lab Number:** L1408495**Report Date:** 05/08/14**Container Information**

Container ID	Container Type	Cooler	pH	Temp deg C	Pres	Seal	Analysis(*)
L1408495-03A	Amber 250ml unpreserved	A	N/A	4.1	Y	Absent	MCP-CR-6010T-10(180),MCP-AS-6010T-10(180),MCP-7471T-10(28),MCP-CD-6010T-10(180),TS(7),MCP-AG-6010T-10(180),MCP-SE-6010T-10(180),MCP-BA-6010T-10(180),MCP-PB-6010T-10(180)

\*Values in parentheses indicate holding time in days



**Project Name:** RIVERWALK  
**Project Number:** 183757

**Lab Number:** L1408495  
**Report Date:** 05/08/14

## GLOSSARY

### Acronyms

EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCS D	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NI	- Not Ignitable.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.

### Footnotes

- 1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

### Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

### Data Qualifiers

- A** - Spectra identified as "Aldol Condensation Product".
- B** - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit.
- C** - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.
- D** - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.
- E** - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.
- G** - The concentration may be biased high due to matrix interferences (i.e. co-elution) with non-target compound(s). The result should be considered estimated.
- H** - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.
- I** - The lower value for the two columns has been reported due to obvious interference.

Report Format: Data Usability Report



**Project Name:** RIVERWALK  
**Project Number:** 183757

**Lab Number:** L1408495  
**Report Date:** 05/08/14

**Data Qualifiers**

- M** - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.
- NJ** - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.
- P** - The RPD between the results for the two columns exceeds the method-specified criteria.
- Q** - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)
- R** - Analytical results are from sample re-analysis.
- RE** - Analytical results are from sample re-extraction.
- S** - Analytical results are from modified screening analysis.
- J** - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).
- ND** - Not detected at the reporting limit (RL) for the sample.

**Project Name:** RIVERWALK**Lab Number:** L1408495**Project Number:** 183757**Report Date:** 05/08/14

## REFERENCES

- 1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - IV, 2007.
- 30 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WPCF. 18th Edition. 1992.
- 97 EPA Test Methods (SW-846) with QC Requirements & Performance Standards for the Analysis of EPA SW-846 Methods under the Massachusetts Contingency Plan, WSC-CAM-IIA, IIB, IIIA, IIIB, IIIC, IIID, VA, VB, VC, VIA, VIB, VIIIA and VIIIB, July 2010.

## LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.



## Certification Information

Last revised April 15, 2014

---

**The following analytes are not included in our NELAP Scope of Accreditation:**

### Westborough Facility

**EPA 524.2:** Acetone, 2-Butanone (Methyl ethyl ketone (MEK)), Tert-butyl alcohol, 2-Hexanone, Tetrahydrofuran, 1,3,5-Trichlorobenzene, 4-Methyl-2-pentanone (MIBK), Carbon disulfide, Diethyl ether.

**EPA 8260C:** 1,2,4,5-Tetramethylbenzene, 4-Ethyltoluene, Iodomethane (methyl iodide), Methyl methacrylate, Azobenzene.

**EPA 8330A/B:** PETN, Picric Acid, Nitroglycerine, 2,6-DANT, 2,4-DANT.

**EPA 8270D:** 1-Methylnaphthalene, Dimethylnaphthalene, 1,4-Diphenylhydrazine.

**EPA 625:** 4-Chloroaniline, 4-Methylphenol.

**SM4500:** Soil: Total Phosphorus, TKN, NO<sub>2</sub>, NO<sub>3</sub>.

**EPA 9071:** Total Petroleum Hydrocarbons, Oil & Grease.

### Mansfield Facility

**EPA 8270D:** Biphenyl.

**EPA 2540D:** TSS

**EPA TO-15:** Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.

---

**The following analytes are included in our Massachusetts DEP Scope of Accreditation, Westborough Facility:**

### Drinking Water

**EPA 200.8:** Sb,As,Ba,Be,Cd,Cr,Cu,Pb,Ni,Se,Tl; **EPA 200.7:** Ba,Be,Ca,Cd,Cr,Cu,Na; **EPA 245.1:** Mercury;

**EPA 300.0:** Nitrate-N, Fluoride, Sulfate; **EPA 353.2:** Nitrate-N, Nitrite-N; **SM4500NO3-F:** Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500CI-D, SM2320B, SM2540C, SM4500H-B**

**EPA 332:** Perchlorate.

**Microbiology:** **SM9215B; SM9223-P/A, SM9223B-Colilert-QT, Enterolert-QT.**

### Non-Potable Water

**EPA 200.8:** Al,Sb,As,Be,Cd,Cr,Cu,Pb,Mn,Ni,Se,Ag,Tl,Zn;

**EPA 200.7:** Al,Sb,As,Be,Cd,Ca,Cr,Co,Cu,Fe,Pb,Mg,Mn,Mo,Ni,K,Se,Ag,Na,Sr,Ti,Tl,V,Zn;

**EPA 245.1, SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2340B, SM2320B, SM4500CL-E, SM4500F-BC, SM426C, SM4500NH3-BH, EPA 350.1:** Ammonia-N, **LACHAT 10-107-06-1-B:** Ammonia-N, **SM4500NO3-F,**

**EPA 353.2:** Nitrate-N, **SM4500NH3-BC-NES, EPA 351.1, SM4500P-E, SM4500P-B, E, SM5220D, EPA 410.4,**

**SM5210B, SM5310C, SM4500CL-D, EPA 1664, SM14 510AC, EPA 420.1, SM4500-CN-CE, SM2540D.**

**EPA 624:** Volatile Halocarbons & Aromatics,

**EPA 608:** Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs

**EPA 625:** SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045:** PCB-Oil.

**Microbiology:** **SM9223B-Colilert-QT; Enterolert-QT, SM9222D-MF.**

---

For a complete listing of analytes and methods, please contact your Alpha Project Manager.



