OCTOBER 2016
REVISED MAY 2017

Long Island Rail Road

Contract No. 6052A-9-5, R-B

Remedial Investigation Report

Arch Street Yard, Long Island City, New York
NYSDEC VCA Site No. V00733

D&B ENGINEERS
AND
ARCHITECTS, P.C.

REMEDIAL INVESTIGATION REPORT
LONG ISLAND RAIL ROAD
ARCH STREET YARD
LONG ISLAND CITY, NEW YORK

NYSDEC VCA SITE NO. V00733

Prepared for:

METROPOLITAN TRANSPORTATION AUTHORITY
LONG ISLAND RAIL ROAD

Prepared by:

D&B ENGINEERS AND ARCHITECTS, P.C.
WOODBURY, NEW YORK

OCTOBER 2016
REVISED MAY 2017

CERTIFICATIONS

I, Thomas P. Fox, P.G., certify that I am currently a Qualified Environmental Professional as defined in 6 NYCRR Part 375 and that this Remedial Investigation Report was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10) and that all activities were performed in full accordance with the DER-approved work plan and any DER-approved modifications.

Thomas P. Fox, P.G.		5/2/17
Name of QEP	Signature	Date

REMEDIAL INVESTIGATION REPORT
ARCH STREET YARD
NYSDEC VCA SITE NO. V00733

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ABBREVIATIONS

1,2-DCE	Cis-1,2-Dichloroethene
AGS	Advanced Geological Services, Inc.
AGV	Air Guideline Values
ASP	Analytical Services Protocol
bgs	Below Ground Surface
CAMP	Community Air Monitoring Program
CLP	Contract Laboratory Program
COPC	Contaminant of Potential Concern
D&B	D&B Engineers and Architects, P.C.
DER	Division of Environmental Remediation
DOT	Department of Transportation
ELAP	Environmental Laboratory Approval Program
ESA	East Side Access Department
ESI	Environmental Site Investigation
FID	Flame-ionization Detector
GPR	Ground Penetrating Radar
LIRR	Long Island Rail Road
LNAPL	Light Nonaqueous Phase Liquid
MIP	Membrane Interface Probe
MNR	Metro North Railroad
MS	Matrix Spike
MSD	Matrix Spike Duplicate
MSL	Mean Sea Level
MTA	Metropolitan Transportation Authority
MTBE	Methyl Tert-Butyl Ether
NAPL	Nonaqueous Phase Liquid
NAVD88	North American Vertical Datum of 1988
NTU	Nephelometric Turbidity Units
NYCRR	New York Codes, Rules and Regulations
NYCT	New York City Transit
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
O.D.	Outer Diameter
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCE	Tetrachloroethene
PID	Photoionization Detector
PPB	Parts Per Billion
PVC	Polyvinyl Chloride
QA/QC	Quality Assurance/Quality Control
RAWP	Remedial Action Work Plan
RI	Remedial Investigation
RIWP	Remedial Investigation Work Plan
SC	Soil Conductivity
SCO	Soil Cleanup Objective
SVOC	Semivolatile Organic Compound
TAGM	Technical and Administrative Guidance Memorandum
TAL	Target Analyte List
TCE	Trichloroethene
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure
TOGS	Technical and Operational Guidance Series
TPH	Total Petroleum Hydrocarbons
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency
uV	Microvolts
VC	Vinyl Chloride
VCA	Voluntary Cleanup Agreement
VOC	Volatile Organic Compound
XSD	Halogen Specific Detector
Yard	Arch Street Yard

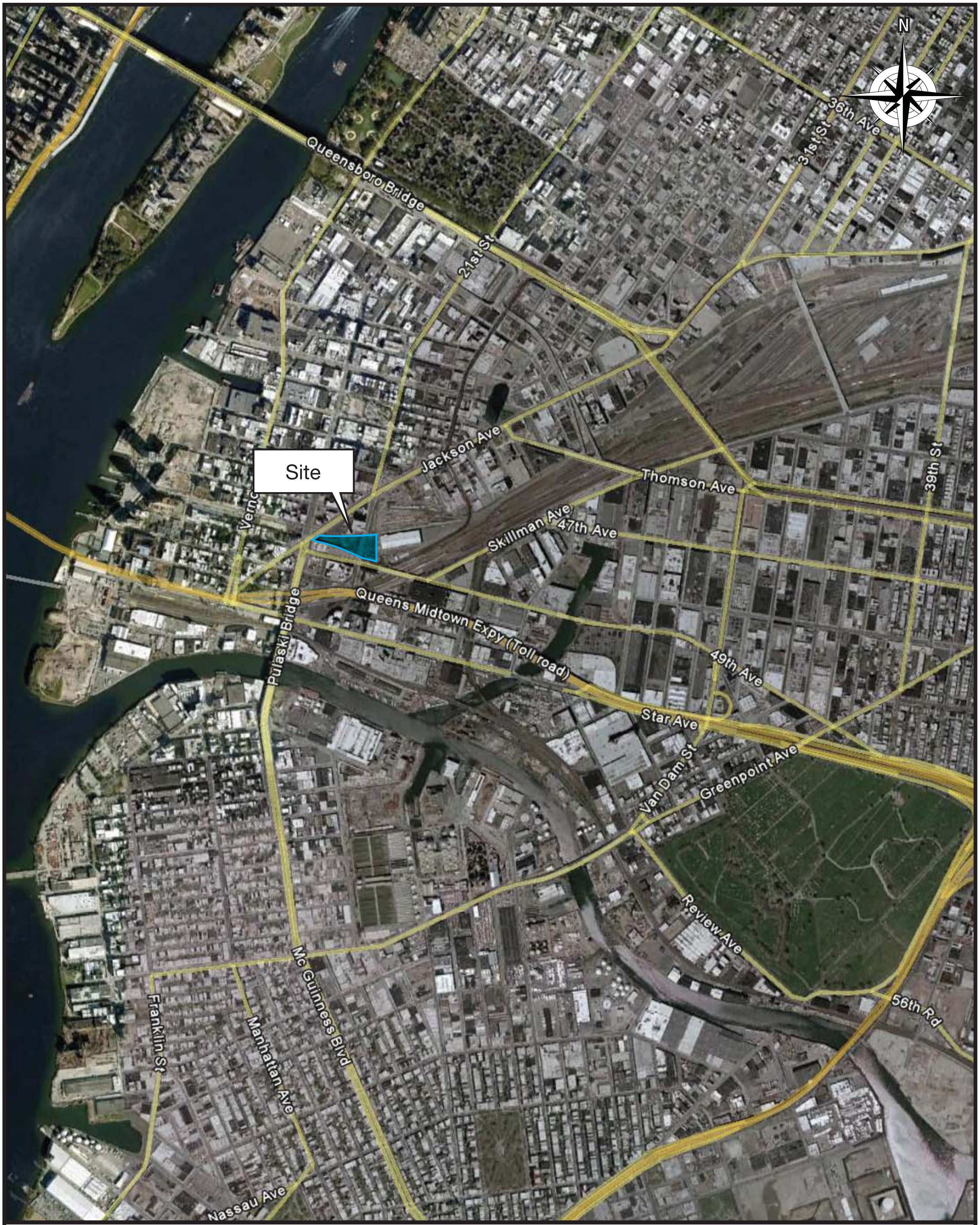
1.0 INTRODUCTION

1.1 Project Background

As part of the existing Long Island Rail Road (LIRR) On-Call Environmental Consulting Services contract (Contract No. 6052A-9-5, Release B), the LIRR authorized D&B Engineers and Architects, P.C. (D&B) to conduct a Remedial Investigation (RI) of contamination at the LIRR Arch Street Yard (the Yard). The RI is being performed in accordance with a Voluntary Cleanup Agreement (VCA) between the New York State Department of Environmental Conservation (NYSDEC) and the Metropolitan Transportation Authority (MTA) LIRR (NYSDEC Index Nos. W1-0993-04-04 and W2-0994-04-04).

The Yard is located south of Jackson Avenue, under the 21st Street Bridge at 49th Avenue, in Long Island City, Queens, New York. A site location map is provided as **Figure 1-1**. The Yard is currently owned by the LIRR and is approximately eight acres in size. The Site that is subject to the VCA and this RI, however, is an approximately 2.7 acre portion of the Yard designated as NYSDEC Site No. V00733 (herein referred to as "the Site"). The defined boundaries of the Site are depicted on the Site Plan, provided as **Figure 1-2**. The Yard was previously utilized by LIRR to perform maintenance on passenger rail cars, however, these activities ceased in December 2009. In September 2016, the Maintenance Facility located east of the Site was leased to Metro North Railroad (MNR) and Bombardier to install Positive Train Control in their trains. The LIRR currently uses the Yard (and the Site) for storage, and operation of an electric substation located east of the Site, which is not regularly occupied.

A Remedial Investigation Work Plan (RIWP) was prepared by D&B dated July 2015, which was approved by the NYSDEC. D&B completed the RI field activities in three phases



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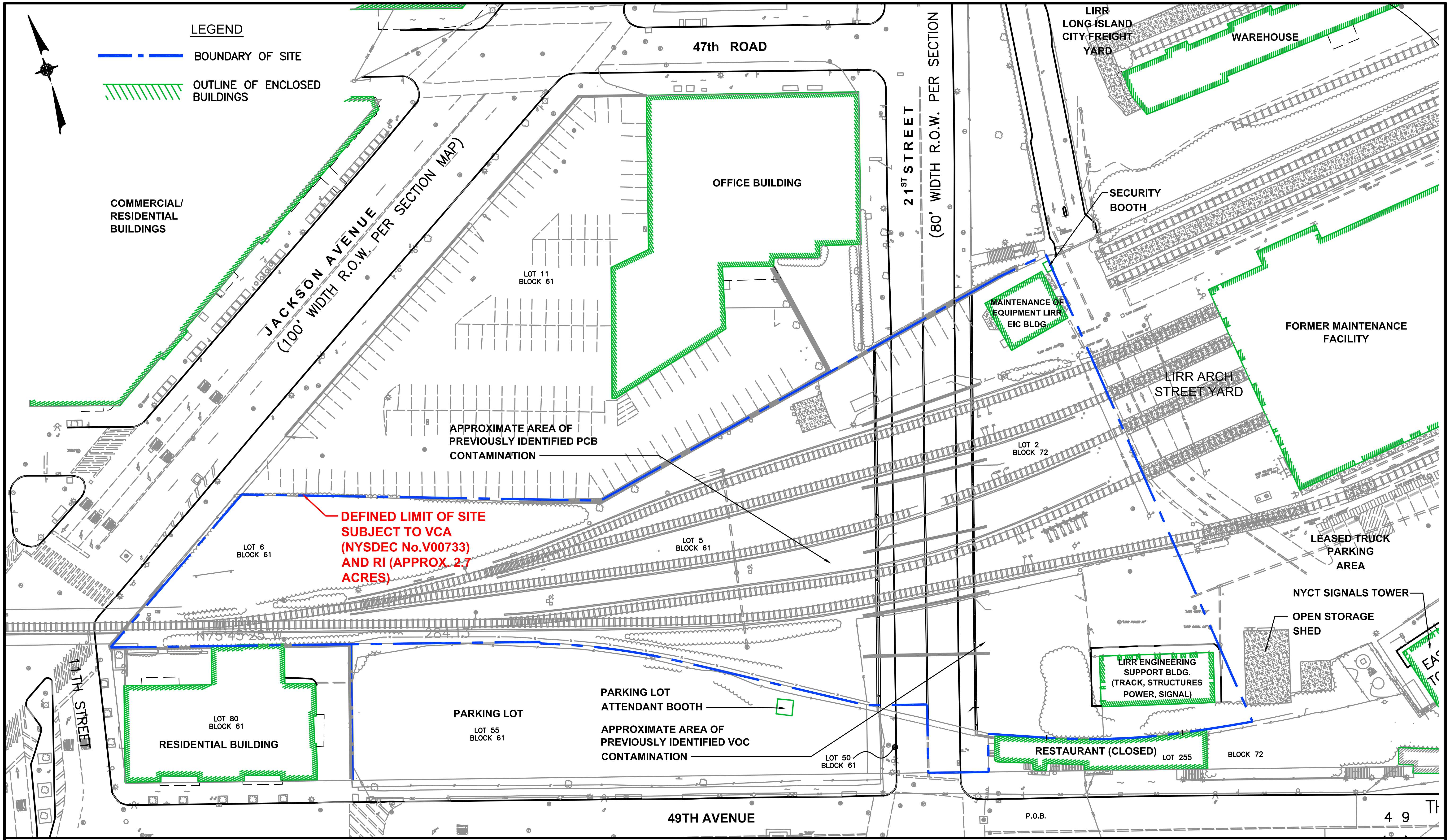
LIRR Arch Street Yard (NYSDEC VCA Site No. V00733)
Long Island City, Queens, New York
Remedial Investigation

SITE LOCATION MAP

FIGURE 1-1

3455-2F - Site Location Map.indd (09/12/16 - 9:26 AM)



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LONG ISLAND RAILROAD - ARCH STREET YARD
LONG ISLAND CITY, NY - REMEDIAL INVESTIGATION

SITE PLAN SHOWING DEFINED BOUNDARIES OF PROJECT SITE

SCALE: 1"=60'

FIGURE 1-2

F:\3455\MTA\Dwg\FIGURES\3455-FIG-1-09-12-16.dwg, 9/23/2016 9:41:01 AM, Adobe PDF.pc3 between October 2015 and August 2016, in accordance with the NYSDEC-approved RIWP and subsequent work plan modifications. The first phase of the RI was a Membrane Interface Probe (MIP) study completed in October 2015, summarized in a letter report to the NYSDEC dated December 2, 2015. The December 2, 2015 letter report outlined a proposed scope of work for the second phase of the RI that was approved by the NYSDEC in a February 11, 2016 letter. The letter report and NYSDEC approval letter are provided in **Appendix A** to this RI Report.

The second phase of the RI was a subsurface soil and groundwater investigation completed in March through May 2016, summarized in a letter report to the NYSDEC dated August 5, 2016. The August 5, 2016 letter report outlined a proposed scope of work for the third and final phase of the RI, a soil vapor/indoor air investigation, that was approved by the NYSDEC in an August 8, 2016 letter. This second letter report and NYSDEC approval letter are also provided in **Appendix A** to this RI Report. The soil vapor/indoor air investigation was completed in August 2016.

This RI Report was first submitted to the NYSDEC in October 2016. After review, the NYSDEC requested that the LIRR collect heating season air samples. D&B collected the samples in February 2017 and this RI Report has been revised accordingly.

This RI Report has been completed in accordance with NYSDEC Program Policy - DER-10/Technical Guidance for Site Investigation and Remediation and presents a comprehensive summary and analysis of the data generated during all phases of the RI. Specifically, this report includes:

- Section 1 (Introduction) includes a site overview, history and previous investigation results;
- Section 2 (Remedial Investigation Scope of Work) describes the completed RI field activities and any deviations from the planned scope of work;

- Section 3 (Remedial Investigation Findings) presents the findings of the RI field activities, including a description of site-specific geology and hydrogeology, and the analytical results of all collected samples; and
- Section 4 (Conclusions and Recommendations) presents conclusions and recommendations for future investigations and/or remediation, based on the findings of the RI.

1.2 Site Description and Adjoining Property

The LIRR Arch Street Yard (the Yard) is located south of Jackson Avenue, under the 21st Street Bridge at 49th Avenue, in Long Island City, Queens, New York. The Yard is currently owned by the LIRR. As stated in Section 1.0, the Yard is approximately eight acres in total area; however, the Site being investigated under the VCP (designated NYSDEC Site No. V00733) is an approximately 2.7 acre portion of the Yard. A plan depicting the Yard, surrounding areas and the defined boundaries of the Site is provided as **Figure 1-2**. The Yard has historically been utilized as a railroad yard where maintenance was performed on passenger rail cars, however, these activities ceased in December 2009. In September 2016, the Maintenance Facility building located east of the Site was leased to MNR and Bombardier to install Positive Train Control in their trains.

As depicted on **Figure 1-2**, buildings currently located on the Site include a Maintenance of Equipment building on the northern end of the Site near the entrance to the Yard, and an Engineering Support Building on the southern end of the Site. These buildings are utilized for storage and are not occupied on a regular basis. The northern building on-site was leased to MNR and Bombardier as part of the September 2016 agreement. A security booth is also located on the northern end of the Site, which is occupied during regular business hours. In addition, several sets of train tracks traverse the Site and under the 21st Street Bridge. These tracks are not currently active, and since the closing of the maintenance facility in 2009, no activities have occurred at the Site.

East of the Site and the Engineering Support Building, are a series of buildings located within the Yard including (from west to east): an open storage shed, a New York City Transit (NYCT) Signals Tower, an electric substation owned by LIRR and Con Edison, and a LIRR electric substation. Second floor office space within the Signals Tower is regularly occupied by NYCT employees during business hours. The remaining buildings are not regularly occupied. Note that a portion of the Yard adjacent to the southern side of the Maintenance Facility building was previously leased to the "Fresh Direct" trucking company from August 2012 through August 2015, which had occasionally washed the cargo areas of their trucks with washing fluid/disinfectant. When this issue was brought to the LIRR's attention by NYSDEC personnel, LIRR alerted MTA Real Estate to advise Fresh Direct to cease and desist with washing their trucks with a disinfectant over our storm drains in the parking lot.

The Yard is zoned for industrial use and the surrounding properties use is a combination of commercial, light industrial, professional office space, residential, and utility right of ways. The neighborhood includes warehouses, automotive repair shops, taxi garages, apartment buildings, and gasoline stations in the vicinity of the Yard. In addition, a below grade subway tunnel (G line) runs beneath Jackson Avenue immediately north of the Yard, approximately 15 feet below grade, and beneath 49th Avenue immediately south of the Yard (7 line).

1.3 Site History

The Yard has historically been used as a railroad maintenance yard and is currently owned by the LIRR. In December 2003, a LIRR contractor discovered contaminated soil while excavating a utility trench under the 21st Street Bridge at the Yard. The NYSDEC was notified and NYSDEC Spill No. 0310802 was opened. In April 2004, the LIRR's East Side Access Department (ESA) performed an environmental investigation of the impacted area in an attempt to delineate the extent of the contamination. Based on the results of this investigation, it was determined that the majority of the impacted surface/shallow subsurface soil had been excavated and removed during the utility trenching. Note there are no records available concerning the details of the utility trenching such as the quantities of soil excavated or the limits of excavation. However, additional follow up investigations were completed in the vicinity of the excavation.

In 2005, ESA installed four groundwater monitoring wells, which were sampled three to four times per year during the time period from 2005 through 2009. In 2009, ESA advanced seven groundwater probes throughout the impacted area, in order to further define the extent of the contamination. Based on the investigation findings, it was determined that further horizontal and vertical delineation of groundwater contamination was required. In September 2011, the LIRR requested to add the 2.7-acre parcel of the Yard (i.e., the Site) to an existing Voluntary Cleanup Agreement with the MTA LIRR. The NYSDEC approved the addition of the Site to the existing VCA Index Nos. W1-0993-04-04 and W2-0994-04-04. Under this VCA, the Site as shown on **Figure 1-2** was designated as NYSDEC Site No. V00733. A summary of previous investigations is presented below in Section 1.4.

1.4 Previous Investigations

The LIRR provided D&B with reports related to previous investigations of soil and groundwater contamination identified at the Site. A detailed summary of D&B's review of the historical reports was presented in the NYSDEC-approved RIWP dated July 2015. As described in the RIWP, the following environmental investigations were previously completed:

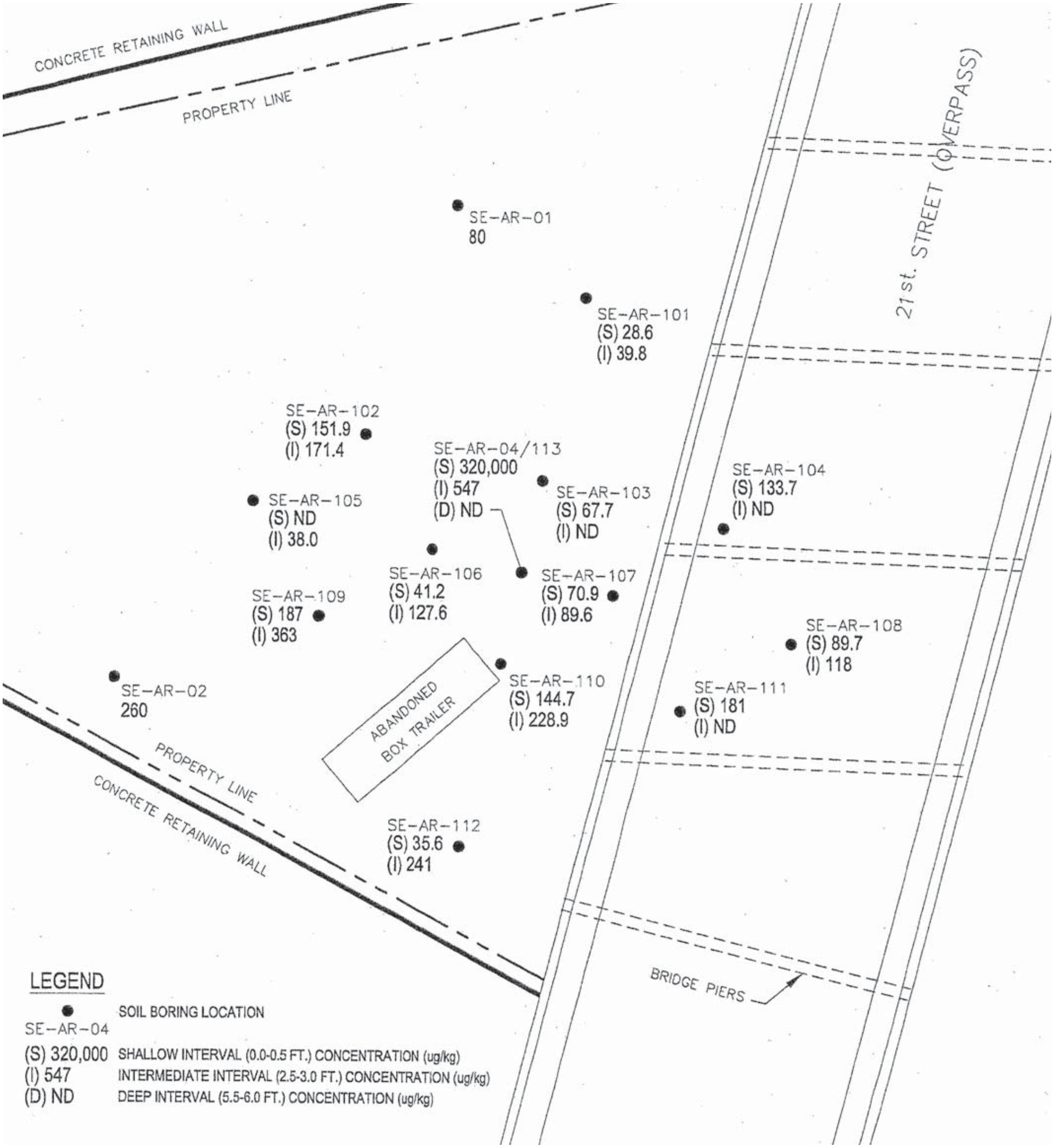
- Initial Environmental Site Investigation – 2000
- Supplemental Environmental Site Investigation – 2001
- Groundwater Monitoring – 2005-2009
- Spill Investigation – 2009

A brief summary of the relevant findings of D&B's review of the available historical reports is provided below. Historical soil data is compared to the Soil Cleanup Objectives (SCOs) for Restricted-Residential and Industrial Use as defined in NYSDEC 6 NYCRR Part 375. Historical groundwater data is compared to Class GA groundwater standards and guidance values (herein referred to as Class GA standards).

Soil

As part of the overall east side access construction project, an initial Environmental Site Investigation (ESI) was completed in October 2000 within the defined Site that detected elevated levels of polychlorinated biphenyls (PCBs) and pesticides in soil. The supplemental ESI included the collection of 26 soil samples from 13 soil borings (SE-AR-101 through SE-AR-113) for analysis of PCBs and pesticides to delineate the extent of the contamination and to provide an estimate of the volume of contaminated soil that would need to be removed for off-site disposal. **Figure 1-3** depicts the approximate locations of the borings, as well as detected PCB concentrations during the ESI. Soil samples were collected for analysis at a depth of 0 to 0.5 feet below ground surface (bgs) and at 2.5 to 3.0 feet bgs at 12 soil borings (SE-AR-101 through SE-AR-112). In addition, two soil samples were collected from soil boring SE-AR-113 at 2.5 to 3.0 feet bgs and at 5.5 to 6.0 feet bgs.

PCBs were detected in 21 of the 26 soil samples collected during the Supplemental ESI, ranging from 28.6 ug/kg to a maximum of 547 ug/kg at SE-AR-113 (2.5 to 3 feet), below the Restricted-Residential Use SCO of 1,000 ug/kg and the Industrial Use SCO of 25,000 ug/kg. Soil boring SE-AR-113 was completed in the location of soil boring SE-AR-04, where the maximum PCB concentration of 320,000 ug/kg was detected during the initial ESI at a depth of 0 to 0.5 feet. Pesticides were detected in 24 of the 26 soil samples collected as part of the supplemental ESI, although all were well below Restricted-Residential and Industrial Use SCOs.



LIRR Arch Street Yard (NYSDEC VCA Site No. V00733)
Long Island City, Queens, New York
Remedial Investigation

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PREVIOUS PCB SAMPLING RESULTS

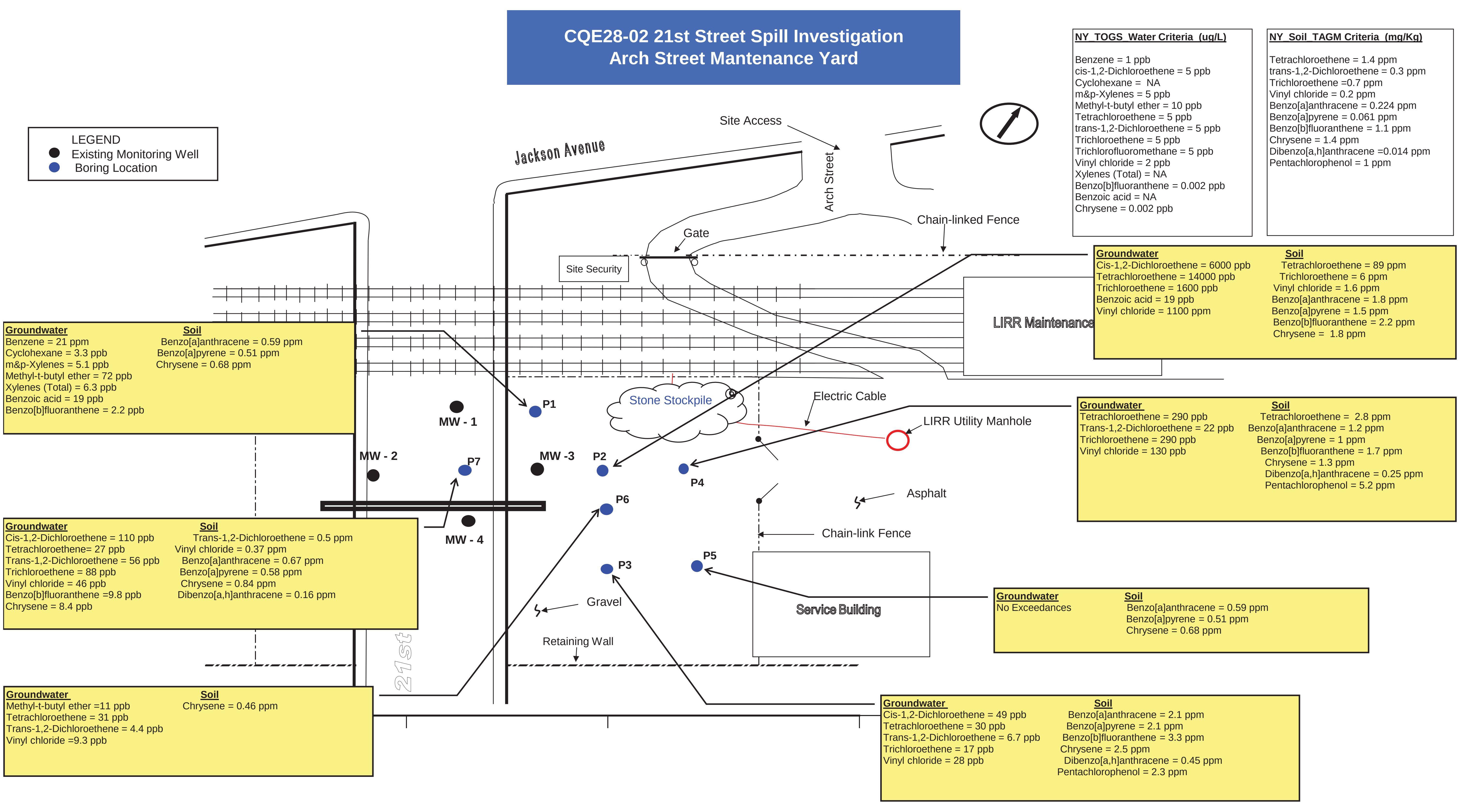
FIGURE 1-3

In February 2009, subsurface soil samples were collected at seven boring locations (P-1 to P-7) to the southeast of the area investigated during the ESI as part of a separate spill investigation. The approximate locations of these borings and a summary of the results are provided on **Figure 1-4**. The highest concentrations of chlorinated volatile organic compounds (VOCs) in subsurface soil were detected at boring P-2 and lower concentrations detected at borings P-3, P-4, and P-7. Tetrachloroethene (PCE) and vinyl chloride (VC) were detected at respective concentrations of 89 mg/kg and 1.6 mg/kg, above the respective Restricted-Residential Use SCOs of 19 mg/kg and 0.9 mg/kg, but below the Industrial Use SCOs. No other VOCs were detected at concentrations above Restricted-Residential or Industrial Use SCOs.

Polycyclic aromatic hydrocarbons (PAHs), a type of semivolatile organic compounds (SVOCs), were detected at concentrations exceeding Restricted-Residential Use SCOs in subsurface soil samples collected from borings P-2, P-3 and P-4. In addition, benzo(a)pyrene was detected at concentrations of 1.5 mg/kg and 2.1 mg/kg in the soil samples collected from borings P-2 and P-3, respectively, above the Industrial Use SCO of 1.1 mg/kg.

Groundwater

Four groundwater monitoring wells (MW-1 through MW-4) were installed in 2005 to the southeast of the area investigated during the ESI as part of a separate spill investigation. Based on the review of the available data, there were 15 sampling events conducted during the time period from March 24, 2005 through April 17, 2009. The approximate location of the wells is shown on **Figure 1-4**. PCE, trichloroethylene (TCE), cis-1,2-dichloroethene (1,2-DCE), trans-1,2-dichloroethene and VC were consistently detected at levels exceeding Class GA standards in samples collected from MW-3. The highest concentrations were PCE at 5,200 ug/l; TCE at 1,500 ug/l; 1,2-DCE at 17,000 ug/l; trans-1, 2-dichloroethene at 230 ug/l and VC at 4,200 ug/l. Groundwater samples collected from MW-2 also detected the


CQE28-02 21st Street Spill Investigation
Arch Street Mantenance Yard

LEGEND
● Existing Monitoring Well
● Boring Location

NY TOGS Water Criteria (ug/L)

Benzene = 1 ppb
cis-1,2-Dichloroethene = 5 ppb
Cyclohexane = NA
m&p-Xylenes = 5 ppb
Methyl-t-butyl ether = 10 ppb
Tetrachloroethene = 5 ppb
trans-1,2-Dichloroethene = 5 ppb
Trichloroethene = 5 ppb
Trichlorofluoromethane = 5 ppb
Vinyl chloride = 2 ppb
Xylenes (Total) = NA
Benzo[b]fluoranthene = 0.002 ppb
Benzoic acid = NA
Chrysene = 0.002 ppb

NY Soil TAGM Criteria (mg/Kg)

Tetrachloroethene = 1.4 ppm
trans-1,2-Dichloroethene = 0.3 ppm
Trichloroethene =0.7 ppm
Vinyl chloride = 0.2 ppm
Benzo[a]anthracene = 0.224 ppm
Benzo[a]pyrene = 0.061 ppm
Benzo[b]fluoranthene = 1.1 ppm
Chrysene = 1.4 ppm
Dibenzo[a,h]anthracene =0.014 ppm
Pentachlorophenol = 1 ppm

Groundwater	**Soil**
Cis-1,2-Dichloroethene = 6000 ppb	Tetrachloroethene = 89 ppm
Tetrachloroethene = 14000 ppb	Trichloroethene = 6 ppm
Trichloroethene = 1600 ppb	Vinyl chloride = 1.6 ppm
Benzoic acid = 19 ppb	Benzo[a]anthracene = 1.8 ppm
Vinyl chloride = 1100 ppm	Benzo[a]pyrene = 1.5 ppm
	Benzo[b]fluoranthene = 2.2 ppm
	Chrysene = 1.8 ppm

Groundwater	**Soil**
Benzene = 21 ppm	Benzo[a]anthracene = 0.59 ppm
Cyclohexane = 3.3 ppb	Benzo[a]pyrene = 0.51 ppm
m&p-Xylenes = 5.1 ppb	Chrysene = 0.68 ppm
Methyl-t-butyl ether = 72 ppb	
Xylenes (Total) = 6.3 ppb	
Benzoic acid = 19 ppb	
Benzo[b]fluoranthene = 2.2 ppb	

Groundwater	**Soil**
Tetrachloroethene = 290 ppb	Tetrachloroethene = 2.8 ppm
Trans-1,2-Dichloroethene = 22 ppb	Benzo[a]anthracene = 1.2 ppm
Trichloroethene = 290 ppb	Benzo[a]pyrene = 1 ppm
Vinyl chloride = 130 ppb	Benzo[b]fluoranthene = 1.7 ppm
	Chrysene = 1.3 ppm
	Dibenzo[a,h]anthracene = 0.25 ppm
	Pentachlorophenol = 5.2 ppm

Groundwater	**Soil**
Cis-1,2-Dichloroethene = 110 ppb	Trans-1,2-Dichloroethene = 0.5 ppm
Tetrachloroethene= 27 ppb	Vinyl chloride = 0.37 ppm
Trans-1,2-Dichloroethene = 56 ppb	Benzo[a]anthracene = 0.67 ppm
Trichloroethene = 88 ppb	Benzo[a]pyrene = 0.58 ppm
Vinyl chloride = 46 ppb	Chrysene = 0.84 ppm
Benzo[b]fluoranthene =9.8 ppb	Dibenzo[a,h]anthracene = 0.16 ppm
Chrysene = 8.4 ppb	

Groundwater	**Soil**
No Exceedances	Benzo[a]anthracene = 0.59 ppm
	Benzo[a]pyrene = 0.51 ppm
	Chrysene = 0.68 ppm

Groundwater	**Soil**
Methyl-t-butyl ether =11 ppb	Chrysene = 0.46 ppm
Tetrachloroethene = 31 ppb	
Trans-1,2-Dichloroethene = 4.4 ppb	
Vinyl chloride =9.3 ppb	

Groundwater	**Soil**
Cis-1,2-Dichloroethene = 49 ppb	Benzo[a]anthracene = 2.1 ppm
Tetrachloroethene = 30 ppb	Benzo[a]pyrene = 2.1 ppm
Trans-1,2-Dichloroethene = 6.7 ppb	Benzo[b]fluoranthene = 3.3 ppm
Trichloroethene = 17 ppb	Chrysene = 2.5 ppm
Vinyl chloride = 28 ppb	Dibenzo[a,h]anthracene = 0.45 ppm
	Pentachlorophenol = 2.3 ppm

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LIRR Arch Street Yard (NYSDEC VCA Site No. V00733)
Long Island City, Queens, New York
Remedial Investigation

DETECTED CONTAMINANTS IN PREVIOUS GROUNDWATER AND SOIL SAMPLES

Source: LIRR

FIGURE 1-4

same VOCs exceeding Class GA standards, but at lower concentrations including PCE at 16 ug/l; TCE at 20 ug/l; 1,2-DCE at 28 ug/l; trans-1,2-dichloroethene at 5.6 ug/l and VC at 14 ug/l. The results of the analysis of groundwater samples collected from MW-1 and MW-4 detected elevated levels of PAHs and methyl-tert-butyl ether (MTBE).

In February 2009, groundwater samples were also collected at seven boring locations (P-1 to P-7) as part of the spill investigation in the same area as the monitoring wells. The approximate locations of these borings and a summary of the results are also provided on Figure 1-4. The highest concentrations of chlorinated VOCs in groundwater were detected at boring P-2 which is located to the east of MW-3. Concentrations in P-2 exceeding Class GA standards included: PCE at 14,000 ug/l; TCE at 1,600 ug/l, 1,2-DCE at 6,000 ug/l; and VC at 1,100 ug/l. These VOCs were also detected at lower concentrations at borings P-3, P-4, P-6 and P-7. Other exceedances of Class GA standards included MTBE at borings P-1 and P-6, and benzene, cyclohexane and xylenes at boring P-1.