# CHAIN OF CUSTODY

PAGE 1 OF 1

Serial No: 05081409:41

ALPHA Job #: L1498495

WESTBORO, MA RAYNHAM, MA  
 TEL: 508-898-9220 TEL: 508-822-9300  
 FAX: 508-898-9193 FAX: 508-822-3288

**Project Information**Project Name: River WalkProject Location: 179 Bridge St, Lowell, MAProject #: 183757Project Manager: Matt Robbins

ALPHA Quote #:

**Turn-Around Time** Standard  RUSH (only confirmed if pre-approved!)Date Due: 5/8/14 5/7/14 Time:**Client Information**Client: TRCAddress: 650 Suffolk StLowell, MA 01854Phone: 978-970-5600

Fax:

Email: me@trcsolutions.com These samples have been previously analyzed by Alpha

Other Project Specific Requirements/Comments/Detection Limits:

**Report Information - Data Deliverables**
 FAX  EMAIL  
 ADEx  Add'l Deliverables
**Billing Information** Same as Client info PO #:**Regulatory Requirements/Report Limits**State / Fed Program MCP Criteria S1**MA MCP PRESUMPTIVE CERTAINTY --- CT REASONABLE CONFIDENCE PROTOCOLS**
 Yes  No Are MCP Analytical Methods Required?  
 Yes  No Are CT RCP (Reasonable Confidence Protocols) Required?

ANALYSIS  
 VOCs via 8260  
 SVOCs via 8270  
 PCBs via 8082  
 TPH-DRO-D  
 RCRA 8 Metals  
 PH/Ignitability  
 Reactivity

**SAMPLE HANDLING**

Filtration  
 Done  
 Not needed  
 Lab to do  
 Lab to do  
 Preservation  
 Lab to do  
 (Please specify below)

TOTAL # BOTTLES

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection		Sample Matrix	Sampler's Initials	ANALYSIS										Sample Specific Comments	TOTAL # BOTTLES					
		Date	Time			VOCs	SVOCs	PCBs	TPH-DRO-D	RCRA 8 Metals	PH/Ignitability	Reactivity	MS Metals	MS Metals	MS Metals			MS Metals	MS Metals	MS Metals		
08495-01	SB-3 (7')	4/22/14	1330	Soil	JPS	X															4	
02	SB-3 (0-14')	↓	1340	↓	↓	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	3
03	SB-3 (14-18')	4/23/14	0810	Soil	JPS	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1

PLEASE ANSWER QUESTIONS ABOVE!

IS YOUR PROJECT MA MCP or CT RCP?

Relinquished By: Jamie Deaton Date/Time: 4/23/14 10:15  
 Received By: Jamie Deaton Date/Time: 4/23/14 15:45

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's Payment Terms. See reverse side.

7A  
Volatile Organics CONTINUING CALIBRATION CHECK

Lab Name: Alpha Analytical Labs

SDG No.: L1408495

Instrument ID: Voal04.i      Calibration Date: 28-APR-2014      Time: 07:19

Lab File ID: 0428A02      Init. Calib. Date(s): 03-APR-2      04-APR-2

Sample No: 8260 CCAL      Init. Calib. Times : 14:54      16:18

Compound	RRF	RRF	MIN RRF	%D	MAX %D	
=====	=====	=====	=====	=====	=====	
dichlorodifluoromethane	.22314	.26452	.1	19	20	
chloromethane	.40722	.42018	.1	3	20	
vinyl chloride	.35837	.39154	.1	9	20	
bromomethane	.13219	.18391	.1	39	20	F
chloroethane	.19989	.21002	.1	5	20	
trichlorofluoromethane	.34309	.41963	.1	22	20	F
ethyl ether	.12077	.118	.05	-2	20	
1,1,-dichloroethene	.24465	.28504	.1	17	20	
carbon disulfide	.87033	.92536	.1	6	20	
methylene chloride	.31022	.36153	.1	17	20	
acetone	100	138	.1	38	20	F
trans-1,2-dichloroethene	.29072	.33364	.1	15	20	
methyl tert butyl ether	.72895	.76314	.1	5	20	
Diisopropyl Ether	1.1417	1.2616	.05	10	20	
1,1-dichloroethane	.60352	.67098	.2	11	20	
Ethyl-Tert-Butyl-Ether	1.0687	1.2055	.05	13	20	
cis-1,2-dichloroethene	.31214	.36162	.1	16	20	
2,2-dichloropropane	.42875	.48895	.05	14	20	
bromochloromethane	.1442	.17551	.05	22	20	F
chloroform	.51698	.5802	.2	12	20	
carbontetrachloride	.37898	.44941	.1	19	20	
tetrahydrofuran	.10344	.11011	.05	6	20	
1,1,1-trichloroethane	.44113	.5048	.1	14	20	
2-butanone	.1377	.1418	.1	3	20	
1,1-dichloropropene	.39325	.45635	.05	16	20	
benzene	1.1385	1.2974	.5	14	20	
Tertiary-Amyl Methyl Ether	.79134	.89816	.05	13	20	
1,2-dichloroethane	.40432	.44004	.1	9	20	
trichloroethene	.30569	.35063	.2	15	20	
dibromomethane	.17058	.19552	.05	15	20	
1,2-dichloropropane	.33941	.38896	.1	15	20	
bromodichloromethane	.39408	.44847	.2	14	20	
1,4-dioxane	.00266	.00323	.05	21	20	F
cis-1,3-dichloropropene	.47395	.54082	.2	14	20	
toluene	.99659	.97758	.4	-2	20	
tetrachloroethene	.3974	.4144	.2	4	20	
4-methyl-2-pentanone	.11926	.13533	.1	13	20	
trans-1,3-dichloropropene	.58729	.56746	.1	-3	20	