1.5 Project Objectives

The primary objectives of the Remedial Investigation are consistent with DER-10 and include:

- Fully investigate and characterize the nature and extent of soil, groundwater and soil gas contamination associated with previously documented VOCs;
- Fully investigate and characterize the nature and extent of soil contamination associated with previously documented PCBs;
- Characterize soil and groundwater contamination related to other contaminants, including SVOCs, metals, etc.;
- Characterize site hydrogeology, especially regarding groundwater flow and how conditions influence contaminant migration;
- Identify migration pathways and potential human and ecological receptors, and collect data sufficient to complete the qualitative exposure assessment;

- Determine the need for supplemental data that may be necessary to adequately delineate the extent of contamination; and
- Collect enough field data in order to select appropriate remedial actions to remediate impacted soil, groundwater and/or soil gas, if warranted.

2.0 REMEDIAL INVESTIGATION SCOPE OF WORK

This section provides an overview of the field activities associated with the Remedial Investigation of an approximately 2.7 acre portion of the LIRR Arch Street Yard, designated as NYSDEC Site No. V00733 and referred to as "the Site". The RI field activities were completed at the Site in three phases between October 2015 and August 2016, as detailed below. In addition, heating season air samples were collected in February 2017 at the request of NYSDEC. The RI was completed in accordance with the NYSDEC-approved July 2015 Remedial Investigation Work Plan and subsequent work plan modifications. In order to meet the objectives stated in Section 1.5, the following activities were performed:

Phasing Schedule of Completed Remedial Investigation

Remedial Investigation Phase	Work Performed	Date(s) Completed	Date of Letter Report/Work Plan Modification to NYSDEC
First Phase	Membrane Interface Probe (MIP) Study	October 2015	December 2, 2015
Second Phase	Deep Soil Boring Installation and Subsurface Soil Sampling	March 2016	August 5, 2016
	Monitoring Well Installation, Development and Sampling	April 2016	
	Shallow PCB Soil Boring Installation and Subsurface Soil Sampling	March 2016	
	Tidal Investigation and Collection of Synoptic Water Levels	May 2016	
Third Phase	Soil Vapor Sampling/Indoor Air Sampling	August 2016 and February 2017	--

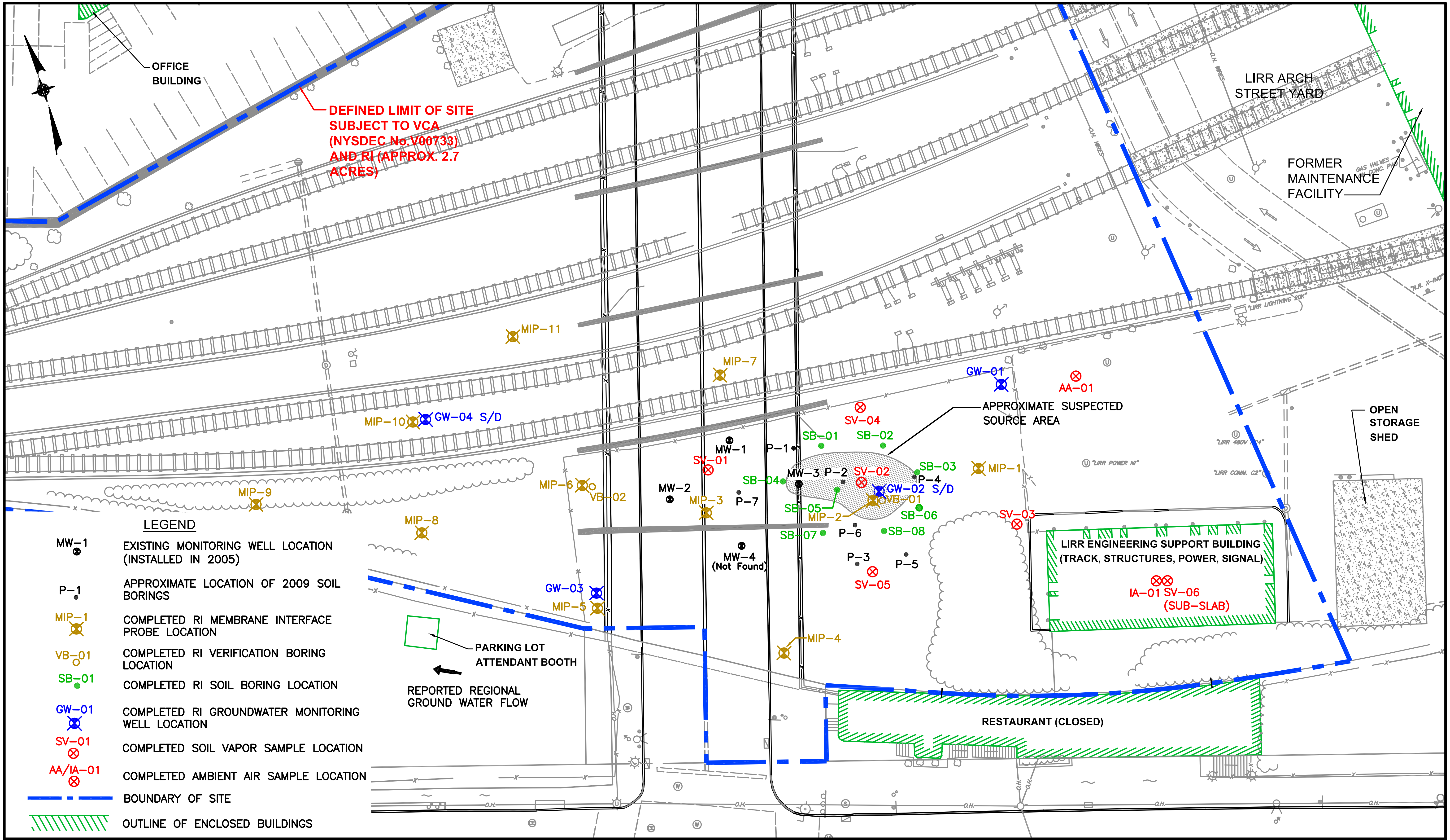
In addition to the activities listed above, underground utility clearance activities, geophysical surveys, air monitoring and a site survey were performed as needed throughout the Remedial Investigation.

The RI was completed in phases in order to select sample locations based on the findings of the previous phase. Based on the findings of the MIP study, which was the first phase of the RI, D&B selected the location of the deep soil borings and the location and screen setting of the monitoring wells for review and approval by the NYSDEC. Similarly, the findings of the soil and groundwater sampling activities, which was the second phase of the RI, were utilized to select air sampling locations for the third phase of the RI.

Completed sample location maps are provided as **Figure 2-1** and **Figure 2-2**. **Figure 2-1** depicts all existing and newly installed sample locations, with the exception of the shallow PCB soil borings, which are depicted on **Figure 2-2**. The location of all newly installed MIPs, soil borings and monitoring wells, as well as existing monitoring wells were surveyed by a New York State-licensed surveyor. **Table 2-1** provides a summary of sample depths and analyses, sample point objectives, field observations and field modifications to the NYSDEC approved scope of work. Due to the presence of underground utilities or other field conditions, modifications to the scope of work were necessary, including the relocation of some sample locations.

2.1 Underground Utility Clearance

Prior to undertaking any intrusive activities, utility clearance procedures were conducted. A Code 753 utility markout was completed as per the 16 New York Codes, Rules and Regulations (NYCRR) Part 753. Consistent with the One-Call (also called Dig Safe New York) criteria, a request was made at least 72 hours prior to initiating fieldwork. Per Code 753 requirements, confirmation that the utilities were marked out was documented in the



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LONG ISLAND RAILROAD - ARCH STREET YARD
LONG ISLAND CITY, NY - REMEDIAL INVESTIGATION

SAMPLE LOCATION MAP

SCALE: 1"=30'

FIGURE 2-1

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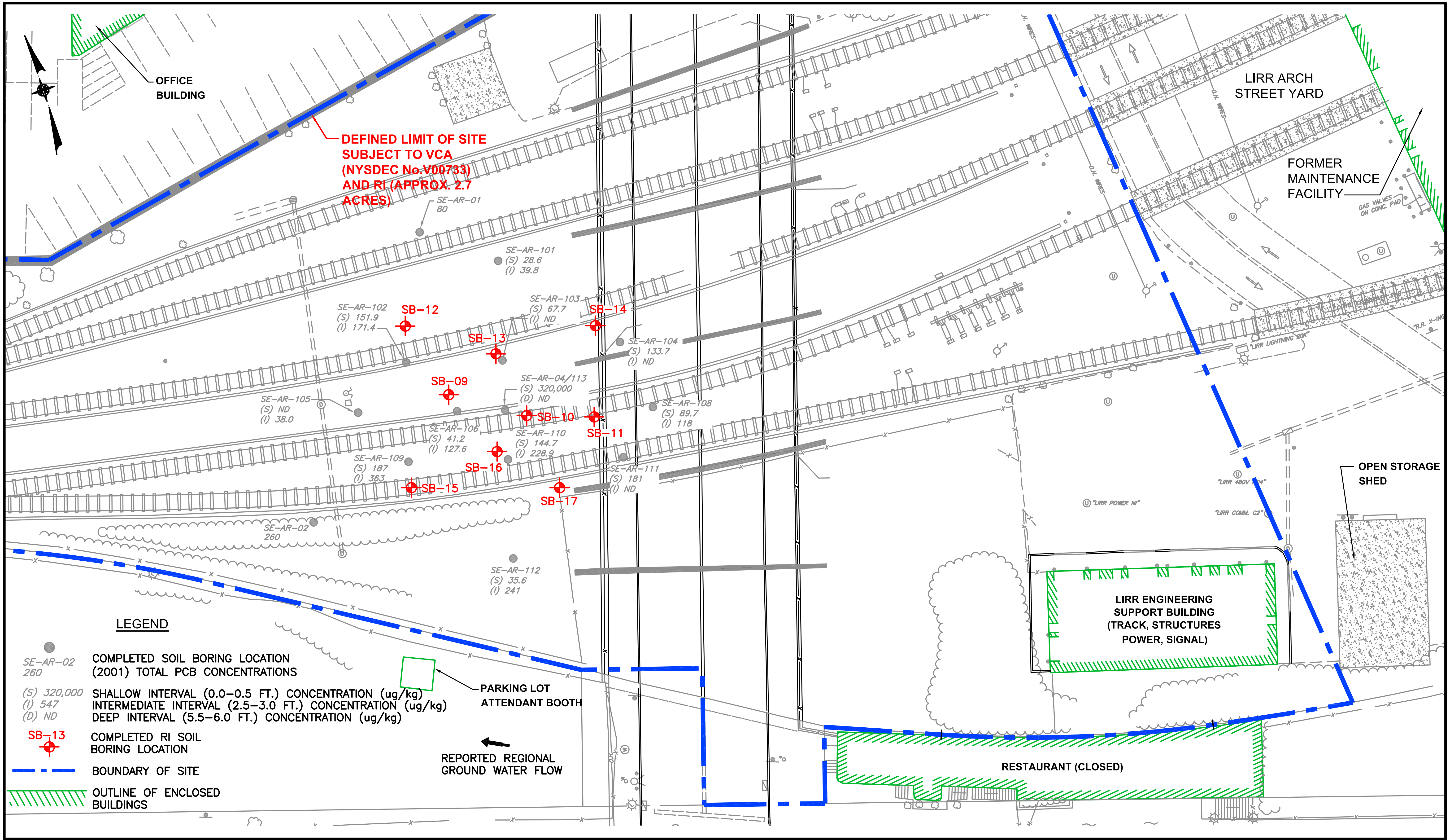

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LONG ISLAND RAILROAD - ARCH STREET YARD
LONG ISLAND CITY, NY - REMEDIAL INVESTIGATION

SAMPLE LOCATION MAP FOR PCB INVESTIGATION

SCALE: 1"=30'

FIGURE 2-2

F:\3455\MTA\Dwg\FIGURES\3455-FIG-2-05-12-16_lp.dwg, 9/22/2016 3:26:02 PM, Adobe PDF.pc3

TABLE 2-1

Long Island Rail Road
Arch Street Yard (Site No. V00733)
Remedial Investigation

REMEDIAL INVESTIGATION SCOPE SUMMARY

Investigation Method/Media	Sample Point ID	Completion Depth Below Grade (feet)	No. of Samples Selected for Analysis	Sample Depth Below Grade (feet)	Analysis [1]					Installation/ Sample Date	Comments/Deviations from Work Plan	Sample Point Objectives
					TCL VOCs	TCL SVOCs	PCBs	TCL Pesticides	TAL Metals			
Remedial Investigation - First Phase (Completed)												
Verification Borings/ Subsurface Soil	VB-01	27	1	13-15	X	--	--	--	--	10/30/2015	Refusal encountered at 27 feet below grade.	Collect soil samples to verify the results of the MIP study.
	VB-02	26.5	1	12-14	X	--	--	--	--	10/30/2015	Refusal encountered at 26.5 feet below grade.	
Verification Borings/ Groundwater	VB-01	27	2	15-16, 26-27	X	--	--	--	--	10/30/2015	Refusal encountered at 27 feet below grade.	Collect groundwater samples to verify the results of the MIP study.
	VB-02	26.5	2	5, 12-14	X	--	--	--	--	10/30/2015	Refusal encountered at 26.5 feet below grade.	
Remedial Investigation - Second Phase (Completed)												
Deep Soil Borings/ Subsurface Soil	SB-01	25	2	13-15, 23-25	X	X	--	--	--	3/16/2016	--	Characterize soil and collect soil samples to define the limits of the contaminated area, with the primary contaminants of concern being VOCs.
	SB-02	25	2	13-15, 23-25	X	X	--	--	--	3/17/2016	--	
	SB-03	25	2	12-14	X	X	X	X	X	3/17/2016	Moved 4 feet south of planned location due to presence of underground utilities.	
				18-20	X	X	--	--	--			
	SB-04	29	3	3-5	X	X	X	X	X	3/16/2016	Refusal encountered at 29 feet below grade.	
				10-12, 27-29	X	X	--	--	--			
	SB-05	25	2	10-11	X	X	X	X	X	3/16/2016	Blind duplicate collected for sample at 10-11'.	
				11-13	X	X	--	--	--			
	SB-06	25	2	8-10	X	X	X	X	X	3/17/2016	--	
				11-13	X	X	--	--	--			
	SB-07	25	2	12-14	X	X	X	X	X	3/18/2016	--	
				23-25	X	X	--	--	--			
	SB-08	25	3	4-6, 6-8, 13-15	X	X	--	--	--	3/17/2016	--	

TABLE 2-1

Long Island Rail Road
Arch Street Yard (Site No. V00733)
Remedial Investigation

REMEDIAL INVESTIGATION SCOPE SUMMARY

Investigation Method/Media	Sample Point ID	Completion Depth Below Grade (feet)	No. of Samples Selected for Analysis	Sample Depth Below Grade (feet)	Analysis [1]					Installation/ Sample Date	Comments/Deviations from Work Plan	Sample Point Objectives
					TCL VOCs	TCL SVOCs	PCBs	TCL Pesticides	TAL Metals			
Remedial Investigation - Second Phase (Completed)												
Shallow PCB Soil Borings/ Subsurface Soil	SB-09	8	4	0-1, 2-3 4-5, 7-8	--	--	X	--	--	3/18/2016	Top of boring below 24" of bluestone. Moved 5 feet north of planned location due to presence of underground utilities.	Characterize soil and collect soil samples for PCB analysis to define the limits of shallow soil PCB contamination, identified in 2000.
	SB-10	8	4	0-1, 2-3 4-5, 7-8	--	--	X	--	--	3/18/2016	Top of boring below 18" of bluestone. Blind duplicate collected for sample at 4-5'. Moved southeast of planned location due to presence of third rail.	
	SB-11	8	4	0-1, 2-3 4-5, 7-8	--	--	X	--	--	3/18/2016	Top of boring below 24" of bluestone.	
	SB-12	6	3	0-1, 2-3 5-6	--	--	X	--	--	3/21/2016	Top of boring below 3" of bluestone. Moved 4 feet west of planned location due to presence of underground utilities.	
	SB-13	6	3	0-1, 2-3 5-6	--	--	X	--	--	3/21/2016	Top of boring below 24" of bluestone. Blind duplicate collected for sample at 5-6'.	
	SB-14	6	3	0-1, 2-3 5-6	--	--	X	--	--	3/21/2016	Top of boring below 24" of bluestone.	
	SB-15	6	3	0-1, 2-3 5-6	--	--	X	--	--	3/18/2016	Top of boring below 24" of bluestone. Moved north of planned location due to presence of third rail.	
	SB-16	6	3	0-1, 2-3 5-6	--	--	X	--	--	3/18/2016	Top of boring below 12" of bluestone. Moved 5 feet north of planned location due to presence of underground utilities.	
	SB-17	6	3	0-1, 2-3 5-6	--	--	X	--	--	3/18/2016	Top of boring below 12" of bluestone. Moved 8 feet west of planned location due to equipment access constraints.	

TABLE 2-1

Long Island Rail Road
Arch Street Yard (Site No. V00733)
Remedial Investigation

REMEDIAL INVESTIGATION SCOPE SUMMARY

Investigation Method/Media	Sample Point ID	Completion Depth Below Grade (feet)	No. of Samples Selected for Analysis	Sample Depth Below Grade (feet)	Analysis [1]					Installation/ Sample Date	Comments/Deviations from Work Plan	Sample Point Objectives
					TCL VOCs	TCL SVOCs	PCBs	TCL Pesticides	TAL Metals			
Remedial Investigation - Second Phase (Completed)												
Groundwater Monitoring Well Borings/ Subsurface Soil	GW-01 (upgradient)	20	3	4-5, 18-20	X	X	--	--	--	3/21/2016	--	Determine background concentrations of contaminants of concern.
				13-15	X	X	X	X	X			
	GW-02	--	--	--	--	--	--	--	--	--	Soil samples not collected since soil boring VB-01 was previously completed in the vicinity of this location.	Determine the presence and extent of soil contamination.
	GW-03	20	3	3-4, 18-20	X	X	--	--	--	3/21/2016	--	
				12-14	X	X	X	X	X			
	GW-04	19	3	2-3, 16-18	X	X	--	--	--	3/23/2016	Top of boring below 24" of bluestone. Refusal encountered at depth of 19 feet. Blind duplicate collected for sample at 12-14'.	
				12-14	X	X	X	X	X			
Newly Installed Groundwater Monitoring Wells/ Groundwater	GW-01 (upgradient)	20	1	Screen interval 10-20	X	X	--	--	--	Sampled 4/7/2016	Installed on 3/22/2016 Developed on 3/24/2016	Determine the presence or absence of contaminants of concern within upgradient groundwater. Confirm groundwater flow direction and the influence of the East River and Newtown Creek.
	GW-02S	7	1	Screen interval 2-7	X	X	--	--	--	Sampled 4/7/2016	Installed on 3/22/2016 Developed on 3/25/2016	Determine the presence and extent of downgradient groundwater contamination. Confirm groundwater flow direction and the influence of the East River and Newtown Creek.
	GW-02D	20	1	Screen interval 10-20	X	X	X	X	X	Sampled 4/7/2016	Installed on 3/22/2016 Developed on 3/24/2016	
	GW-03	19	1	Screen interval 9-19	X	X	--	--	--	Sampled 4/7/2016	Installed on 3/21/2016 Developed on 3/24/2016	
	GW-04S	8	1	Screen interval 3-8	X	X	--	--	--	Sampled 4/7/2016	Installed on 3/23/2016 Developed on 3/25/2016	
	GW-04D	18	1	Screen interval 8-18	X	X	--	--	--	Sampled 4/7/2016	Installed on 3/23/2016 Developed on 3/25/2016	
Existing Groundwater Monitoring Wells/ Groundwater	MW-1	N/A	1	Well depth 12.60	X	X	--	--	--	Sampled 4/7/2016	Developed on 3/24/2016. Blind duplicate collected.	Determine the presence and extent of downgradient groundwater contamination. Confirm groundwater flow direction and the influence of the East River and Newtown Creek.
	MW-2	N/A	1	Well depth 6.85	X	X	--	--	--	Sampled 4/7/2016	Developed on 3/25/2016	
	MW-3	N/A	1	Well depth 12.75	X	X	X	X	X	Sampled 4/7/2016	Developed on 3/24/2016	

TABLE 2-1

Long Island Rail Road
Arch Street Yard (Site No. V00733)
Remedial Investigation

REMEDIAL INVESTIGATION SCOPE SUMMARY

Investigation Method/Media	Sample Point ID	Completion Depth Below Grade (feet)	No. of Samples Selected for Analysis	Sample Depth Below Grade (feet)	Analysis [1]					Installation/ Sample Date	Comments/Deviations from Work Plan	Sample Point Objectives
					TCL VOCs	TCL SVOCs	PCBs	TCL Pesticides	TAL Metals			
Remedial Investigation - Third Phase (Completed)												
Soil Vapor Probes and Indoor/ Ambient Air	SV-01	2.7	1	Screen interval 2.2-2.7	X	--	--	--	--	8/17/2016	Outside soil vapor probe.	Determine if soil vapor intrusion is a potential exposure pathway.
	SV-02	4.4	1	Screen interval 3.9-4.4	X	--	--	--	--	8/17/2016	Outside soil vapor probe. Completed within area of soil and groundwater chlorinated VOC contamination.	
	SV-03	4.8	1	Screen interval 4.3-4.8	X	--	--	--	--	8/17/2016	Outside soil vapor probe.	
	SV-04	4.4	1	Screen interval 3.9-4.4	X	--	--	--	--	8/17/2016	Outside soil vapor probe.	
	SV-05	4.5	1	Screen interval 4-4.5	X	--	--	--	--	8/17/2016	Outside soil vapor probe.	
	SV-06	Below Building Slab	1	Below Building Slab	X	--	--	--	--	8/17/2016	Sub-slab soil vapor sample collected in office area of LIRR Engineering Support Building.	
	SV-06(R)	Below Building Slab	1	Below Building Slab	X	--	--	--	--	2/22/2017	Recollected during the heating season at the request of NYSDEC.	
	IA-01	N/A	1	N/A	X	--	--	--	--	8/17/2016	Collected in office area of LIRR Engineering Support Building.	
	IA-01(R)	N/A	1	N/A	X	--	--	--	--	2/22/2017	Recollected during the heating season at the request of NYSDEC.	
	AA-01	N/A	1	N/A	X	--	--	--	--	8/17/2016	Outdoor ambient air sample collected upwind of soil vapor/indoor air sampling area.	
	AA-01(R)	N/A	1	N/A	X	--	--	--	--	2/22/2017	Recollected during the heating season at the request of NYSDEC.	

Notes:

X: Sample selected for analysis.
--: Sample not selected for analysis.
N/A: Not available

[1] As per Work Plan, approximately 20% of the soil and groundwater samples collected from the soil borings and groundwater monitoring wells were analyzed for TAL metals, PCBs and pesticides in addition to VOC and SVOCs, biased toward visually impacted samples. Analytical methods were as follows
Target Compound List (TCL) Volatile Organic Compounds (VOCs) by EPA Methods 5035 and 8260 for soil samples, EPA Method 8260 for groundwater samples and EPA Method TO-15 for air samples.
TCL Semivolatile Organic Compounds (SVOCs) by EPA Method 8270.
Polychlorinated Biphenyls (PCBs) by EPA Method 8082.
TCL Pesticides by EPA Method 8081.
Target Analyte List (TAL) metals by EPA Method 6010.

project file. All hard copy confirmations were available in the field during all intrusive operations. Note that these markouts were limited to the sidewalk and public right-of-ways. The LIRR marked out all known or suspected underground utilities within LIRR property prior to D&B undertaking any intrusive work. In addition, D&B's geophysical contractor, Advanced Geological Services, Inc. (AGS), attempted to verify and mark all underground utilities in the vicinity of all proposed drilling locations prior to undertaking any intrusive work. Details regarding geophysical surveys are provided below in Section 2.2.

Following completion of the utility clearance described above, all boring/well locations were excavated to a maximum depth of 5 feet, and to the water table at a minimum, using hand tools to further ensure a utility was not located in the area to be drilled.

2.2 Geophysical Surveys

Prior to undertaking any intrusive activities, a 1-day geophysical survey was performed on October 6, 2015 by AGS in an attempt to verify and mark the location of any underground utilities present in the vicinity of all drilling locations. As part of this task, AGS utilized terrain conductivity and electromagnetic methods, along with ground penetrating radar (GPR). AGS marked the approximate limits of any underground utilities in the field. Note that the geophysical survey was limited in its ability to identify unknown utilities in the vicinity of the track areas of the Site given interference from the steel tracks. As stated above in Section 2.1, the LIRR also marked out all known or suspected underground utilities within their property.

2.3 Membrane Interface Probe (MIP) Study

A MIP study was completed as the first phase of the RI in order to define the current limits of VOC contamination in the Site and help optimize the selection of soil boring and permanent groundwater monitoring well locations. MIP technology can detect the presence and relative concentration of chlorinated and non-chlorinated VOCs in both soil and groundwater by advancing instruments including: photoionization detector (PID); flame-ionization detector (FID); and a halogen specific detector (XSD). These detectors provide an overall screening level "snapshot" of total organic chemical constituent concentrations (in microvolts[uV]) present in the subsurface as the probe is advanced. The PID is used for the detection of aromatic VOCs (such as benzene), the FID is used for the detection of straight-chain alkanes (such as methane), and the XSD is utilized for the detection of halogenated organics including chlorinated VOCs. A soil conductivity (SC) detector also provides real-time soil conductivity data in millisiemens/meter as the probe is advanced into the subsurface.

As shown on **Figure 2-1**, a total of 11 MIP locations (MIP-1 through MIP-11) were completed within the Site and in the vicinity of the area where VOC contamination was documented during the previous investigations discussed in Section 1.4. The MIPs were advanced into the subsurface using standard Geoprobe equipment. The logs for the completed MIPs are provided in **Appendix B**. Each MIP location was completed until refusal, which was encountered at a depth between 20 and 30 feet below grade at all locations except MIP-11 where refusal was encountered at a depth of 15 feet below grade. Groundwater was observed at a depth of approximately 3 to 5 feet below grade. Based on the results of the MIPs, additional MIP locations were not determined to be necessary.

Two Geoprobe verification borings (VB-01 and VB-02) were completed at two MIP locations (MIP-2 and MIP-6, respectively), that were selected by D&B in order to collect subsurface soil and groundwater samples for analysis to verify the MIP results. Verification boring VB-01 was completed at the MIP-2 location to confirm the XSD/PID/FID detections at this location. Verification boring VB-02 was completed at the MIP-6 location to investigate the FID-only detections found at the remaining MIP locations. Boring logs are provided in **Appendix C**.

Soil borings were logged and subsurface soil samples were collected in accordance with the procedures detailed in Section 2.4 below. Groundwater samples were collected by driving probe rods to the designated sample depth and installing a temporary well point. A portable peristaltic pump with disposable tubing was used to purge and sample using United States Environmental Protection Agency (USEPA) low-flow sampling techniques, and new tubing was used between each interval. The purge water was monitored in the field for the following parameters utilizing a calibrated multiple parameter water quality instrument: pH, conductivity, turbidity, dissolved oxygen, temperature and oxidation-reduction potential. After stabilization, groundwater samples were collected for laboratory analysis. Additionally, any evidence of odors, sheens or the presence of free phase nonaqueous phase liquid (NAPL) was noted.

As summarized in **Table 2-1**, one subsurface soil sample and two groundwater samples were collected from each verification boring for laboratory analysis of Target Compound List (TCL) VOCs by USEPA Methods 5035 and 8260. Analytical results are summarized in **Appendix E** on Table E-1 for subsurface soil and Table E-6 for groundwater. The results of the MIP study are discussed in Section 3.2. Analytical and Quality Assurance/Quality Control (QA/QC) procedures are discussed in Section 2.14.

2.4 Deep Soil Boring Installation and Subsurface Soil Sampling

A total of eight deep soil borings (SB-01 through SB-08) were completed as part of the field investigation in order to define the limits of VOC contamination identified by the MIP study at MIP-2. The surveyed soil boring locations are depicted on **Figure 2-1** and the rationales are provided in **Table 2-1**. Soil borings were completed using direct push technology, i.e., Geoprobe, with soil samples collected continuously from ground surface to the boring termination depth of 25 feet below grade. However, soil boring SB-04 was completed until refusal at 29 feet below grade. Groundwater was observed at a depth of approximately 3 to 5 feet below grade.

The borings were advanced utilizing a decontaminated macro core soil sampler fitted with a disposable 5-foot acetate liner. During the advancement of each boring, each recovered soil sample was inspected and characterized by a geologist in accordance with the Unified Soil Classification System (USCS). The geologist also described any evidence of contamination, such as NAPL, staining, sheens or odors, and screened the sample for organic vapors using a PID. Boring logs are provided in **Appendix C**.

As summarized in **Table 2-1**, a total of 18 subsurface soil samples were collected for laboratory analysis from the eight deep soil borings. At a minimum, soil samples were collected for analysis from the most impacted zone based on visual/PID readings and the first visually clean zone beneath the impacted zone at each soil boring. Additional samples were collected as necessary to delineate any suspected contamination. Each soil sample was selected for analysis of TCL VOCs by USEPA Methods 5035 and 8260 (using the Encore sampling method), and TCL SVOCs by USEPA Method 8270. Five of the selected soil samples (greater than 20% of the total) were also analyzed for Target Analyte List (TAL) metals, PCBs and TCL pesticides by USEPA Methods 6010, 8082 and 8081, respectively, biased towards visually impacted samples. Subsurface soil analytical results are summarized in **Appendix E** on Tables E-1 through E-5. The results of the deep soil borings are discussed in Section 3.3.1. Analytical and QA/QC procedures are discussed in Section 2.14.

2.5 Monitoring Well Installation and Development

Two water table monitoring wells (GW-02S and GW-04S) and four deep monitoring wells (GW-01, GW-02D, GW-03 and GW-04D) were installed and developed in order to determine the presence and extent of groundwater contamination, and confirm groundwater flow direction and tidal influence. The surveyed monitoring well locations are depicted on **Figure 2-1**, and the rationales are provided in **Table 2-1**. Note that both a water table and a deep well were installed at the GW-02 and GW-04 locations, designated by a “S” and “D”, respectively. Based on the results of the MIP study, deep monitoring wells were installed below the water table in order to intercept the highest chlorinated VOC concentration observed during the MIP study at MIP-2/VB-01. The following sections describe the soil sampling completed during monitoring well installation, and detail the construction and development of the new wells.

2.5.1 Soil Sampling

Soil samples were collected at three of the four well locations (GW-01, GW-03 and GW-04) utilizing direct push sampling methods, i.e., Geoprobe. Subsurface soil samples were not collected at GW-02 since verification soil boring VB-01 was previously completed in the vicinity of GW-02. Soil samples were collected continuously from ground surface to a depth of 20 feet below grade. However, refusal was encountered at well location GW-04 at 19 feet below grade. Groundwater was observed at a depth of approximately 3 to 5 feet below grade.

The borings were advanced utilizing a decontaminated macro core soil sampler fitted with a disposable 5-foot acetate liner. Each recovered soil sample was inspected and characterized by a D&B geologist as described in Section 2.4. Boring logs are provided in Appendix C.

As summarized in Table 2-1, a total of nine subsurface soil samples were collected for laboratory analysis from the three well locations. Soil samples were collected for analysis from the most impacted zone based on visual/PID readings and the previously completed MIP study, and the first visually clean zone beneath the impacted zone at each location. Lastly, a soil sample at the groundwater interface or water table was selected for analysis. Each soil sample was selected for analysis of TCL VOCs by USEPA Methods 5035 and 8260 (using the Encore sampling method), and TCL SVOCs by USEPA Method 8270. Three of the selected soil samples (greater than 20% of the total) were also analyzed for TAL metals, PCBs and TCL pesticides by USEPA Methods 6010, 8082 and 8081, respectively, biased towards visually impacted samples. Subsurface soil analytical results are summarized in **Appendix E** on Tables E-1 through E-5, and the results are discussed in Section 3.3.1. Analytical and QA/QC procedures are discussed in Section 2.14.

2.5.2 Monitoring Well Construction

Groundwater monitoring wells were installed in unconsolidated sediment as 1-inch diameter pre-packed PVC wells by direct push technology, i.e., Geoprobe. Shallow wells GW-02S and GW-04S were installed with a 5-foot length of 1-inch diameter PVC pre-packed well screen to intercept the water table, observed at a depth of 3 to 5 feet below grade, and are between 7 and 8 feet deep. Deep wells GW-01, GW-02D, GW-03 and GW-04D were installed with 10 feet of screen below the water table and are between 18 and 20 feet deep.

Each well was installed by advancing 3.5-inch O.D. probe rods to the desired depth with a disposable drive point. After reaching the desired depth, the pre-assembled well screen and PVC riser pipe were installed inside the probe rods. After setting the well, the probe rods were retracted from the ground and a 1 to 2-foot layer of fine sand was placed above the pre-packed well screen prior to installing a 2-foot bentonite seal. To complete each well, a locking steel "stick-up" protective casing was grouted in place, except for the wells completed in track areas (GW-04S and GW-04D) which were completed with flush-mounted well covers. Monitoring well depths and screen intervals are summarized in **Table 2-1**. Monitoring well construction logs are provided in **Appendix D**.

2.5.3 Monitoring Well Development

Following installation, the newly installed monitoring wells were developed by the pump and surge method for up to 2 hours, or until the turbidity of the groundwater achieved a reading of 50 NTUs (nephelometric turbidity units) or less. However, a minimum of five well volumes of water were purged from each well. Well development was supplemented by measurements of additional field parameters, including pH, conductivity, dissolved oxygen, temperature and oxidation-reduction potential. In addition, existing wells MW-1, MW-2 and MW-3 were redeveloped. Existing well MW-4 could not be located and is presumed to be destroyed.

2.6 Monitoring Well Sampling

As summarized on **Table 2-1**, groundwater samples were collected from the three remaining existing wells (MW-1, MW-2 and MW-3), and the six newly installed wells (GW-01, GW-02S, GW-02D, GW-03, GW-04S and GW-04D) on April 7, 2016. Sampling of the newly installed wells was completed more than one week after well installation and development as specified in the RIWP.

Prior to sampling, the depth to groundwater and the presence of an immiscible floating NAPL layer (LNAPL) was measured in the wells using an electronic oil/water interface probe attached to a measuring tape accurate to 0.01 foot. The well was opened, and the head space was monitored with a PID. The probe was then carefully lowered into the well to check the depth of the water surface, as well as for the presence and thickness of an LNAPL layer. VOCs were not detected within the headspace of any of the newly installed or existing monitoring wells during the sampling process. In addition, LNAPL was not observed in any of the monitoring wells.

A portable peristaltic pump with disposable tubing was used to purge and sample each well using USEPA low-flow sampling techniques, and new tubing was used between each well. The purge water was monitored in the field for the following parameters utilizing a calibrated multiple parameter water quality instrument: pH, conductivity, turbidity, dissolved oxygen, temperature and oxidation-reduction potential. After stabilization, groundwater samples were collected for laboratory analysis in laboratory-supplied sample bottles.

Additionally, any evidence of odors, sheens or the presence of NAPL was noted. All samples will be labeled and placed in a cooler with bagged ice sufficient to cool the samples to 4°C.

As summarized in **Table 2-1**, the nine groundwater samples were analyzed for TCL VOCs and SVOCs by USEPA Methods 8260 and 8270, respectively. Two of the groundwater monitoring well samples (greater than 20% of the total) were also analyzed for TAL metals, PCBs and TCL pesticides by USEPA Methods 6010, 8082 and 8081, respectively, biased towards the most impacted areas. Groundwater analytical results are summarized in **Appendix E** on Tables E-6 through E-9, and the results are discussed in Section 3.4. Analytical and QA/QC procedures are discussed in Section 2.14.

As described in Section 2.12, all purge water was containerized on-site in DOT-approved 55-gallon drums for proper characterization and off-site disposal by the LIRR. All non-dedicated sampling equipment (e.g., oil-water interface probes) was decontaminated between sampling locations as described in Section 2.13.

2.7 Shallow PCB Soil Boring Installation and Subsurface Soil Sampling

A total of nine shallow soil borings (SB-09 through SB-17) were completed as part of the PCB field investigation in order to confirm and define the limits of the PCB contamination previously identified at the Site in 2000. The surveyed soil boring locations are depicted on **Figure 2-2** and the rationales are provided in **Table 2-1**. As indicated in **Table 2-1**, a majority of the soil borings had to be moved several feet due to the presence of the third rail or underground utilities within this area of tracks. However, the completed soil borings remained centered around the previously identified maximum PCB concentration of 320 mg/kg detected in subsurface soil sample SE-AR-04 (0 to 0.5 feet). Soil borings SB-09 through SB-11 were completed to a depth of 8 feet and a total of four samples were selected for PCB analysis at the following intervals:

- 0 to 1 feet (not including the 12 to 24 inches of bluestone found in the track area)
- 2 to 3 feet
- 4 to 5 feet
- 7 to 8 feet

The remaining six soil borings (SB-12 through SB-17) were completed to a depth of 6 feet with three samples selected for PCB analysis at the following intervals:

- 0 to 1 feet (not including the 12 to 24 inches of bluestone found in the track area)
- 2 to 3 feet
- 5 to 6 feet

Once the 12 to 24 inches of bluestone present in the track area was cleared away at each location, the soil borings were completed using direct push technology, i.e., Geoprobe. The borings were advanced utilizing a decontaminated macro core soil sampler fitted with a disposable 5-foot acetate liner. Each recovered soil sample was inspected and characterized by a D&B geologist as described in Section 2.4. Boring logs are provided in **Appendix C**.