FORM VII MCP-8260HLW-10

7A  
CONTINUING CALIBRATION CHECK

Lab Name: Alpha Analytical Labs

SDG No.: L1408495

Instrument ID: Voal04.i      Calibration Date: 28-APR-2014      Time: 07:19

Lab File ID: 0428A02      Init. Calib. Date(s): 03-APR-2      04-APR-2

Sample No: 8260 CCAL      Init. Calib. Times : 14:54      16:18

Compound	RRF	RRF	MIN RRF	%D	MAX %D
1,1,2-trichloroethane	.28594	.28815	.1	1	20
chlorodibromomethane	.41486	.41493	.1	0	20
1,3-dichloropropane	.57213	.56219	.05	-2	20
1,2-dibromoethane	.34292	.34449	.1	0	20
2-hexanone	.30378	.27598	.1	-9	20
chlorobenzene	1.0983	1.1169	.5	2	20
ethyl benzene	1.8995	1.9054	.1	0	20
1,1,1,2-tetrachloroethane	.39976	.40388	.05	1	20
p/m xylene	.72253	.7289	.1	1	20
o xylene	.67667	.6925	.3	2	20
styrene	1.1253	1.1588	.3	3	20
bromoform	.52	.49433	.1	-5	20
isopropylbenzene	3.7499	3.5438	.1	-5	20
bromobenzene	.93231	.89643	.05	-4	20
n-propylbenzene	4.3541	4.1449	.05	-5	20
1,1,2,2,-tetrachloroethane	.91864	.86239	.3	-6	20
2-chlorotoluene	2.7508	2.5574	.05	-7	20
1,2,3-trichloropropane	.69902	.63589	.05	-9	20
1,3,5-trimethylbenzene	3.0919	2.939	.05	-5	20
4-chlorotoluene	2.6856	2.5266	.05	-6	20
tert-butylbenzene	2.5927	2.4871	.05	-4	20
1,2,4-trimethylbenzene	3.1296	2.9848	.05	-5	20
sec-butylbenzene	3.9068	3.8343	.05	-2	20
p-isopropyltoluene	3.2939	3.2162	.05	-2	20
1,3-dichlorobenzene	1.7316	1.7027	.6	-2	20
1,4-dichlorobenzene	1.7430	1.7305	.5	-1	20
n-butylbenzene	3.0403	2.9829	.05	-2	20
1,2-dichlorobenzene	1.6073	1.5700	.4	-2	20
1,2-dibromo-3-chloropropane	.14014	.13177	.05	-6	20
hexachlorobutadiene	.52313	.53376	.05	2	20
1,2,4-trichlorobenzene	1.0809	1.1070	.2	2	20
naphthalene	2.6748	2.5929	.05	-3	20
1,2,3-trichlorobenzene	1.0030	1.0084	.05	1	20
dibromofluoromethane	.25794	.26091	.05	1	30
1,2-dichloroethane-d4	.28551	.25844	.05	-9	30
toluene-d8	1.3466	1.2272	.05	-9	30
4-bromofluorobenzene	1.0031	.95649	.05	-5	30

FORM VII MCP-8260HLW-10



## ANALYTICAL REPORT

Lab Number:	L1410053
Client:	TRC Environmental Consultants Wannalancit Mills 650 Suffolk Street Lowell, MA 01854
ATTN:	Matt Robbins
Phone:	(978) 656-3549
Project Name:	RIVERWALK
Project Number:	183757
Report Date:	05/16/14

The original project report/data package is held by Alpha Analytical. This report/data package is paginated and should be reproduced only in its entirety. Alpha Analytical holds no responsibility for results and/or data that are not consistent with the original.

Certifications & Approvals: MA (M-MA086), NY (11148), CT (PH-0574), NH (2003), NJ NELAP (MA935), RI (LAO00065), ME (MA00086), PA (68-03671), USDA (Permit #P-330-11-00240), NC (666), TX (T104704476), DOD (L2217), US Army Corps of Engineers.

---

Eight Walkup Drive, Westborough, MA 01581-1019  
508-898-9220 (Fax) 508-898-9193 800-624-9220 - [www.alphalab.com](http://www.alphalab.com)



**Project Name:** RIVERWALK  
**Project Number:** 183757

**Lab Number:** L1410053  
**Report Date:** 05/16/14

<b>Alpha Sample ID</b>	<b>Client ID</b>	<b>Sample Location</b>	<b>Collection Date/Time</b>
L1410053-01	SB-3 (0-14')	179 BRIDGE ST., LOWELL, MA	04/22/14 13:40

Project Name: RIVERWALK

Lab Number: L1410053

Project Number: 183757

Report Date: 05/16/14

**MADEP MCP Response Action Analytical Report Certification**

**This form provides certifications for all samples performed by MCP methods. Please refer to the Sample Results and Container Information sections of this report for specification of MCP methods used for each analysis. The following questions pertain only to MCP Analytical Methods.**

<b>An affirmative response to questions A through F is required for "Presumptive Certainty" status</b>		
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
B	Were the analytical method(s) and all associated QC requirements specified in the selected CAM protocol(s) followed?	YES
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
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data?"	YES
E a.	VPH, EPH, and APH Methods only: Was each method conducted without significant modification(s)? (Refer to the individual method(s) for a list of significant modifications).	N/A
E b.	APH and TO-15 Methods only: Was the complete analyte list reported for each method?	N/A
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
<b>A response to questions G, H and I is required for "Presumptive Certainty" status</b>		
G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)?	YES
H	Were all QC performance standards specified in the CAM protocol(s) achieved?	YES
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?	YES
<b>For any questions answered "No", please refer to the case narrative section on the following page(s).</b>		

**Please note that sample matrix information is located in the Sample Results section of this report.**



**Project Name:** RIVERWALK  
**Project Number:** 183757

**Lab Number:** L1410053  
**Report Date:** 05/16/14

### Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet all of the requirements of NELAC, for all NELAC accredited parameters. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. Performance criteria for CAM and RCP methods allow for some LCS compound failures to occur and still be within method compliance. In these instances, the specific failures are not narrated but are noted in the associated QC table. This information is also incorporated in the Data Usability format for our Data Merger tool where it can be reviewed along with any associated usability implications. Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances the specific failure is not narrated but noted in the associated QC table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

#### HOLD POLICY

For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Client Service Representative and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Client Services at 800-624-9220 with any questions.

---

**Project Name:** RIVERWALK  
**Project Number:** 183757

**Lab Number:** L1410053  
**Report Date:** 05/16/14

### Case Narrative (continued)

MCP Related Narratives

Report Submission

All MCP required questions were answered with affirmative responses; therefore, there are no relevant protocol-specific QC and/or performance standard non-conformances to report.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature:

 Kelly Stenstrom

Title: Technical Director/Representative

Date: 05/16/14

## METALS

Project Name: RIVERWALK

Lab Number: L1410053

Project Number: 183757

Report Date: 05/16/14

**SAMPLE RESULTS**

Lab ID: L1410053-01

Date Collected: 04/22/14 13:40

Client ID: SB-3 (0-14')

Date Received: 04/23/14

Sample Location: 179 BRIDGE ST., LOWELL, MA

Field Prep: Not Specified

Matrix: Soil

TCLP/SPLP Ext. Date: 05/12/14 11:33

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
TCLP Metals by EPA 1311 - Westborough Lab											
Lead, TCLP	ND		mg/l	0.50	--	1	05/13/14 10:32	05/15/14 16:43	EPA 3015	1,6010C	MG