As summarized in **Table 2-1**, a total of 30 subsurface soil samples were collected for PCB analysis from the nine shallow PCB soil borings in accordance with EPA Method 8082. Subsurface soil analytical results for PCBs are summarized in **Appendix E** on Table E-3. The results of the shallow PCB soil borings are discussed in Section 3.3.2. Analytical and QA/QC procedures are discussed in Section 2.14.

2.8 Site Survey

At the completion of installation activities, the location and elevation of all newly installed MIPs, soil borings and groundwater monitoring wells were surveyed by a New York State-licensed surveyor for placement on the base map. Two elevation measurements were taken at each new monitoring well location to assist in the determination of groundwater flow direction: the ground elevation and the elevation of the top of PVC well casing. In addition, the location and elevation of all existing monitoring wells were surveyed in order to properly locate them on the D&B sample location map. The survey elevations were measured to an accuracy of 0.01 foot. All elevations were referenced to the North American Vertical Datum of 1988 (NAVD88) and horizontal locations were based upon the North American Datum of 1983, New York State Coordinate System.

2.9 Tidal Investigation and Collecting Synoptic Water Levels

D&B collected two rounds of synoptic water levels from all 9 monitoring wells at the approximate time of low, mid and high tides in the nearest water bodies (East River and Newtown Creek) on April 22 and April 27, 2016. In addition, D&B conducted a 48-hour tidal survey between May 4 and May 6, 2016 to determine the degree of tidal influence associated with the East River and Newtown Creek. As part of the tidal survey, D&B selected three monitoring wells (GW-01, GW-03 and MW-3) for the installation of pressure transducer/data loggers which convert water pressure into water level elevation. The pressure transducers were configured to record water levels every 15 minutes over the 48-hour test period, and D&B collected manual water level measurements before and after the tidal survey. Note that the tidal survey included a new moon on May 6, when the tidal fluctuation is greatest.

The findings of the tidal survey and synoptic water levels are discussed in Section 3.1, including a summary of water level measurements and calculated groundwater elevations, and groundwater contour maps. Graphs of the water level data over time compared to the tidal cycle of the two water bodies are also provided to determine the degree of tidal influence.

2.10 Soil Vapor Sampling/Indoor Air Sampling

A total of five temporary soil vapor probes (SV-01 through SV-05), one sub-slab soil vapor sample (SV-06), one indoor air sample (IA-01) and one outdoor ambient air sample (AA-01) were completed to determine if soil vapor intrusion is a potential exposure pathway. The sample locations were selected based on the VOC contamination identified during the MIP study, and the soil and groundwater sampling. The completed locations are depicted on **Figure 2-1** and the rationales are provided in **Table 2-1**. Note that the indoor air sample (IA-01) was collected within an office area of the LIRR Engineering Support Building, which is the closest on-site building to the VOC contamination. The sub-slab soil vapor sample (SV-06) was completed from below the concrete slab in the vicinity of the indoor air sample.

Each air sample was selected for analysis of VOCs by USEPA Method TO-15. Air analytical results are summarized in **Appendix E** on Tables E-10 and E-11. The results of the air sampling are discussed in Section 3.5. Sampling protocols were consistent with the New York State Department of Health (NYSDOH) document entitled, "Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York", dated October 2006, as follows:

The air sampling was completed in August 2016 during the summer. After initially submitting this RI Report to NYSDEC in October 2016, the NYSDEC requested that the LIRR recollect three of these air samples during the heating season, including the indoor air sample (IA-01), the sub-slab soil vapor sample (SV-06) and the outdoor ambient air sample (AA-01). The samples were recollected in February 2017 from the same locations, and the results are provided in **Appendix E** on Table E-12. An "R" has been added to the sample IDs to indicate that these locations were resampled.

Soil Vapor Sampling

The soil vapor samples were collected using a direct-drive rig (i.e., Geoprobe) that utilized drive rods to advance the stainless steel probe to the sample depth above the water table. As summarized in **Table 2-1**, subsurface soil vapor samples were collected at depths ranging from 2 to 5 feet below grade, depending on the water table depth at each location. The temporary soil vapor probe was then purged using a PID to evacuate one to three volumes of soil vapor. The PID recorded VOC concentrations from the soil vapor probe in the parts per billion (ppb) range. Each probe was connected via Teflon tubing to a laboratory-supplied SUMMA canister. Using a flow regulator calibrated at a flow rate not to exceed 0.2 liter per minute and an individually certified clean 6-liter capacity SUMMA canister, the sample collection time was 2 hours. In accordance with the NYSDOH vapor intrusion guidance, tracer gas (i.e., helium) was used at every soil vapor sampling location to ensure that an adequate surface seal was created.

Sub-Slab Soil Vapor Sampling

The collection of the sub-slab soil vapor sample followed a similar procedure to the soil vapor samples. Prior to installation of the sub-slab vapor probe, the building floor was inspected for any penetrations, and the location chosen to ensure that there was minimal potential for ambient air infiltration via floor penetrations. The sub-slab soil vapor sample was collected in an office area in the approximate center of the Engineering Support Building from 2 inches beneath the concrete slab. The sample was collected in an individually certified clean 6-liter SUMMA canister fitted with a laboratory calibrated low-flow regulator set to collect the sample over a 2-hour period. Similar to the outdoor soil vapor samples, a tracer gas (i.e., helium) was used to ensure that an adequate surface seal was created. The heating season resample was collected in close proximity to the original sample location, but with a new penetration through the slab.

Indoor Air Sample

An indoor air quality questionnaire and building inventory was completed by D&B prior to sampling to evaluate the type of structure, floor layout and physical conditions of the buildings being studied and to identify and minimize conditions that may affect or interfere with the testing. This information along with information on sources of potential indoor contamination were identified. A ppb range PID was used to help evaluate potential interferences. The building inventory included the use or storage of petroleum products including gasoline operated equipment, un-vented kerosene heaters, recent use of petroleum-based finishes or products containing petroleum distillates. Products that contain VOCs were listed on the building inventory form along with PID readings obtained near the container. Where available, the volatile ingredients were recorded for each product. The manufacturer's name, address and/or phone number were also recorded (where available) when the ingredients were not listed on the product label. The completed indoor air quality questionnaire and building inventory is provided in Appendix F.

The indoor air sample was collected in an office area in the approximate center of the Engineering Support Building utilizing an individually certified clean 6-liter stainless steel SUMMA canister fitted with a laboratory calibrated low-flow regulator. The sample was collected over an 8-hour period with the regulator calibrated at a flow rate not to exceed 0.2 liter per minute. The canister was placed at a height of approximately 3 feet above the floor.

Ambient Air Sampling

D&B collected one ambient air sample in conjunction with the soil vapor and indoor air sampling over an 8-hour period. The ambient air sample was collected within the Site in the observed upwind direction on the day of the soil vapor and indoor air sampling. The ambient air was screened with a properly calibrated ppb range PID and the readings were recorded prior to sampling.

The ambient air sample was collected utilizing an individually certified clean 6-liter stainless steel SUMMA canister fitted with a laboratory calibrated low-flow regulator. The sample was collected over an 8-hour period with the regulator calibrated at a flow rate not to exceed 0.2 liter per minute. The canister was placed in a secure location at a height of approximately 3 feet.

2.11 Air Monitoring

Ambient air monitoring was performed during all intrusive activities. A PID was utilized to detect VOCs in ambient air. All readings were below action levels during intrusive activities. In addition, the PID was used to screen soil samples for the presence of VOCs and assist in the selection of soil samples for chemical analysis.

In accordance with the RIWP, a Community Air Monitoring Program (CAMP) consistent with NYSDOH guidance was implemented during intrusive activities as a precaution in order to protect the downwind community. This included continuous monitoring of VOCs and particulates (dust) at the downwind perimeter of the work area using a PID and portable dust monitor, respectively. Upwind concentrations were also monitored for comparison purposes. Action levels above background concentrations were not reached or exceeded during intrusive activities.

2.12 Management of Investigation Derived Waste

No excess visibly-impacted soil and soil cuttings were generated during the soil boring and well installation tasks. However, all well development and sampling purge water was collected and containerized on-site in DOT-approved 55-gallon drums for proper off-site disposal by the LIRR. A total of 4 drums of liquid waste were generated.

The drums used to store investigation waste were sealed at the end of each workday and labeled with the date, the well(s), the type of waste (i.e., development water or purge water) and the name of a point-of-contact. Grab samples were collected from the drums in order to determine the most appropriate disposal method. Since the source of the elevated levels of VOCs detected in the soil and groundwater has not been identified, the investigational waste would not be classified as a listed hazardous waste and, therefore, a "contained-in" demonstration is not required. However, a determination was made as to whether the waste is classified as a characteristic waste. To conduct that determination, the samples were analyzed for Toxicity Characteristic Leaching Procedure (TCLP) VOCs, TCLP SVOCs, TCLP metals, PCBs, total petroleum hydrocarbons (TPHs), ignitability, corrosivity, reactivity, and total cyanide. All drums were labeled "pending analysis" until laboratory data was available.

Based on the TCLP vinyl chloride results, the liquid waste was considered a characteristic waste. The LIRR properly disposed of the drummed waste according to applicable local, state and federal regulations. The hazardous waste manifest is included in Appendix G.

2.13 Equipment Decontamination

Whenever possible, all field sampling equipment was sterile/disposable and dedicated to a particular sampling point. In instances where this was not possible, a field cleaning/ decontamination procedure was used in order to mitigate cross contamination between sample locations. In addition, drilling equipment was decontaminated before use and between sample locations in an area located away from the source of contamination so as not to adversely impact the decontamination procedure, but close enough to the sampling locations to keep equipment transport handling to a minimum after decontamination. Specific decontamination procedures for drilling equipment and sampling equipment were described in the QA/QC plan in the RIWP.

2.14 Analytical and QA/QC Procedures

All sample analyses were performed by Chemtech, a certified NYSDOH Environmental Laboratory Approval Program (ELAP) laboratory. All analyses were conducted utilizing NYSDEC 7/05 Analytical Services Protocol (ASP) methods, or latest version, that are at least as stringent as USEPA CLP protocols. NYSDEC ASP Category B data deliverable packages and EDDs in EQuIS format were provided by the laboratory for all analyses. The EDDs will be submitted to the NYSDEC. In accordance with USEPA guidance, samples were shipped daily to ensure that they were received at the laboratory no later than 48 hours after collection.

QA/QC samples that were collected as part of the RI include matrix spike (MS) and matrix spike duplicate (MSD) samples, blind duplicate samples, field blanks and trip blanks. The MS/MSD samples, blind duplicate samples and field blanks were collected at a frequency of one per 20 environmental samples for each sampled medium (soil and groundwater), per analytical parameter. Trip blanks were shipped to and from the field with the sample containers when VOC analyses were conducted on aqueous samples. Trip blanks consist of VOC vials filled at the laboratory with distilled, deionized water, which remain unopened in the field and are analyzed for VOCs only to provide an indication of potential sample contamination due to sample transport, preservation, storage and preparation procedures, as well as atmospheric conditions during transportation and time on-site.

2.15 Data Usability Summary Report

A total of 59 subsurface soil samples, 13 groundwater samples and 11 air samples were selected for analysis as part of the Remediation Investigation that occurred at LIRR Arch Street Yard, NYSDEC VCA Site No. V00733. Depending on the sample location, soil and groundwater samples were analyzed for TCL VOCs, TCL SVOCs, PCBs, TCL pesticides and/or TAL metals. Air samples were analyzed for TO-15 VOCs.

The analytical laboratory, Chemtech, provided eight NYSDEC ASP Category B deliverable data packages for review, including G4239, H1857, H1881, H1884, H1937, H2402, H4563 and I1974. These data packages were reviewed by Ms. Donna Brown, D&B's QA/QC Officer. Ms. Brown meets the NYSDEC requirements of a data validator as listed in the DER-10 Technical Guidance for Site Investigation and Remediation, dated June 2010. The review of the data was conducted in accordance with NYSDEC 7/05 ASP QA/QC requirements, as well as DER-10, as specified in the RIWP.

All samples were analyzed using the proper methods and within the method-specified holding times. The internal standard area counts and spike recoveries were within QC limits except where noted below. Initial and continuing calibrations were analyzed at the method specified frequency and were within QC limits. Raw data confirmed the reported sample results. The sample results were qualified based on the review process as follows:

- Numerous VOCs and SVOCs exceeded the calibration range in G4239, H1857, H1937, H2402 and H4563, and acetone for sub-slab soil vapor sample SV-06(R) in I1974, and were reanalyzed at a secondary dilution. The reanalyzed data was reported for these compounds, and the results qualified as "D".

- Methylene chloride was qualified as non-detect (UB) based on blank results for subsurface soil samples SB-01 (13 to 15 feet), SB-07 (12 to 14 feet) and SB-07 (23 to 25 feet), and air samples AA-01, IA-01, SV-01 and SV-02.

- The following compounds were qualified as estimated (J) based on the relative percent difference (RPD) in subsurface soil sample SB-05 (10 to 11 feet) and the blind duplicate for this sample: cis-1,2-dichloroethene, tetrachloroethene, trichloroethene, vinyl chloride and calcium.

- Carbon disulfide was qualified as estimated (J) based on the RPD in subsurface soil sample GW-04 (12 to 14 feet) and the blind duplicate for this sample.

- The percent recovery (%R) was beyond the QC limits in the MS, MSD and/or laboratory control sample (LCS) for the following: 2,4-dinitrophenol in H1857; 1,4-dioxane and 3+4-methylphenols in H2402; 1,4-dioxane and benzaldehyde in H1937; tetrachloroethene for groundwater samples GW-02S, GW-02D and MW-3; and dichlorodifluoromethane and naphthalene in H4563. These compounds were qualified as estimated (J/UJ) for the corresponding samples.

- The RPD was above the QC limits in the MS/MSD for acetone in subsurface soil samples GW-01 (4 to 5 feet), GW-03 (12 to 14 feet) and GW-03 (18 to 20 feet), and for detected SVOCs in H1884 and H1937. These compounds were qualified as estimated (J) for the corresponding samples.

- The %R was below the QC limit in the laboratory control sample for dichlorodifluoromethane in I1974, and the RPD was above the QC limit in the duplicate. Dichlorodifluoromethane was qualified as estimated (J) for the corresponding samples.

- The surrogate %R and internal standards were outside the QC limits in the original and reanalysis for subsurface soil sample GW-01 (4 to 5 feet). The reanalysis was reported for this sample with all VOCs qualified as estimated (UJ) or estimated bias high (J+).

- The surrogate %R was below the QC limit for 4-bromoflurobenzene in subsurface soil sample GW-03 (3 to 4 feet) and was within QC limits in the reanalysis. In addition, this sample had the internal standards chlorobenzene-d5 and 1,4-dichlorobenzene-d4 below the QC limit. Based on surrogate and internal standard results, the reanalysis was reported and the following compounds were qualified as an estimated (UJ) or estimated bias high (J+): bromoform; chlorobenzene; ethylbenzene; m/p-xylenes; o-xylene; styrene; tetrachloroethene; 1,1,2,2-tetrachloroethane; 1,2,3-trichlorobenzene; 1,2,4-trichlorobenzene; 1,2-dibromo-3-chloropropane; 1,2-dichlorobenzene; 1,3-dichlorobenzene; 1,4-dichlorobenzene; and isopropylbenzene.

- The surrogates %R was below the QC limit, and the original analysis was reported for groundwater sample GW-01. The SVOCs were qualified as estimated (UJ) or estimated bias low (J-) for this sample.

- The internal standards area was below the QC limit for 1,4-dichlorobenzene-d4 in several samples. The reanalysis for subsurface soil samples VP-02 (12 to 14 feet), SB-01 (13 to 15 feet), SB-08 (4 to 6 feet) and GW-04 (2 to 3 feet), and the original analysis for subsurface soil samples SB-04 (3 to 5 feet), SB-05 (11 to 13 feet) and SB-08 (6 to 8 feet) were reported with the following compounds qualified as estimated (UJ) or estimated bias high (J+): 1,1,2,2-tetrachloroethane; 1,2,3-

trichlorobenzene; 1,2,4-trichlorobenzene; 1,2-dibromo-3-chloropropane; 1,2-dichlorobenzene; 1,3-dichlorobenzene; 1,4-dichlorobenzene; and isopropylbenzene.

- The surrogate %R was below the QC limit for the original and reanalysis for the following subsurface soil samples: SB-04 (3 to 5 feet); SB-06 (8 to 10 feet); SB-07 (12 to 14 feet); SB-09 (4 to 5 feet); SB-10 (2 to 3 feet); SB-12 (2 to 3 feet); SB-12 (5 to 6 feet); SB-13 (2 to 3 feet); SB-15 (0 to 1 feet); SB-17 (2 to 3 feet); GW-01 (13 to 15 feet); and GW-03 (12 to 14 feet). All PCB results were reported from the original analysis and qualified as estimated (UJ) or estimated bias low (J-) for these samples.

- The %Rs for numerous metals were outside the QC limit in the spike sample in H1857, H1881, H1884 and H1937. These metals were qualified as estimated (J/UJ) for the corresponding samples.

- The percent difference (%D) for numerous metals were above the QC limit of 10% in the serial dilution check in H1857, H1881, H1884 and H1937. These metals were qualified as estimated (J) for the corresponding samples.

Based on the findings of the data validation process, the results have been deemed valid and usable for environmental assessment purposes as qualified above.

3.0 REMEDIAL INVESTIGATION FINDINGS

This section presents a detailed discussion of the results of the Remedial Investigation specific to geology and hydrogeology, and the presence or absence of contaminants in soil, groundwater and air. In order to present a logical discussion of the data generated as part of this Remedial Investigation, the discussion has been organized into the following subsections:

- Site Geology and Hydrogeology;
- Membrane Interface Probe (MIP) Study;
- Subsurface Soil;
- Groundwater; and
- Air.

Figure 2-1 and **Figure 2-2**, provided in Section 2.0, depicts the location of all sample locations referenced in this section. **Table 2-1**, also provided in Section 2.0, presents a summary of the completed RI scope of work. MIP logs, boring logs and monitoring well construction logs for the RI are provided in **Appendix B**, **Appendix C** and **Appendix D**, respectively.

3.1 Site Geology and Hydrogeology

The following section presents the findings, as well as a discussion and interpretation of geologic and hydrogeologic data collected during the RI. Information utilized in support of this evaluation includes the following:

- Logs from completed MIPs, soil borings and groundwater monitoring wells;
- Hydraulic head measurements from groundwater monitoring wells; and

- Geologic and hydrogeologic data obtained from previously completed investigations.

Topography

Based on the survey data and field observations, land surface within the Site is generally flat with an elevation of between 7 to 11 feet above mean sea level (msl). The area where VOC contamination was detected during previous investigations, located south of the tracks within the fenced area, has an elevation of approximately 7 to 9 feet msl.

Geology

As is typical for most highly industrialized areas such as Queens, New York, the Yard property was likely filled and reworked to allow for development. Based on the RI boring logs and consistent with previous investigations, a layer of urban fill material was observed immediately below the ground surface with a minimum thickness of 5 feet. The fill material is generally described as a dark brown to gray and black, sand and gravel mix with some silt. Varying amounts of anthropogenic material were observed in the fill, such as bluestone, concrete and brick, as well as coal, slag, ash and cinders. The water table was observed within this fill material at a depth of approximately 3 to 5 feet below grade.

Based on the absence of anthropogenic materials, native glacial deposits may be present beneath the fill material in some locations that is similar in texture but generally finer and lighter in color. However, at all locations the top of a native clay-rich unit was observed at depths ranging from 10 to 15 feet below grade. The clay-rich unit consists of gray, plastic clay, with some zones of silt or silty sand, and often mixed with significant amounts of organic peat material. It is possible that this clay-rich unit marks the location of a wetland area which may have existed prior to filling activities. The clay-rich unit continues to approximately 20 feet below grade, with a thickness ranging from 5 to 10 feet.

The clay-rich unit transitions into a coarser sandy material at depths greater than 20 feet below grade, with refusal generally being encountered at a depth between 25 and 30 feet below grade. Based on USGS data for this area of Queens, it is suspected that the refusal is bedrock-related. Bedrock is this area of Queens likely consists of gneiss of the Ravenswood Formation or schist of the Hartland Formation. Material consistent with weathered bedrock was encountered before refusal, including rock fragments. In the track area where the PCB investigation was conducted, refusal was encountered at shallower depths ranging from 15 to 20 feet below grade.

Limited evidence of contamination was observed in soil during the RI, primarily in soil borings located within the area where VOC contamination was detected during previous investigations, such as soil borings VB-01 and SB-05. These soil borings exhibited PID readings up to 250 ppm, slight staining and a hydrocarbon or solvent-like odor immediately above the clay-rich unit at depths ranging from 10 to 13 feet below grade. Some minor petroleum contamination was also observed in soil boring SB-04 at the water table at a depth of 3 to 5 feet below grade, including a PID reading of 7.8 ppm, petroleum odor and a sheen on the water. Evidence of contamination was not observed deeper within the clay-rich unit or below the unit.

Hydrogeology

As discussed in Section 2.9, D&B collected two rounds of synoptic water levels at the approximate time of low, mid and high tides in the nearest water bodies (East River and Newtown Creek). A summary of the water level data is provided in **Table 3-1**, including surveyed measuring point elevations, measured total well depths and calculated water elevations. The water table was observed at a depth of 3 to 5 feet below grade, at an elevation ranging from 4.50 feet msl at the easternmost monitoring well GW-01 to 3.64 feet msl at the westernmost monitoring well GW-04S. As discussed above, clay and silt with peat

TABLE 3-1
LONG ISLAND RAIL ROAD ARCH STREET YARD

WATER LEVEL MEASUREMENTS AND GROUNDWATER ELEVATIONS

Well #	Total Depth of Well (ft)	Casing Elevation (ft msl)	Date	Approximate Tidal Stage	Depth to Water (ft)	Calculated Groundwater Elevation (ft msl)
MW-1	12.60	8.03	4/22/2016	Low	3.83	4.20
				Mid	3.83	4.20
				High	3.83	4.20
			4/27/2016	Low	3.72	4.31
				Mid	3.71	4.32
				High	3.71	4.32
MW-2	6.85	9.43	4/22/2016	Low	5.04	4.39
				Mid	5.04	4.39
				High	5.04	4.39
			4/27/2016	Low	4.98	4.45
				Mid	4.98	4.45
				High	4.98	4.45
MW-3	12.75	9.89	4/22/2016	Low	5.50	4.39
				Mid	5.51	4.38
				High	5.51	4.38
			4/27/2016	Low	5.41	4.48
				Mid	5.41	4.48
				High	5.41	4.48
GW-01	22.80	12.20	4/22/2016	Low	7.68	4.52
				Mid	7.70	4.50
				High	7.69	4.51
			4/27/2016	Low	7.65	4.55
				Mid	7.65	4.55
				High	7.64	4.56
GW-02D	22.80	11.05	4/22/2016	Low	10.68	0.37
				Mid	10.70	0.35
				High	10.70	0.35
			4/27/2016	Low	10.71	0.34
				Mid	10.71	0.34
				High	10.70	0.35
GW-02S	9.45	10.65	4/22/2016	Low	6.24	4.41
				Mid	6.24	4.41
				High	6.24	4.41
			4/27/2016	Low	6.15	4.50
				Mid	6.15	4.50
				High	6.15	4.50
GW-03	20.10	10.41	4/22/2016	Low	11.87	-1.46
				Mid	11.88	-1.47
				High	11.87	-1.46
			4/27/2016	Low	12.13	-1.72
				Mid	12.12	-1.71
				High	12.12	-1.71
GW-04D	19.35	7.12	4/22/2016	Low	9.00	-1.88
				Mid	8.99	-1.87
				High	8.99	-1.87
			4/27/2016	Low	9.18	-2.06
				Mid	9.19	-2.07
				High	9.18	-2.06
GW-04S	7.85	7.01	4/22/2016	Low	3.38	3.63
				Mid	3.37	3.64
				High	3.37	3.64
			4/27/2016	Low	3.28	3.73
				Mid	3.28	3.73
				High	3.28	3.73

NOTES:
Measurements collected in feet below top of casing
NAPL was not detected in any groundwater monitoring well.

and organic material was observed throughout the Site starting at a depth of approximately 10 to 15 feet below grade. As indicated in **Table 3-1**, deep wells screened within or below this material, such as GW-02D, GW-03 and GW-04D, exhibited apparent confined groundwater conditions with the water level depressed approximately 4 to 5 feet as compared with unconfined, water table conditions.

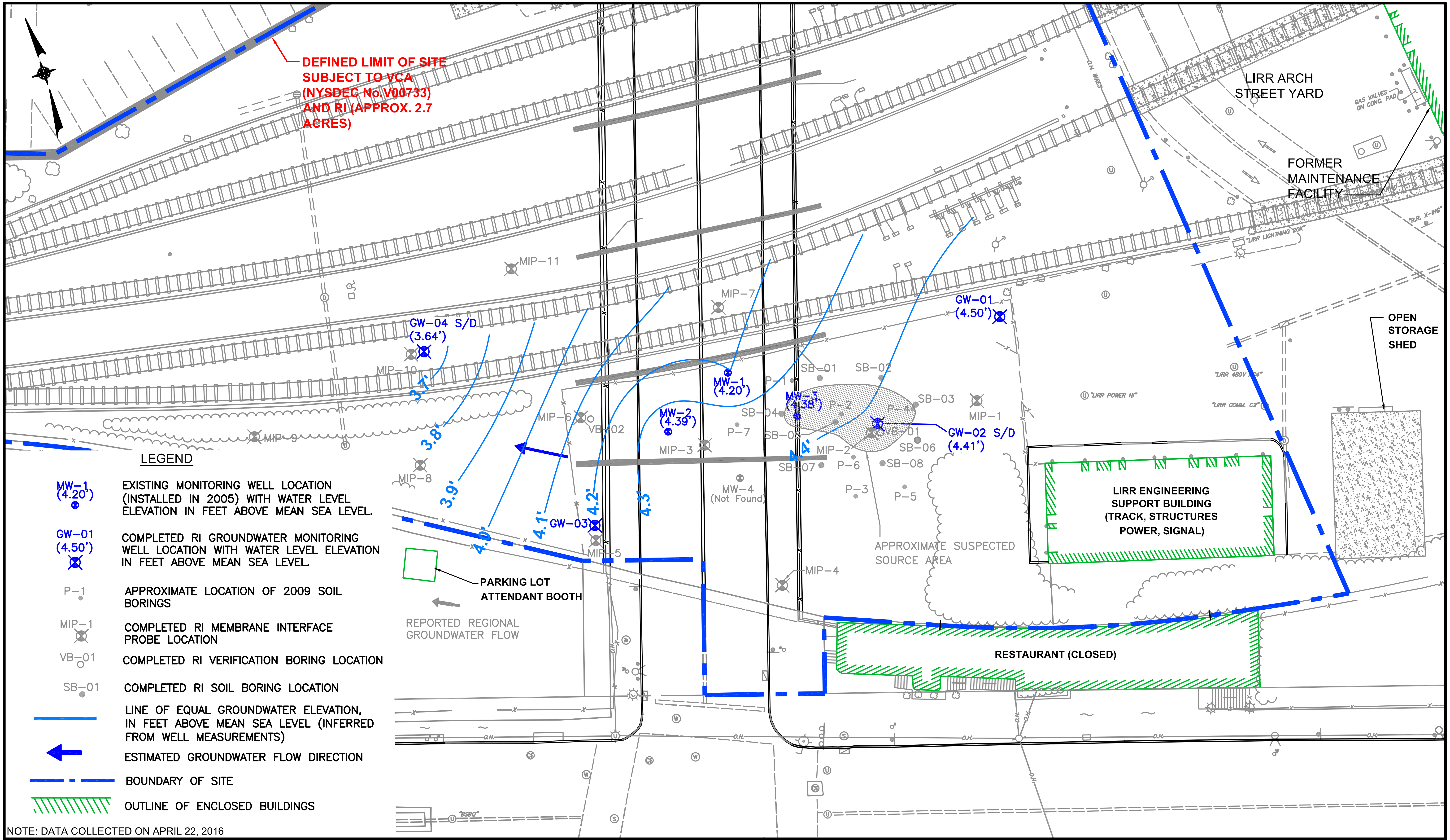
A shallow (water table) groundwater contour map is provided as **Figure 3-1**, and a deep groundwater contour map as **Figure 3-2**. As indicated on **Figure 3-1**, shallow groundwater generally flows in a west-northwesterly direction, consistent with the reported regional groundwater flow direction towards the East River. The groundwater contour map for the deep wells provided on **Figure 3-2** shows that groundwater generally flows in a westerly direction in this zone, similar to the water table.

The synoptic water elevation data summarized on **Table 3-1** showed no discernable tidal fluctuation, and the data suggests that groundwater flow remains in a general west-northwesterly direction during all stages of the tidal cycle. These results are supported by the findings of the tidal survey, which are depicted on **Figure 3-3** through **Figure 3-5**. These graphs depict the water levels in the three wells selected for the tidal study (GW-01, GW-03 and MW-3) over time, and the data is compared to the nearest tidal gauge station. The tidal study results do not show a tidal fluctuation in groundwater at the Site.

3.2 Membrane Interface Probe (MIP) Study

3.2.1 Membrane Interface Probes

As described in Section 2.3, a total of 11 MIP locations (MIP-1 through MIP-11) were completed within the Site and in the vicinity of the area where VOC contamination was documented during the previous investigations. The MIP locations are depicted on **Figure 2-1**



NOTE: DATA COLLECTED ON APRIL 22, 2016

D&B ENGINEERS AND ARCHITECTS, P.C.

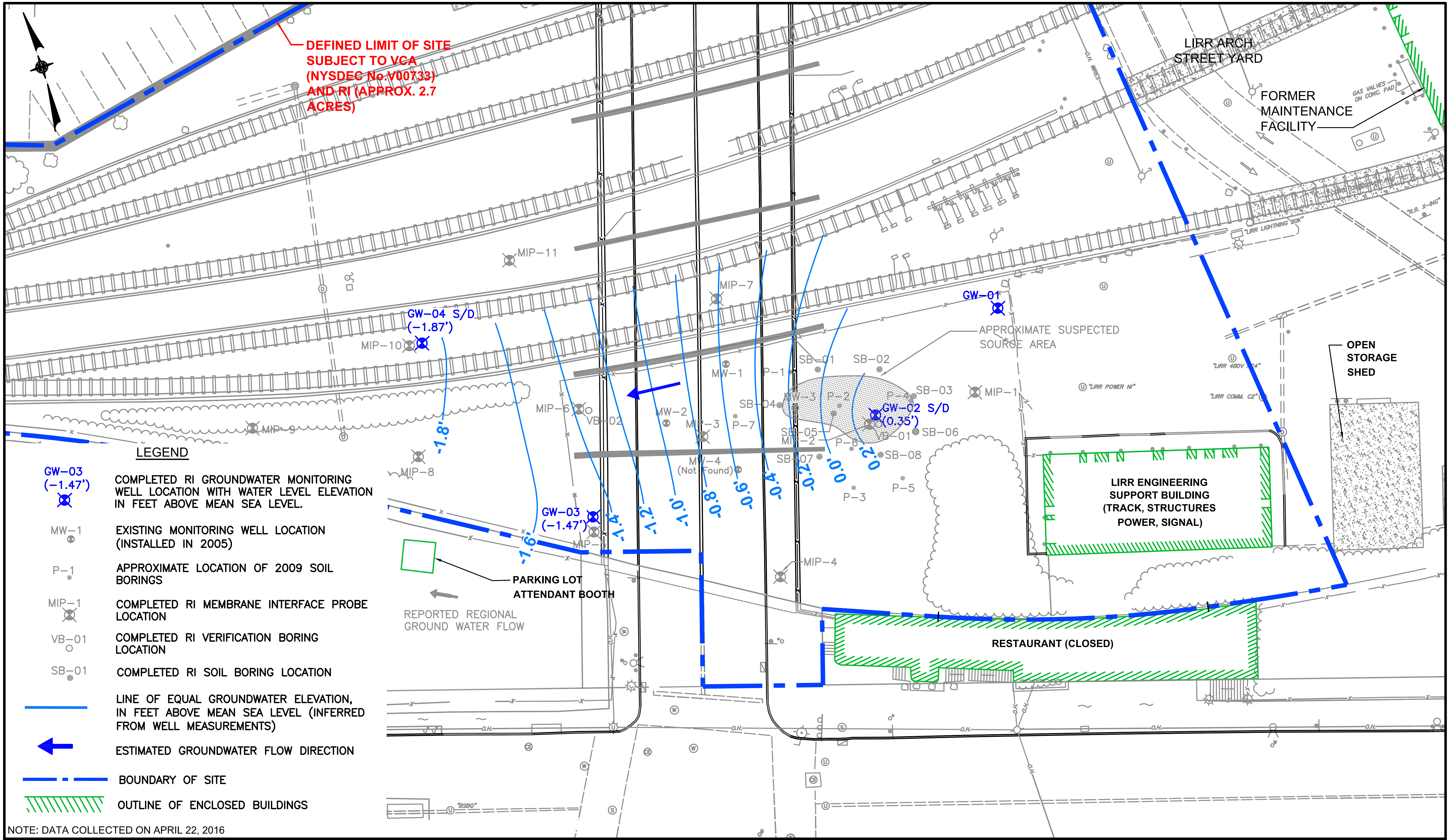
LONG ISLAND RAILROAD - ARCH STREET YARD
LONG ISLAND CITY, NY - REMEDIAL INVESTIGATION

SHALLOW (WATER TABLE) GROUNDWATER CONTOUR MAP

SCALE: 1"=30'

FIGURE 3-1

F:\3455\MTA\Dwg\FIGURES\3455-Shallow Mid_April 2016.dwg, 9/22/2016 2:25:18 PM, Adobe PDF.pc3



NOTE: DATA COLLECTED ON APRIL 22, 2016

D&B ENGINEERS AND ARCHITECTS, P.C.

LONG ISLAND RAILROAD - ARCH STREET YARD
LONG ISLAND CITY, NY - REMEDIAL INVESTIGATION

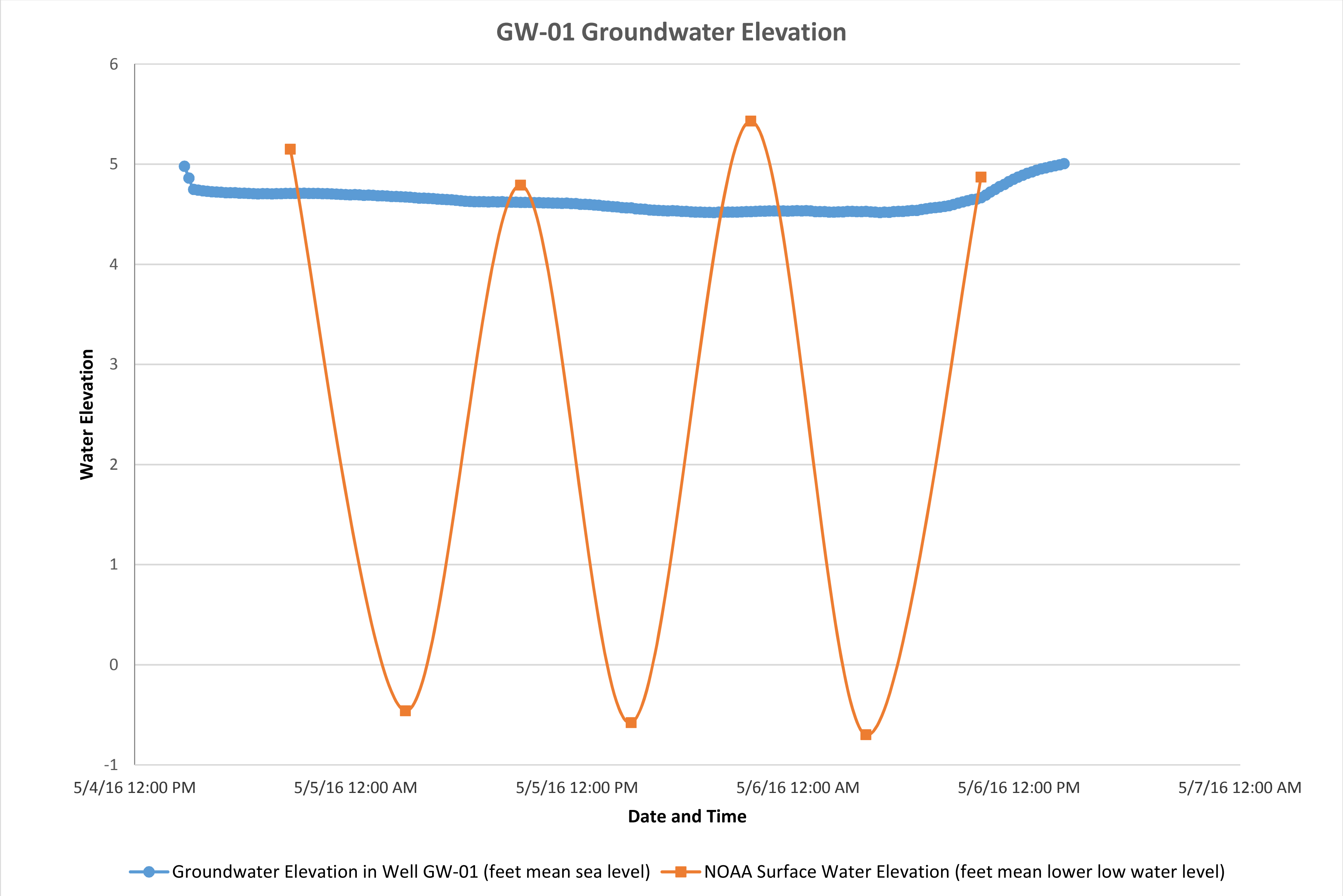
DEEP GROUNDWATER CONTOUR MAP

SCALE: 1"=30'