Project Name: RIVERWALK

Lab Number: L1410053

Project Number: 183757

Report Date: 05/16/14

## Method Blank Analysis Batch Quality Control

Parameter	Result Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
TCLP Metals by EPA 1311 - Westborough Lab for sample(s): 01 Batch: WG689178-1									
Lead, TCLP	ND	mg/l	0.50	--	1	05/13/14 10:32	05/15/14 16:01	1,6010C	MG

### Prep Information

Digestion Method: EPA 3015

TCLP/SPLP Extraction Date: 05/12/14 11:33

## Lab Control Sample Analysis

Batch Quality Control

**Project Name:** RIVERWALK  
**Project Number:** 183757

**Lab Number:** L1410053  
**Report Date:** 05/16/14

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
TCLP Metals by EPA 1311 - Westborough Lab Associated sample(s): 01 Batch: WG689178-2								
Lead, TCLP	102		-		75-125	-		20

**Matrix Spike Analysis**  
Batch Quality Control

Project Name: RIVERWALK

Lab Number: L1410053

Project Number: 183757

Report Date: 05/16/14

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
TCLP Metals by EPA 1311 - Westborough Lab Associated sample(s): 01 QC Batch ID: WG689178-4 QC Sample: L1409999-01 Client ID: MS Sample												
Lead, TCLP	ND	5.1	4.8	94		-	-		75-125	-		20

## Lab Duplicate Analysis

Batch Quality Control

Project Name: RIVERWALK

Project Number: 183757

Lab Number: L1410053

Report Date: 05/16/14

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
TCLP Metals by EPA 1311 - Westborough Lab Associated sample(s): 01 QC Batch ID: WG689178-3 QC Sample: L1409999-01 Client ID: DUP Sample						
Lead, TCLP	ND	ND	mg/l	NC		20

Project Name: RIVERWALK

Lab Number: L1410053

Project Number: 183757

Report Date: 05/16/14

**Sample Receipt and Container Information**

Were project specific reporting limits specified? YES

Reagent H2O Preserved Vials Frozen on: NA

**Cooler Information Custody Seal****Cooler**

A Absent

**Container Information**

Container ID	Container Type	Cooler	pH	Temp deg C	Pres	Seal	Analysis(*)
L1410053-01A	Amber 250ml unpreserved	A	N/A	4.1	Y	Absent	-
L1410053-01X	Plastic 250ml HNO3 preserved spl	A	<2	4.1	Y	Absent	PB-CI(180)
L1410053-01X9	Tumble Vessel	A	N/A	4.1	Y	Absent	-

\*Values in parentheses indicate holding time in days

**Project Name:** RIVERWALK  
**Project Number:** 183757

**Lab Number:** L1410053  
**Report Date:** 05/16/14

## GLOSSARY

### Acronyms

EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCS D	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NI	- Not Ignitable.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.

### Footnotes

- 1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

### Terms

**Analytical Method:** Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

### Data Qualifiers

- A** - Spectra identified as "Aldol Condensation Product".
- B** - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit.
- C** - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.
- D** - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.
- E** - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.
- G** - The concentration may be biased high due to matrix interferences (i.e. co-elution) with non-target compound(s). The result should be considered estimated.
- H** - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.
- I** - The lower value for the two columns has been reported due to obvious interference.

**Report Format:** Data Usability Report



**Project Name:** RIVERWALK  
**Project Number:** 183757

**Lab Number:** L1410053  
**Report Date:** 05/16/14

**Data Qualifiers**

- M** - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.
- NJ** - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.
- P** - The RPD between the results for the two columns exceeds the method-specified criteria.
- Q** - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)
- R** - Analytical results are from sample re-analysis.
- RE** - Analytical results are from sample re-extraction.
- S** - Analytical results are from modified screening analysis.
- J** - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).
- ND** - Not detected at the reporting limit (RL) for the sample.

**Project Name:** RIVERWALK  
**Project Number:** 183757

**Lab Number:** L1410053  
**Report Date:** 05/16/14

## REFERENCES

- 1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - IV, 2007.

## LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.



## Certification Information

Last revised April 15, 2014

**The following analytes are not included in our NELAP Scope of Accreditation:**

### Westborough Facility

**EPA 524.2:** Acetone, 2-Butanone (Methyl ethyl ketone (MEK)), Tert-butyl alcohol, 2-Hexanone, Tetrahydrofuran, 1,3,5-Trichlorobenzene, 4-Methyl-2-pentanone (MIBK), Carbon disulfide, Diethyl ether.

**EPA 8260C:** 1,2,4,5-Tetramethylbenzene, 4-Ethyltoluene, Iodomethane (methyl iodide), Methyl methacrylate, Azobenzene.

**EPA 8330A/B:** PETN, Picric Acid, Nitroglycerine, 2,6-DANT, 2,4-DANT.

**EPA 8270D:** 1-Methylnaphthalene, Dimethylnaphthalene, 1,4-Diphenylhydrazine.

**EPA 625:** 4-Chloroaniline, 4-Methylphenol.

**SM4500:** Soil: Total Phosphorus, TKN, NO<sub>2</sub>, NO<sub>3</sub>.

**EPA 9071:** Total Petroleum Hydrocarbons, Oil & Grease.

### Mansfield Facility

**EPA 8270D:** Biphenyl.

**EPA 2540D:** TSS

**EPA TO-15:** Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.

**The following analytes are included in our Massachusetts DEP Scope of Accreditation, Westborough Facility:**

### Drinking Water

**EPA 200.8:** Sb,As,Ba,Be,Cd,Cr,Cu,Pb,Ni,Se,Tl; **EPA 200.7:** Ba,Be,Ca,Cd,Cr,Cu,Na; **EPA 245.1:** Mercury;

**EPA 300.0:** Nitrate-N, Fluoride, Sulfate; **EPA 353.2:** Nitrate-N, Nitrite-N; **SM4500NO3-F:** Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500CI-D, SM2320B, SM2540C, SM4500H-B**

**EPA 332:** Perchlorate.

**Microbiology:** **SM9215B; SM9223-P/A, SM9223B-Colilert-QT, Enterolert-QT.**

### Non-Potable Water

**EPA 200.8:** Al,Sb,As,Be,Cd,Cr,Cu,Pb,Mn,Ni,Se,Ag,Tl,Zn;

**EPA 200.7:** Al,Sb,As,Be,Cd,Ca,Cr,Co,Cu,Fe,Pb,Mg,Mn,Mo,Ni,K,Se,Ag,Na,Sr,Ti,Tl,V,Zn;

**EPA 245.1, SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2340B, SM2320B, SM4500CL-E, SM4500F-BC, SM426C, SM4500NH3-BH, EPA 350.1:** Ammonia-N, **LACHAT 10-107-06-1-B:** Ammonia-N, **SM4500NO3-F,**

**EPA 353.2:** Nitrate-N, **SM4500NH3-BC-NES, EPA 351.1, SM4500P-E, SM4500P-B, E, SM5220D, EPA 410.4,**

**SM5210B, SM5310C, SM4500CL-D, EPA 1664, SM14 510AC, EPA 420.1, SM4500-CN-CE, SM2540D.**

**EPA 624:** Volatile Halocarbons & Aromatics,

**EPA 608:** Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs

**EPA 625:** SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045:** PCB-Oil.

**Microbiology:** **SM9223B-Colilert-QT; Enterolert-QT, SM9222D-MF.**

For a complete listing of analytes and methods, please contact your Alpha Project Manager.



# CHAIN OF CUSTODY

PAGE 1 OF 1

Serial 10053145610/14 - BB

ALPHA Job # ~~1998995~~

WESTBORO, MA TEL: 508-898-9220  
 RAYNHAM, MA TEL: 508-822-9300  
 FAX: 508-898-9193 FAX: 508-822-3288

### Project Information

Project Name: River Walk  
 Project Location: 179 Bridge St, Lowell, MA  
 Project #: 183757  
 Project Manager: Matt Robbins  
 ALPHA Quote #:

### Report Information - Data Deliverables

FAX  EMAIL  
 ADEx  Add'l Deliverables

### Billing Information

Same as Client info PO #:

### Client Information

Client: TRC  
 Address: 650 Suffolk St Lowell, MA 01854  
 Phone: 978-970-5600  
 Fax:  
 Email: me@trcsolutions.com

### Regulatory Requirements/Report Limits

State / Fed Program MCP Criteria S1

### Regulatory Requirements/Report Limits

State / Fed Program MCP Criteria S1

### MA MCP PRESUMPTIVE CERTAINTY --- CT REASONABLE CONFIDENCE PROTOCOLS

Yes  No Are MCP Analytical Methods Required?  
 Yes  No Are CT RCP (Reasonable Confidence Protocols) Required?

### Turn-Around Time

Standard (10-day)  RUSH (only confirmed if pre-approved!)  
 Date Due: 5/16/14 Time:  
 These samples have been previously analyzed by Alpha

Other Project Specific Requirements/Comments/Detection Limits:  
5/16/14

**ANALYSIS**

VOCs via 8260  
SUOS via 8290  
PUBS via 8290  
1PH-DRO-D  
ROH Metals  
PH/19 Metals  
Recovery

**SAMPLE HANDLING**

Done  
 Not needed  
 Lab to do Preservation  
 Lab to do  
 (Please specify below)

**TCLP Pb**

**Sample Specific Comments**

TOTAL # BOTTLES

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection		Sample Matrix	Sampler's Initials
		Date	Time		
<del>00445</del>	SB-3 (7')	4/22/14	1330	Soil	JPS
00053 - 01	SB-3 (0-14')	↓	1340	↓	↓
03	SB-3 (14-18')	4/23/14	0810	Soil	JPS

ANALYSIS	VOCs via 8260	SUOS via 8290	PUBS via 8290	1PH-DRO-D	ROH Metals	PH/19 Metals	Recovery	Sample Specific Comments
X	X	X	X	X	X	X	X	MS Metals <u>4H</u> 4/23/14
X	X	X	X	X	X	X	X	MS Metals

PLEASE ANSWER QUESTIONS ABOVE!

IS YOUR PROJECT MA MCP or CT RCP?

Relinquished By <u>Jamie Deaton</u>	Date/Time <u>4/23/14 10:15</u>	Received By <u>Joe Lane</u>	Date/Time <u>4/23/14 15:45</u>
--	-----------------------------------	--------------------------------	-----------------------------------

Container Type	V	A	A	A	A	A	A
Preservative	F/0	A	A	A	A	A	A

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's Payment Terms. See reverse side.

## **APPENDIX E**

### **ORDER OF CONDITIONS**



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

MassDEP File Number:

206-0641

**A. General Information**

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



1. From: Lowell  
Conservation Commission

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

3. To: Applicant:

Diane Tradd  
 a. First Name b. Last Name  
City of Lowell - DPD  
 c. Organization  
50 arcand Drive  
 d. Mailing Address  
Lowell MA 01852  
 e. City/Town f. State g. Zip Code

4. Property Owner (if different from applicant):

a. First Name b. Last Name  
  
 c. Organization  
  
 d. Mailing Address  
    
 e. City/Town f. State g. Zip Code

5. Project Location:

Along Merrimack River 129 John St. - 169.1 Lowell  
Bridge St. b. City/Town  
  
 c. Assessors Map/Plat Number d. Parcel/Lot Number  
 42.3851N 71.1819W  
 Latitude and Longitude, if known: e. Latitude f. Longitude

6. Property recorded at the Registry of Deeds for (attach additional information if more than one parcel):

Middlesex North  
 a. County b. Certificate Number (if registered land)  
1602 543  
 c. Book d. Page

7. Dates: Feb. 23, 2009 March 18, 2009 March 18, 2009  
 a. Date Notice of Intent Filed b. Date Public Hearing Closed c. Date of Issuance

8. Final Approved Plans and Other Documents (attach additional plan or document references as needed):

City of Lowell Riverwalk Phase II  
 a. Plan Title  
TRC  
 b. Prepared By c. Signed and Stamped by  
Feb 2009 1" = 20'  
 d. Final Revision Date e. Scale  
   
 f. Additional Plan or Document Title g. Date



**B. Findings**

1. Findings pursuant to the Massachusetts Wetlands Protection Act:

Following the review of the above-referenced Notice of Intent and based on the information provided in this application and presented at the public hearing, this Commission finds that the areas in which work is proposed is significant to the following interests of the Wetlands Protection Act. Check all that apply:

- a.  Public Water Supply
- b.  Land Containing Shellfish
- c.  Prevention of Pollution
- d.  Private Water Supply
- e.  Fisheries
- f.  Protection of Wildlife Habitat
- g.  Groundwater Supply
- h.  Storm Damage Prevention
- i.  Flood Control

2. This Commission hereby finds the project, as proposed, is: (check one of the following boxes)

**Approved** subject to:

- a.  the following conditions which are necessary in accordance with the performance standards set forth in the wetlands regulations. This Commission orders that all work shall be performed in accordance with the Notice of Intent referenced above, the following General Conditions, and any other special conditions attached to this Order. To the extent that the following conditions modify or differ from the plans, specifications, or other proposals submitted with the Notice of Intent, these conditions shall control.