FIGURE 3-2

F:\3455\MTA\Dwg\FIGURES\3455-Deep Mid_April 2016.dwg, 9/22/2016 2:26:25 PM, Adobe PDF.pc3

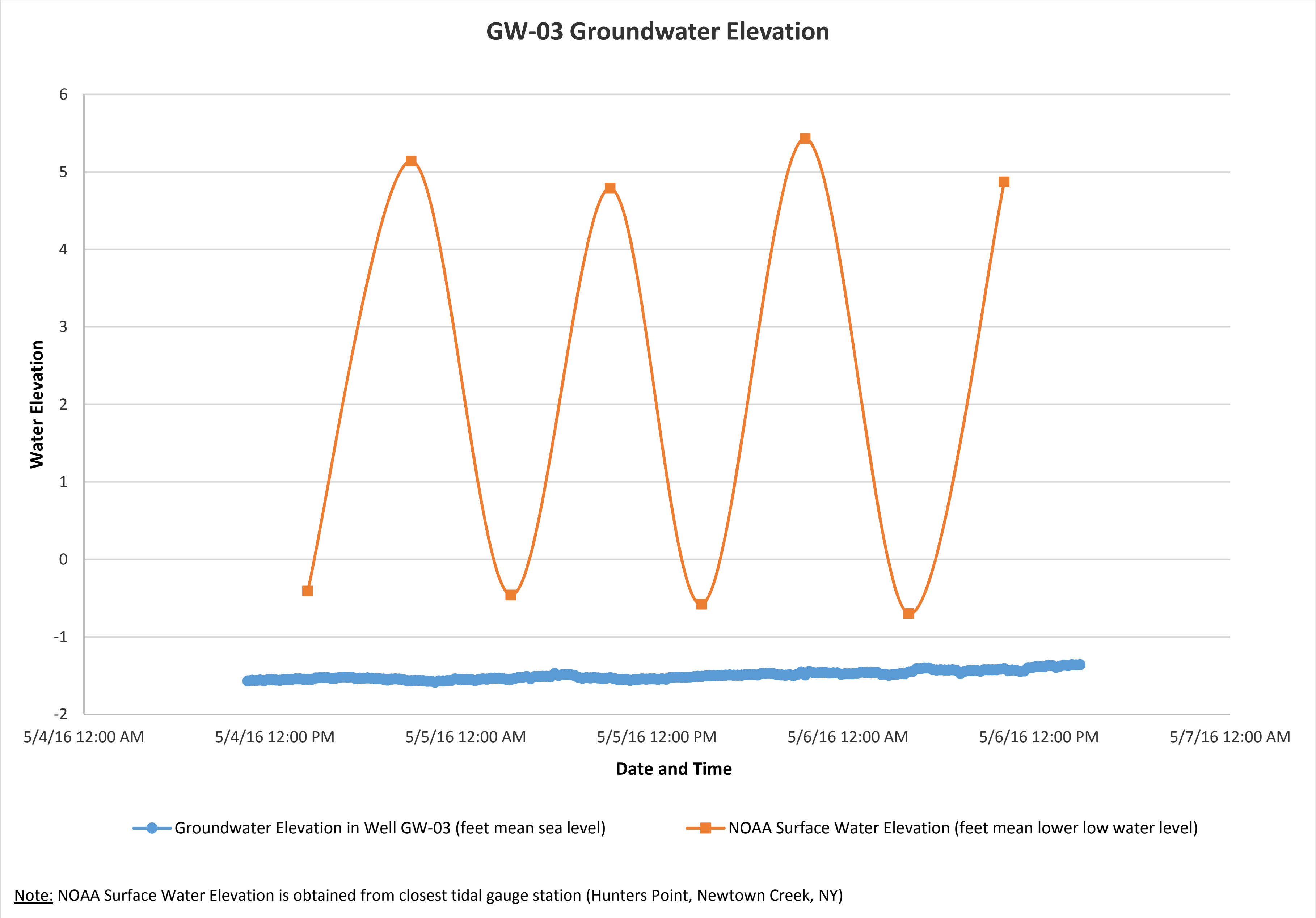
FIGURE 3-3
LONG ISLAND RAIL ROAD
ARCH STREET YARD RI
TIDAL SURVEY



<u>Note:</u> NOAA Surface Water Elevation is obtained from closest tidal gauge station (Hunters Point, Newtown Creek, NY)

J:_HazWaste\3455 (LIRR On-Call)\Task 2 (Arch Street)\Transducer data\GW-01\well a 2016-05-06 16.52.14.wsl

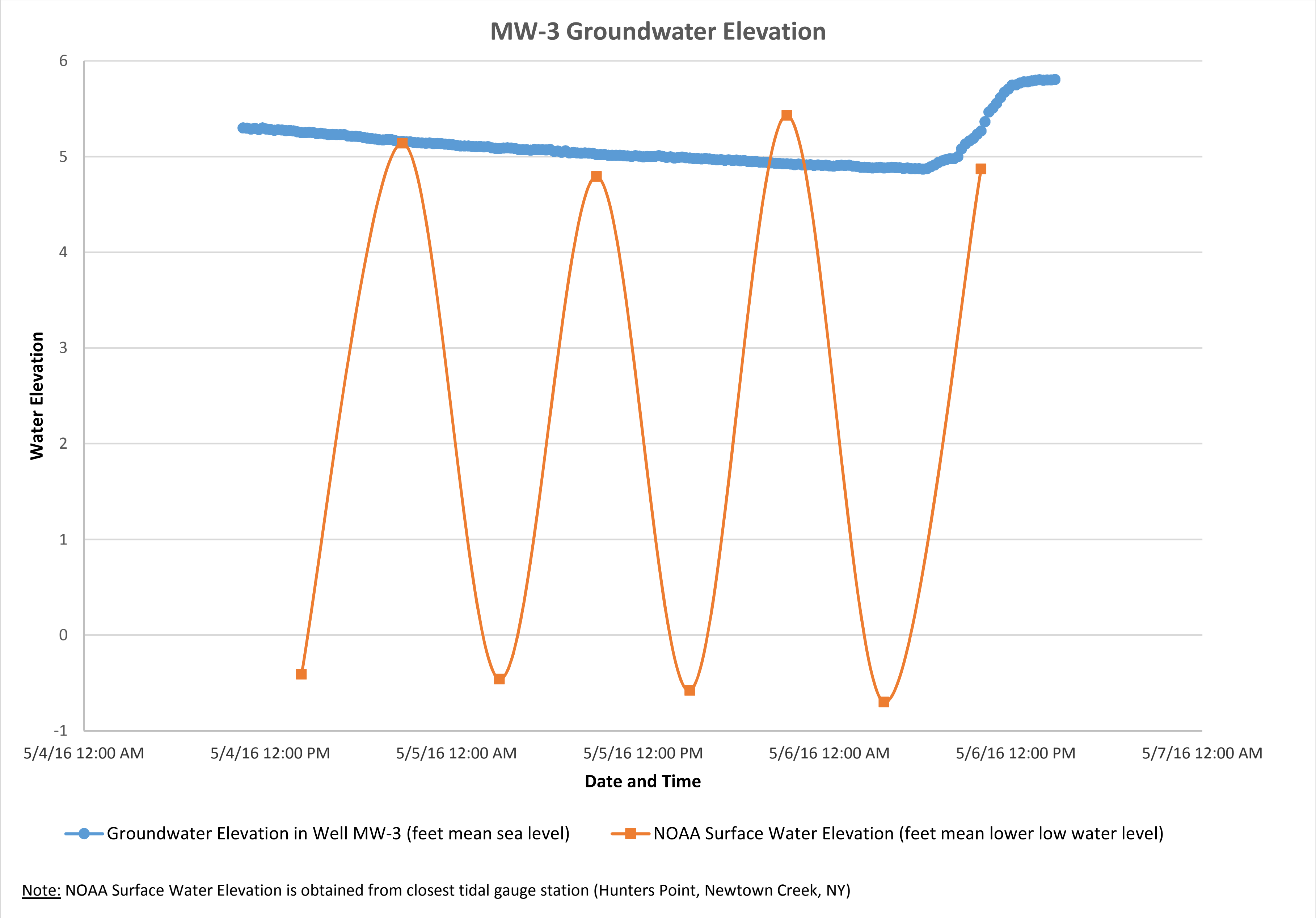
FIGURE 3-4
LONG ISLAND RAIL ROAD
ARCH STREET YARD RI
TIDAL SURVEY



Note: NOAA Surface Water Elevation is obtained from closest tidal gauge station (Hunters Point, Newtown Creek, NY)

J:_HazWaste\3455 (LIRR On-Call)\Task 2 (Arch Street)\Transducer data\GW-03\well c 2016-05-06 16.49.03.wsl

FIGURE 3-5
LONG ISLAND RAIL ROAD
ARCH STREET YARD RI
TIDAL SURVEY



J:_HazWaste\3455 (LIRR On-Call)\Task 2 (Arch Street)\Transducer data\MW-3\well b 2016-05-06 16.46.13.wsl and the MIP logs are provided in **Appendix B**. As indicated on the MIP logs, only MIP-2 exhibited evidence of chlorinated VOCs, with elevated XSD detections above background. There were no XSD detections above background at MIP-2 until a depth of approximately 10 feet below grade, which is approximately 6 feet below the water table. The maximum XSD detection of 794 mV was observed at a depth of approximately 12.5 feet below grade, above the background level of 17 mV. The XSD detections then slowly decreased with depth until refusal at 23 feet below grade. The PID and FID results showed a similar pattern, hitting the maximum detection limit of 5,000 mV at a depth of approximately 14.5 to 15 feet below grade.

The other MIP locations did not exhibit elevated XSD detections above background. Although some spikes in PID detections above background were observed at MIP-1, MIP-4, MIP-5 and MIP-6, these detections were not sustained and were at least one order of magnitude lower than those detected at MIP-2. Some peaks in FID detections were observed in most MIP locations. However, in the absence of XSD or PID detections, it is likely that the FID detections are related to methane derived from organic decomposition. Note that verification boring VB-02, completed in the location of MIP-6, exhibited clay with peat and organic material at depths coinciding with FID peaks, with no indication of VOC contamination. As discussed in Section 3.1, peat and organic material was commonly observed in soil borings completed during the RI.

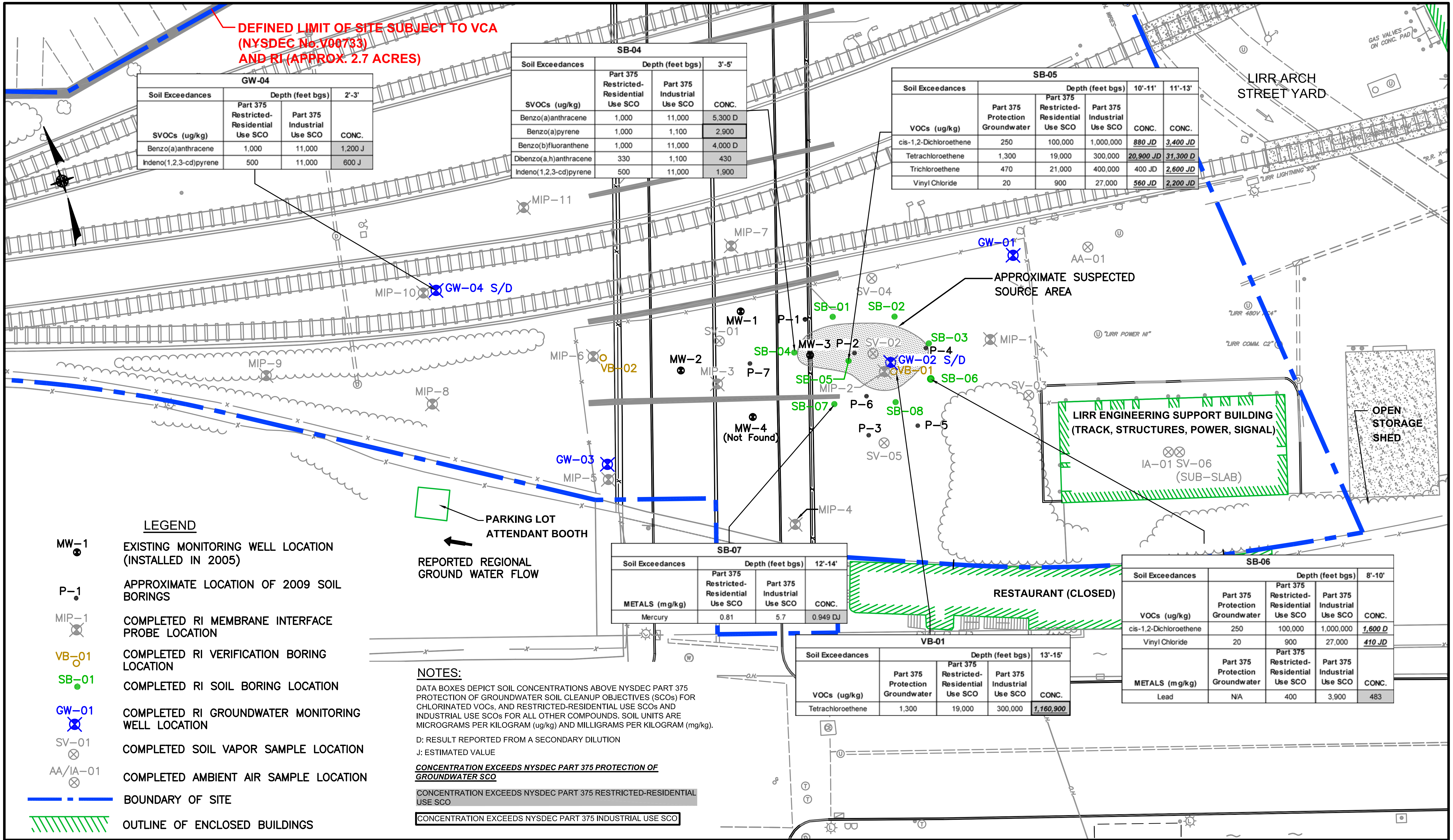
3.2.2 Verification Borings

Two verification borings (VB-01 and VB-02) were completed at two MIP locations (MIP-2 and MIP-6, respectively) to verify the MIP results. As summarized in **Table 2-1**, one subsurface soil sample and two groundwater samples were collected from each verification boring for analysis of TCL VOCs. The results are summarized in **Appendix E** on Table E-1 for subsurface soil and Table E-6 for groundwater. The subsurface soil data has been compared to the SCOs for Restricted-Residential and Industrial Use as defined in NYSDEC 6 NYCRR

Part 375. At the request of NYSDEC, chlorinated VOCs have also been compared to Protection of Groundwater SCOs. The groundwater data has been compared to Class GA groundwater standards and guidance values. In addition, **Figure 3-6** presents a summary of the subsurface soil sample locations where exceedances of the SCOs were detected during the RI, and **Figure 3-7** presents a summary of groundwater sample locations where Class GA standards were exceeded.

The results of verification boring VB-01 confirmed the presence of chlorinated VOCs at MIP-2. As indicated on the boring log provided in **Appendix C**, a maximum PID reading of 250 ppm and a hydrocarbon-like odor were observed in VB-01 from approximately 12 to 13 feet below grade, coinciding with the maximum XSD detection during advancement of the MIP. In addition, subsurface soil sample VB-01 (13 to 15 feet) exhibited a PCE concentration of 1,160,900 ug/kg, above the Restricted-Residential Use SCO of 19,000 ug/kg and the Industrial Use SCO of 300,000 ug/kg, as well the Protection of Groundwater SCO of 1,300 ug/kg. Groundwater samples VB-01 (15 to 16 feet) and (26 to 27 feet) exhibited PCE, TCE, 1,2-DCE and VC at concentrations well above Class GA standards. The highest concentrations were detected in groundwater sample VB-01 (15 to 16 feet), with PCE exhibiting the maximum individual concentration of 17,600 ug/l, above the Class GA standard of 5 ug/l.

The analytical results from verification boring VB-02 were consistent with the MIP findings, with significantly lower chlorinated VOC concentrations compared with verification boring VB-01. Subsurface soil sample VB-02 (12 to 14 feet) did not exhibit VOCs at concentrations above SCOs. Groundwater sample VB-02 (5 feet), collected at the water table, exhibited 1,2-DCE and VC at concentrations of 36 ug/l and 17.9 ug/l, respectively, above their respective Class GA standards of 5 ug/l and 2 ug/l. VOCs were not detected above Class GA standards in the deeper groundwater sample, VB-02 (12 to 14 feet).



GW-04

Soil Exceedances	Depth (feet bgs)		2'-3'
SVOCs (ug/kg)	Part 375 Restricted-Residential Use SCO	Part 375 Industrial Use SCO	CONC.
Benzo(a)anthracene	1,000	11,000	1,200 J
Indeno(1,2,3-cd)pyrene	500	11,000	600 J

SB-04

Soil Exceedances	Depth (feet bgs)		3'-5'
SVOCs (ug/kg)	Part 375 Restricted-Residential Use SCO	Part 375 Industrial Use SCO	CONC.
Benzo(a)anthracene	1,000	11,000	5,300 D
Benzo(a)pyrene	1,000	1,100	2,900
Benzo(b)fluoranthene	1,000	11,000	4,000 D
Dibenzo(a,h)anthracene	330	1,100	430
Indeno(1,2,3-cd)pyrene	500	11,000	1,900

SB-05

Soil Exceedances	Depth (feet bgs)			10'-11'	11'-13'
VOCs (ug/kg)	Part 375 Protection Groundwater	Part 375 Restricted-Residential Use SCO	Part 375 Industrial Use SCO	CONC.	CONC.
cis-1,2-Dichloroethene	250	100,000	1,000,000	***880 JD***	***3,400 JD***
Tetrachloroethene	1,300	19,000	300,000	***20,900 JD***	***31,300 D***
Trichloroethene	470	21,000	400,000	400 JD	***2,600 JD***
Vinyl Chloride	20	900	27,000	***560 JD***	***2,200 JD***

SB-07

Soil Exceedances	Depth (feet bgs)		12'-14'
METALS (mg/kg)	Part 375 Restricted-Residential Use SCO	Part 375 Industrial Use SCO	CONC.
Mercury	0.81	5.7	0.949 DJ

VB-01

Soil Exceedances	Depth (feet bgs)			13'-15'
VOCs (ug/kg)	Part 375 Protection Groundwater	Part 375 Restricted-Residential Use SCO	Part 375 Industrial Use SCO	CONC.
Tetrachloroethene	1,300	19,000	300,000	***1,160,900***

SB-06

Soil Exceedances	Depth (feet bgs)			8'-10'
VOCs (ug/kg)	Part 375 Protection Groundwater	Part 375 Restricted-Residential Use SCO	Part 375 Industrial Use SCO	CONC.
cis-1,2-Dichloroethene	250	100,000	1,000,000	***1,600 D***
Vinyl Chloride	20	900	27,000	***410 JD***
METALS (mg/kg)	Part 375 Protection Groundwater	Part 375 Restricted-Residential Use SCO	Part 375 Industrial Use SCO	CONC.
Lead	N/A	400	3,900	483

LEGEND

MW−1	EXISTING MONITORING WELL LOCATION (INSTALLED IN 2005)
P−1	APPROXIMATE LOCATION OF 2009 SOIL BORINGS
MIP−1	COMPLETED RI MEMBRANE INTERFACE PROBE LOCATION
VB−01	COMPLETED RI VERIFICATION BORING LOCATION
SB−01	COMPLETED RI SOIL BORING LOCATION
GW−01	COMPLETED RI GROUNDWATER MONITORING WELL LOCATION
SV−01	COMPLETED SOIL VAPOR SAMPLE LOCATION
AA/IA−01	COMPLETED AMBIENT AIR SAMPLE LOCATION
▬ ▪ ▬	BOUNDARY OF SITE
▨	OUTLINE OF ENCLOSED BUILDINGS

NOTES:

DATA BOXES DEPICT SOIL CONCENTRATIONS ABOVE NYSDEC PART 375 PROTECTION OF GROUNDWATER SOIL CLEANUP OBJECTIVES (SCOs) FOR CHLORINATED VOCs, AND RESTRICTED-RESIDENTIAL USE SCOs AND INDUSTRIAL USE SCOs FOR ALL OTHER COMPOUNDS. SOIL UNITS ARE MICROGRAMS PER KILOGRAM (ug/kg) AND MILLIGRAMS PER KILOGRAM (mg/kg).