**Denied** because:

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

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

3.  Buffer Zone Impacts: Shortest distance between limit of project disturbance and wetland boundary (if available)

Resource Area	Proposed Alteration	Permitted Alteration	Proposed Replacement	Permitted Replacement
4. <input type="checkbox"/> Bank	a. linear feet	b. linear feet	c. linear feet	d. linear feet
5. <input type="checkbox"/> Bordering Vegetated Wetland	a. square feet	b. square feet	c. square feet	d. square feet
6. <input type="checkbox"/> Land Under Waterbodies and Waterways	a. square feet	b. square feet	c. square feet	d. square feet
	e. c/y dredged	f. c/y dredged		



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

MassDEP File Number:

206-0641

**B. Findings (cont.)**

Resource Area	Proposed Alteration	Permitted Alteration	Proposed Replacement	Permitted Replacement
7. <input type="checkbox"/> <b>Bordering Land Subject to Flooding</b>	a. square feet	b. square feet	c. square feet	d. square feet
Cubic Feet Flood Storage	e. cubic feet	f. cubic feet	g. cubic feet	h. cubic feet
8. <input type="checkbox"/> <b>Isolated Land Subject to Flooding</b>	a. square feet	b. square feet		
Cubic Feet Flood Storage	c. cubic feet	d. cubic feet	e. cubic feet	f. cubic feet
9. <input type="checkbox"/> <b>Riverfront area</b>	a. total sq. feet	b. total sq. feet		
Sq ft within 100 ft	c. square feet	d. square feet	e. square feet	f. square feet
Sq ft between 100-200 ft	g. square feet	h. square feet	i. square feet	j. square feet

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

10. <input type="checkbox"/> <b>Designated Port Areas</b>	Indicate size under Land Under the Ocean, below			
11. <input type="checkbox"/> <b>Land Under the Ocean</b>	a. square feet	b. square feet		
	c. c/y dredged	d. c/y dredged		
12. <input type="checkbox"/> <b>Barrier Beaches</b>	Indicate size under Coastal Beaches and/or Coastal Dunes below			
13. <input type="checkbox"/> <b>Coastal Beaches</b>	a. square feet	b. square feet	c. c/y nourishmt.	d. c/y nourishmt.
14. <input type="checkbox"/> <b>Coastal Dunes</b>	a. square feet	b. square feet	c. c/y nourishmt.	d. c/y nourishmt.
15. <input type="checkbox"/> <b>Coastal Banks</b>	a. linear feet	b. linear feet		
16. <input type="checkbox"/> <b>Rocky Intertidal Shores</b>	a. square feet	b. square feet		
17. <input type="checkbox"/> <b>Salt Marshes</b>	a. square feet	b. square feet	c. square feet	d. square feet
18. <input type="checkbox"/> <b>Land Under Salt Ponds</b>	a. square feet	b. square feet		
	c. c/y dredged	d. c/y dredged		
19. <input type="checkbox"/> <b>Land Containing Shellfish</b>	a. square feet	b. square feet	c. square feet	d. square feet
20. <input type="checkbox"/> <b>Fish Runs</b>	Indicate size under Coastal Banks, inland Bank, Land Under the Ocean, and/or inland Land Under Waterbodies and Waterways, above			
	a. c/y dredged	b. c/y dredged		
21. <input type="checkbox"/> <b>Land Subject to Coastal Storm Flowage</b>	a. square feet	b. square feet		



## C. General Conditions Under Massachusetts Wetlands Protection Act

(only applicable to approved projects)

1. Failure to comply with all conditions stated herein, and with all related statutes and other regulatory measures, shall be deemed cause to revoke or modify this Order.
2. The Order does not grant any property rights or any exclusive privileges; it does not authorize any injury to private property or invasion of private rights.
3. This Order does not relieve the permittee or any other person of the necessity of complying with all other applicable federal, state, or local statutes, ordinances, bylaws, or regulations.
4. The work authorized hereunder shall be completed within three years from the date of this Order unless either of the following apply:
  - a. the work is a maintenance dredging project as provided for in the Act; or
  - b. the time for completion has been extended to a specified date more than three years, but less than five years, from the date of issuance. If this Order is intended to be valid for more than three years, the extension date and the special circumstances warranting the extended time period are set forth as a special condition in this Order.
5. This Order may be extended by the issuing authority for one or more periods of up to three years each upon application to the issuing authority at least 30 days prior to the expiration date of the Order.
6. Any fill used in connection with this project shall be clean fill. Any fill shall contain no trash, refuse, rubbish, or debris, including but not limited to lumber, bricks, plaster, wire, lath, paper, cardboard, pipe, tires, ashes, refrigerators, motor vehicles, or parts of any of the foregoing.
7. This Order is not final until all administrative appeal periods from this Order have elapsed, or if such an appeal has been taken, until all proceedings before the Department have been completed.
8. No work shall be undertaken until the Order has become final and then has been recorded in the Registry of Deeds or the Land Court for the district in which the land is located, within the chain of title of the affected property. In the case of recorded land, the Final Order shall also be noted in the Registry's Grantor Index under the name of the owner of the land upon which the proposed work is to be done. In the case of the registered land, the Final Order shall also be noted on the Land Court Certificate of Title of the owner of the land upon which the proposed work is done. The recording information shall be submitted to this Conservation Commission on the form at the end of this Order, which form must be stamped by the Registry of Deeds, prior to the commencement of work.
9. A sign shall be displayed at the site not less than two square feet or more than three square feet in size bearing the words,

"Massachusetts Department of Environmental Protection" [or, "MassDEP"]

"File Number 206-0641"



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

10. Where the Department of Environmental Protection is requested to issue a Superseding Order, the Conservation Commission shall be a party to all agency proceedings and hearings before MassDEP.
11. Upon completion of the work described herein, the applicant shall submit a Request for Certificate of Compliance (WPA Form 8A) to the Conservation Commission.
12. The work shall conform to the plans and special conditions referenced in this order.
13. Any change to the plans identified in Condition #12 above shall require the applicant to inquire of the Conservation Commission in writing whether the change is significant enough to require the filing of a new Notice of Intent.
14. The Agent or members of the Conservation Commission and the Department of Environmental Protection shall have the right to enter and inspect the area subject to this Order at reasonable hours to evaluate compliance with the conditions stated in this Order, and may require the submittal of any data deemed necessary by the Conservation Commission or Department for that evaluation.
15. This Order of Conditions shall apply to any successor in interest or successor in control of the property subject to this Order and to any contractor or other person performing work conditioned by this Order.
16. Prior to the start of work, and if the project involves work adjacent to a Bordering Vegetated Wetland, the boundary of the wetland in the vicinity of the proposed work area shall be marked by wooden stakes or flagging. Once in place, the wetland boundary markers shall be maintained until a Certificate of Compliance has been issued by the Conservation Commission.
17. All sedimentation barriers shall be maintained in good repair until all disturbed areas have been fully stabilized with vegetation or other means. At no time shall sediments be deposited in a wetland or water body. During construction, the applicant or his/her designee shall inspect the erosion controls on a daily basis and shall remove accumulated sediments as needed. The applicant shall immediately control any erosion problems that occur at the site and shall also immediately notify the Conservation Commission, which reserves the right to require additional erosion and/or damage prevention controls it may deem necessary. Sedimentation barriers shall serve as the limit of work unless another limit of work line has been approved by this Order.

#### NOTICE OF STORMWATER CONTROL AND MAINTENANCE REQUIREMENTS

18. **The work associated with this Order (the “Project”) is (1)  is not (2)  subject to the Massachusetts Stormwater Standards. If the work is subject to the Stormwater Standards, then the project is subject to the following conditions:**
  - a) All work, including site preparation, land disturbance, construction and redevelopment, shall be implemented in accordance with the construction period pollution prevention and erosion and sedimentation control plan and, if applicable, the Stormwater Pollution Prevention Plan required by the National Pollution Discharge Elimination System Construction General Permit as required by Stormwater Condition 8. Construction period erosion, sedimentation and pollution control measures and best management practices (BMPs) shall remain in place until the site is fully stabilized.



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

- b) No stormwater runoff may be discharged to the post-construction stormwater BMPs unless and until a Registered Professional Engineer provides a Certification that:
- i.* all construction period BMPs have been removed or will be removed by a date certain specified in the Certification. For any construction period BMPs intended to be converted to post construction operation for stormwater attenuation, recharge, and/or treatment, the conversion is allowed by the MassDEP Stormwater Handbook BMP specifications and that the BMP has been properly cleaned or prepared for post construction operation, including removal of all construction period sediment trapped in inlet and outlet control structures;
  - ii.* as-built final construction BMP plans are included, signed and stamped by a Registered Professional Engineer, certifying the site is fully stabilized;
  - iii.* any illicit discharges to the stormwater management system have been removed, as per the requirements of Stormwater Standard 10;
  - iv.* all post-construction stormwater BMPs are installed in accordance with the plans (including all planting plans) approved by the issuing authority, and have been inspected to ensure that they are not damaged and that they are in proper working condition;
  - v.* any vegetation associated with post-construction BMPs is suitably established to withstand erosion.
- c) The landowner is responsible for BMP maintenance until the issuing authority is notified that another party has legally assumed responsibility for BMP maintenance. Prior to requesting a Certificate of Compliance, or Partial Certificate of Compliance, the responsible party (defined in General Condition 18(e)) shall execute and submit to the issuing authority an Operation and Maintenance Compliance Statement ("O&M Statement") for the Stormwater BMPs identifying the party responsible for implementing the stormwater BMPs Operation and Maintenance Plan ("O&M Plan") and certifying the following: *i.*) the O&M Plan is complete and will be implemented upon receipt of the Certificate of Compliance, and *ii.*) the future responsible parties shall be notified in writing of their ongoing legal responsibility to operate and maintain the stormwater management BMPs and implement the Stormwater Pollution Prevention Plan.
- d) Post-construction pollution prevention and source control shall be implemented in accordance with the long-term pollution prevention plan section of the approved Stormwater Report and, if applicable, the Stormwater Pollution Prevention Plan required by the National Pollution Discharge Elimination System Multi-Sector General Permit.
- e) Unless and until another party accepts responsibility, the landowner, or owner of any drainage easement, assumes responsibility for maintaining each BMP. To overcome this presumption, the landowner of the property must submit to the issuing authority a legally binding agreement of record, and acceptable to the issuing authority, evidencing that another entity has accepted responsibility for maintaining the BMP, and that the proposed responsible party shall be treated as a permittee for purposes of implementing the requirements of Conditions 18(f) through 18(k) with respect to that BMP. Any failure of the proposed responsible party to implement the requirements of Conditions 18(f) through 18(k) with respect to that BMP shall be a violation of the Order of Conditions or Certificate of Compliance. In the case of stormwater BMPs that are serving more than one lot, the legally binding agreement shall also identify the lots that will be serviced by the stormwater BMPs. A plan and easement deed that grants the responsible party access to perform the required operation and maintenance must be submitted along with the legally binding agreement.
- f) The responsible party shall operate and maintain all stormwater BMPs in accordance with the design plans, the O&M Plan, and the requirements of the Massachusetts Stormwater Handbook.



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

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

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

**See Attached**

---



---



---



---

**D. Findings Under Municipal Wetlands Bylaw or Ordinance**

- 1. Is a municipal wetlands bylaw or ordinance applicable?  Yes  No
- 2. The \_\_\_\_\_ hereby finds (check one that applies):
  - a.  that the proposed work cannot be conditioned to meet the standards set forth in a municipal ordinance or bylaw specifically:

1. Municipal Ordinance or Bylaw

2. Citation

Therefore, work on this project may not go forward unless and until a revised Notice of Intent is submitted which provides measures which are adequate to meet these standards, and a final Order of Conditions is issued.



**D. Findings Under Municipal Wetlands Bylaw or Ordinance (cont.)**

- b.  that the following additional conditions are necessary to comply with a municipal ordinance or bylaw:

1. Municipal Ordinance or Bylaw

2. Citation

3. The Commission orders that all work shall be performed in accordance with the following conditions and with the Notice of Intent referenced above. To the extent that the following conditions modify or differ from the plans, specifications, or other proposals submitted with the Notice of Intent, the conditions shall control.

The special conditions relating to municipal ordinance or bylaw are as follows (if you need more space for additional conditions, attach a text document):

---

---

---

---



# WPA Form 5 – Order of Conditions

2006-0641

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

## E. Issuance

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

3/18/09

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

1. Date of Issuance

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

2. Number of Signers

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

Signatures:

[Signature]  
[Signature]  
[Signature]

### Notary Acknowledgement

Commonwealth of Massachusetts County of

Middlesex

On this 18 Day of

MARCH  
Month

2009  
Year

Before me, the undersigned Notary Public, personally appeared

Christopher Zacharer  
Name of Document Signer

proved to me through satisfactory evidence of identification, which was/were

MA Drivers License  
Description of evidence of identification

to be the person whose name is signed on the preceding or attached document, and acknowledged to me that he/she signed it voluntarily for its stated purpose.

As member of

Lowell  
City/Town

Conservation Commission

Place notary seal and/or any stamp above

[Signature]  
Signature of Notary Public

Christine Thomas  
Printed Name of Notary Public

7/28/2011  
My Commission Expires (Date)

This Order is issued to the applicant as follows:

by hand delivery on

by certified mail, return receipt requested, on

Date

3/25/2009  
Date



---

## **F. Appeals**

The applicant, the owner, any person aggrieved by this Order, any owner of land abutting the land subject to this Order, or any ten residents of the city or town in which such land is located, are hereby notified of their right to request the appropriate MassDEP Regional Office to issue a Superseding Order of Conditions. The request must be made by certified mail or hand delivery to the Department, with the appropriate filing fee and a completed Request of Departmental Action Fee Transmittal Form, as provided in 310 CMR 10.03(7) within ten business days from the date of issuance of this Order. A copy of the request shall at the same time be sent by certified mail or hand delivery to the Conservation Commission and to the applicant, if he/she is not the appellant. Any appellants seeking to appeal the Department's Superseding Order associated with this appeal will be required to demonstrate prior participation in the review of this project. Previous participation in the permit proceeding means the submission of written information to the Conservation Commission prior to the close of the public hearing, requesting a Superseding Order or Determination, or providing written information to the Department prior to issuance of a Superseding Order or Determination.

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

**Section G, Recording Information is available on the following page.**



**G. Recording Information**

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

Conservation Commission

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

To:

Conservation Commission

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

Project Location

MassDEP File Number

Has been recorded at the Registry of Deeds of:

County

Book

Page

for:

Property Owner

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

Book

Page

In accordance with the Order of Conditions issued on:

Date

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

Instrument Number

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

Document Number

Signature of Applicant

## STANDARD LOWELL ORDER OF CONDITIONS

1. Forty-eight (48) hours prior to the commencement of any work, the Lowell Conservation Commission will be given written notification of said work.
2. No Work shall commence until this Order of Conditions has been recorded at the Registry of Deeds, Middlesex North and the recording information has been submitted to the Lowell Conservation Commission office.
3. Failures to record this Order of Conditions within twenty-eight (28) days from the date of issuance will result in the Order becoming Null and Void.
4. Additional erosion/sedimentation control measures shall be installed as deemed necessary at the direction of the Lowell Conservation Commission and/or the agent (s).
5. The Lowell Conservation Commission reserves the right to impose additional conditions in order to protect the public interests as identified in M.G.L. 131, s40.
6. Any changes made or intended to be made in the plans submitted to the Lowell Conservation Commission shall require the applicant to inquire of this department in writing as to whether the change is significant enough to require the filing of a new Notice of Intent.
7. The Lowell Conservation Commission and/or the authorized representative(s) reserve the right to access the property at any time for the purpose of inspecting the work covered by this Order of Conditions.
8. This Order of Conditions shall be made a part of all construction specifications and contracts.
9. The Order of Conditions shall apply to any successor in control or successor in interest of the property described in the Notice of Intent and accompanying plans submitted to the Lowell Conservation Commission.
10. Unless otherwise specifically stated in this Order, this Order shall also be a permit under the City of Lowell Wetlands Ordinance, City of Lowell Code of Ordinances Section 31 - 54.1 et.seq. and all conditions of this Order shall also be conditions of such permit.
11. No plants shall be used that are listed as invasive or potentially invasive on the Massachusetts Invasive Plant Advisory Group (MIPAG) list of invasive plants. A list of plantings shall be submitted to the Conservation commission for approval.
12. Upon completion of the project, the applicant shall submit with their request for a Certificate of Compliance, a statement and as-built plans by a registered professional engineer, architect, landscape architect or land surveyor stating that the project has been built in accordance with this Order of Conditions and referenced site plans.

**If you have any question regarding this Order of Conditions, Please contact the Lowell Conservation Commission office at (978) 446-7200**

City of Lowell – DPD  
50 Arcand Drive  
Lowell, MA 01852  
DEP #206-0641

Project Location: Boott Mills to Bridge Street

1. Proponent shall submit a stormwater plans and report for review and approval before construction
2. Proponent shall submit an alternatives analysis for improvements in the Riverfront area
3. A plan showing an inventory of the trees and selective pruning shall be submitted for review and approval

**APPENDIX F**

**PUBLIC NOTIFICATION LETTERS**



Wannalancit Mills  
650 Suffolk St., Suite 200  
Lowell, MA 01854

978.970.5600 PHONE  
978.453.1995 FAX

[www.trcsolutions.com](http://www.trcsolutions.com)

May 21, 2015

Kevin J. Murphy  
Chief Municipal Officer  
375 Merrimack Street  
2nd Floor, Room 43  
Lowell, MA 01852

Mr. Frank Singleton  
Director  
City of Lowell Department of Public Health  
341 Pine Street  
Lowell, MA 0185

**Re: Notice of Implementation of Release Abatement Measure Plan  
Proposed Riverwalk Park  
179 Bridge Street  
Lowell, Massachusetts  
RTN 3-32312**

Dear Mr. Murphy and Mr. Singleton:

TRC Environmental (TRC) has prepared this notification letter on behalf of the City of Lowell Department of Neighborhood Development (DND) to inform you of the implementation of a Release Abatement Measure (RAM) as part of development the property located at 179 Bridge Street in Lowell, Massachusetts.

The RAM that will be performed at this location involves redevelopment of a currently undeveloped parcel into the proposed Riverwalk Park. Remediation waste generated as part of the RAM will be disposed off-site to a suitable facility.

If you have any questions concerning the RAM activities planned by DND, please do not hesitate to contact me at TRC at (978) 656-3549.

Sincerely,  
TRC Environmental Corporation

Matthew E. Robbins, LSP  
Sr. Project Manager

cc: MassDEP NERO  
TRC File