D: RESULT REPORTED FROM A SECONDARY DILUTION

J: ESTIMATED VALUE

CONCENTRATION EXCEEDS NYSDEC PART 375 PROTECTION OF GROUNDWATER SCO

CONCENTRATION EXCEEDS NYSDEC PART 375 RESTRICTED-RESIDENTIAL USE SCO

CONCENTRATION EXCEEDS NYSDEC PART 375 INDUSTRIAL USE SCO

D&B ENGINEERS
AND
ARCHITECTS, P.C.

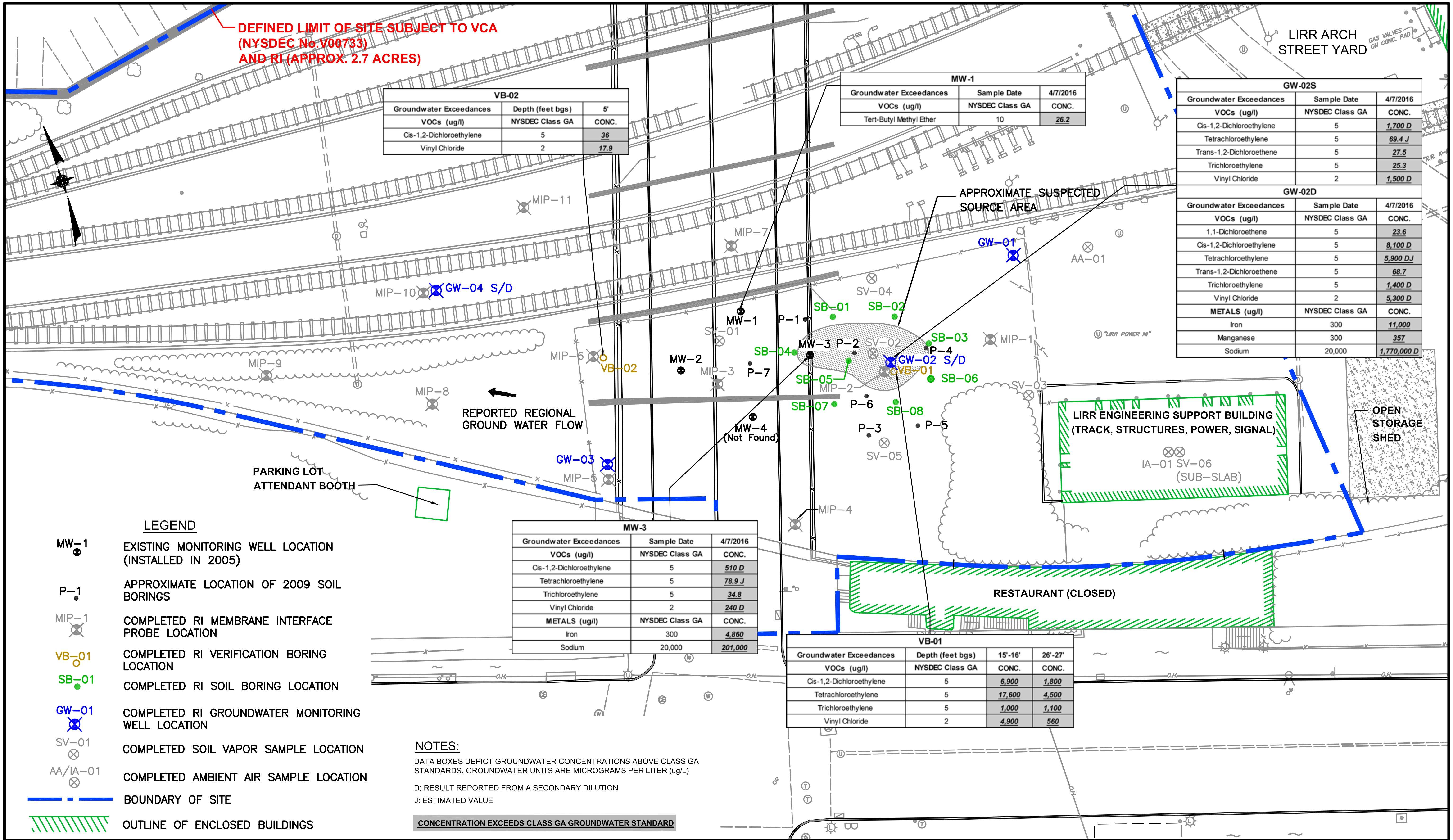
LONG ISLAND RAILROAD - ARCH STREET YARD
LONG ISLAND CITY, NY - REMEDIAL INVESTIGATION

SUMMARY OF RI SOIL SAMPLE EXCEEDANCES

SCALE: 1"=30'

FIGURE 3-6

F:\3455\MTA\Dwg\FIGURES\3455-COMP SAMPLE CONC MAP_SOIL.dwg, 9/23/2016 9:39:53 AM, Adobe PDF.pc3



VB-02		
Groundwater Exceedances	Depth (feet bgs)	5'
VOCs (ug/l)	NYSDEC Class GA	CONC.
Cis-1,2-Dichloroethylene	5	36
Vinyl Chloride	2	17.9

MW-1		
Groundwater Exceedances	Sample Date	4/7/2016
VOCs (ug/l)	NYSDEC Class GA	CONC.
Tert-Butyl Methyl Ether	10	26.2

GW-02S		
Groundwater Exceedances	Sample Date	4/7/2016
VOCs (ug/l)	NYSDEC Class GA	CONC.
Cis-1,2-Dichloroethylene	5	1,700 D
Tetrachloroethylene	5	69.4 J
Trans-1,2-Dichloroethene	5	27.5
Trichloroethylene	5	25.3
Vinyl Chloride	2	1,500 D

GW-02D		
Groundwater Exceedances	Sample Date	4/7/2016
VOCs (ug/l)	NYSDEC Class GA	CONC.
1,1-Dichloroethene	5	23.6
Cis-1,2-Dichloroethylene	5	8,100 D
Tetrachloroethylene	5	5,900 DJ
Trans-1,2-Dichloroethene	5	68.7
Trichloroethylene	5	1,400 D
Vinyl Chloride	2	5,300 D
METALS (ug/l)	NYSDEC Class GA	CONC.
Iron	300	11,000
Manganese	300	357
Sodium	20,000	1,770,000 D

MW-3		
Groundwater Exceedances	Sample Date	4/7/2016
VOCs (ug/l)	NYSDEC Class GA	CONC.
Cis-1,2-Dichloroethylene	5	510 D
Tetrachloroethylene	5	78.9 J
Trichloroethylene	5	34.8
Vinyl Chloride	2	240 D
METALS (ug/l)	NYSDEC Class GA	CONC.
Iron	300	4,860
Sodium	20,000	201,000

VB-01			
Groundwater Exceedances	Depth (feet bgs)	15'-16'	26'-27'
VOCs (ug/l)	NYSDEC Class GA	CONC.	CONC.
Cis-1,2-Dichloroethylene	5	6,900	1,800
Tetrachloroethylene	5	17,600	4,500
Trichloroethylene	5	1,000	1,100
Vinyl Chloride	2	4,900	560

LEGEND

MW–1 ●	EXISTING MONITORING WELL LOCATION (INSTALLED IN 2005)
P–1	APPROXIMATE LOCATION OF 2009 SOIL BORINGS
MIP–1 ⊗	COMPLETED RI MEMBRANE INTERFACE PROBE LOCATION
VB–01 ○	COMPLETED RI VERIFICATION BORING LOCATION
SB–01 ●	COMPLETED RI SOIL BORING LOCATION
GW–01 ⊗	COMPLETED RI GROUNDWATER MONITORING WELL LOCATION
SV–01 ⊗	COMPLETED SOIL VAPOR SAMPLE LOCATION
AA/IA–01 ⊗	COMPLETED AMBIENT AIR SAMPLE LOCATION
– · –	BOUNDARY OF SITE
▨	OUTLINE OF ENCLOSED BUILDINGS

NOTES:

DATA BOXES DEPICT GROUNDWATER CONCENTRATIONS ABOVE CLASS GA STANDARDS. GROUNDWATER UNITS ARE MICROGRAMS PER LITER (ug/L)

D: RESULT REPORTED FROM A SECONDARY DILUTION

J: ESTIMATED VALUE

CONCENTRATION EXCEEDS CLASS GA GROUNDWATER STANDARD

D&B ENGINEERS
AND
ARCHITECTS, P.C.

LONG ISLAND RAILROAD - ARCH STREET YARD
LONG ISLAND CITY, NY - REMEDIAL INVESTIGATION

SUMMARY OF RI GROUNDWATER SAMPLE EXCEEDANCES

SCALE: 1"=30'

FIGURE 3-7

F:\3455\MTA\Dwg\FIGURES\3455-COMP SAMPLE CONC MAP_GW.dwg, 9/23/2016 9:38:23 AM, Adobe PDF.pc3

3.3 Subsurface Soil

As summarized on **Table 2-1**, a total of 27 subsurface soil samples were collected for analysis from the eight deep soil borings (SB-01 through SB-08) and three of the monitoring well locations (GW-01, GW-03 and GW-04). Each soil sample was analyzed for TCL VOCs and TCL SVOCs, and eight of the samples were also analyzed for TAL metals, PCBs and TCL pesticides. In addition, a total of 30 subsurface soil samples were collected for analysis of PCBs from the nine shallow PCB soil borings (SB-09 through SB-17). The results are summarized on Table E-1 through Table E-5, provided in **Appendix E**. The subsurface soil data has been compared to the SCOs for Restricted-Residential and Industrial Use as defined in NYSDEC 6 NYCRR Part 375. At the request of NYSDEC, chlorinated VOCs have also been compared to Protection of Groundwater SCOs. In addition, **Figure 3-6** presents a summary of the subsurface soil sample locations where exceedances of these SCOs were detected during the RI.

The following is a discussion of the analytical results for the subsurface soil samples, organized by the deep soil borings and shallow PCB soil borings. It should be noted that a discussion of the visual evidence of impacts was previously provided in Section 3.1, and is referenced below where appropriate. Historical soil data was discussed in Section 1.4.

3.3.1 Deep Soil Borings

VOCs were detected in all 27 subsurface soil samples collected from the deep soil borings. However, as indicated on Table E-1 in **Appendix E**, detections of VOCs above Restricted-Residential Use SCOs in the deep soil borings were limited to SB-05. Only the subsurface soil sample collected from verification boring VB-01, discussed above in Section 3.2.2, exhibited VOC concentrations above Industrial Use SCOs. The following table summarizes all VOCs detected above SCOs in subsurface soil samples collected during the

RI, including the verification boring results. At the request of NYSDEC, detections of chlorinated VOCs above Protection of Groundwater SCOs are also provided:

Compound	Concentration (ug/kg)				Protection of Groundwater SCO (ug/kg)	Restricted-Residential Use SCO (ug/kg)	Industrial Use SCO (ug/kg)
	SB-05 (10-11 feet)	SB-05 (11-13 feet)	SB-06 (8-10 feet)	VB-01 (13-15 feet)			
cis-1,2-Dichloroethene	**880**	**3,400**	**1,600**	ND*	250	100,000	1,000,000
Tetrachloroethene	**20,900**	**31,300**	1,300	**1,160,900**	1,300	19,000	300,000
Trichloroethene	400	**2,600**	22.2	ND*	470	21,000	400,000
Vinyl Chloride	**560**	**2,200**	**410**	ND*	20	900	27,000

Bold/Underline=exceeds Protection of Groundwater SCO
Shading=also exceeds Restricted-Residential Use SCO
Bold outline=also exceeds Industrial Use SCO
ND*=Not Detected, note that other VOCs are likely present but were not detected due to dilution.

Soil boring SB-05 was completed in the area where VOC contamination was documented during the previous investigations, and approximately 10 to 15 feet to the west of MIP-2/VB-01 where chlorinated VOCs were detected during the MIP study as part of this RI. Note that an elevated PID reading of 250 ppm and a solvent odor were observed in subsurface soil sample SB-05 (10 to 11 feet). Similar to the results from MIP-2/VB-01, the chlorinated VOC contamination at soil boring SB-05 was located below a depth of 10 feet below grade. The remaining soil borings completed around the suspected source area did not exhibit VOCs at concentrations above Restricted-Residential Use SCOs.

Several SVOCs, consisting of PAHs, were detected at concentrations above Restricted-Residential Use SCOs in subsurface soil samples SB-04 (3 to 5 feet) and GW-04 (2 to 3 feet). The highest concentrations were detected in SB-04 (3 to 5 feet), with benzo(a)anthracene detected at a concentration of 5,300 ug/kg, above the Restricted-Residential Use SCO of 1,000 ug/kg. All SVOC concentrations were below Industrial Use SCOs, except for benzo(a)pyrene in SB-04 (3 to 5 feet) at 2,900 ug/kg, above the SCO of 1,100 ug/kg. A sheen, petroleum odor and PID reading of 7.8 ppm was noted in this soil sample.

PCBs and pesticides were not detected in any of the subsurface soil samples collected from the deep soil borings. Metals were detected at concentrations below Restricted-Residential Use SCOs, except for lead detected at a concentration of 483 mg/kg in subsurface soil sample SB-06 (8 to 10 feet) above the SCO of 400 mg/kg, and mercury detected at 0.949 mg/kg in SB-07 (12 to 14 feet) above the SCO of 0.81 mg/kg. All metals concentrations were below Industrial Use SCOs.

3.3.2 Shallow PCB Soil Borings

PCBs were detected in 5 of the 30 subsurface soil samples collected from the shallow PCB borings, but at concentrations below Restricted-Residential Use and Industrial Use SCOs. The maximum PCB concentration of 310 ug/kg was detected in subsurface soil sample SB-14 (0 to 1 foot), well below the Restricted-Residential SCO of 1,000 ug/kg.

3.4 Groundwater

As summarized on **Table 2-1**, a total of 9 groundwater samples were collected for analysis from the three existing groundwater monitoring wells (MW-1, MW-2 and MW-3) and the six newly installed wells (GW-01, GW-02S, GW-02D, GW-03, GW-04S and GW-04D). Each groundwater sample was analyzed for TCL VOCs and TCL SVOCs, and two of the samples were also analyzed for TAL metals, PCBs and TCL pesticides. The results are summarized on Table E-6 through Table E-9, provided in **Appendix E**. The groundwater data has been compared to the Class GA groundwater standards and guidance values (herein referred to as Class GA standards). In addition, **Figure 3-7** presents a summary of the groundwater sample locations where exceedances of Class GA standards were detected during the RI.

The following is a discussion of the analytical results for the groundwater samples. Note that NAPL was not observed in any of the monitoring wells during the RI. Historical groundwater data was discussed in Section 1.4.

VOCs were detected in all 9 groundwater monitoring well samples. However, as indicated on Table E-6 in **Appendix E**, VOC concentrations were generally detected below Class GA standards. Detections of VOCs above Class GA standards in the monitoring wells were limited to the following:

Compound	Concentration (ug/l)				Class GA Groundwater Standard (ug/l)
	GW-02S	GW-02D	MW-1	MW-3	
1,1-Dichloroethene	3.9	**23.6**	ND	3.2	5
cis-1,2-Dichloroethene	**1,700**	**8,100**	ND	**510**	5
trans-1,2-Dichloroethene	**27.5**	**68.7**	ND	2	5
Tetrachloroethene	**69.4**	**5,900**	ND	**78.9**	5
Trichloroethene	**25.3**	**1,400**	ND	**34.8**	5
Vinyl Chloride	**1,500**	**5,300**	ND	**240**	2
MTBE	ND	ND	**26.2**	0.74	10

Bold/shading=exceeds standard
ND=Not Detected

Note that monitoring wells GW-02S, GW-02D and MW-3, which exhibited chlorinated VOC concentrations above Class GA standards, are located in the area where VOC contamination was documented during the previous investigations, and where chlorinated VOCs were detected during the MIP study and soil boring installation program as part of this RI. Neither the upgradient well GW-01 nor any of the downgradient wells exhibited chlorinated VOCs above Class GA standards.

SVOCs were either not detected or were detected below Class GA standards. PCBs and pesticides were not detected in any groundwater samples. The following metals were detected at concentrations above Class GA standards in the total (unfiltered) analysis: iron in GW-02D and MW-3, manganese in GW-02D and sodium in GW-02D and MW-3. The concentrations of these metals are typically elevated in urban settings. Turbidity was low in these samples, and a filtered analysis was not completed.

3.5 Air

As summarized on **Table 2-1**, a total of 8 air samples were collected for analysis in August 2016, including five temporary soil vapor probes (SV-01 through SV-05), one sub-slab soil vapor sample (SV-06), one indoor air sample (IA-01) and one outdoor ambient air sample (AA-01). In addition, sample locations SV-06, IA-01 and AA-01 were resampled during the heating season in February 2017 at NYSDEC request. Each air sample was analyzed for TO-15 VOCs. The results are summarized on Table E-10 (indoor/outdoor air) and Table E-11 (soil vapor), provided in **Appendix E**. The heating season sample results are summarized on Table E-12. New York State has not established standards for soil vapor quality. For conservative evaluation purposes, all air data has been compared to the NYSDOH Air Guideline Values (AGVs).

Chlorinated VOCs were detected in all 5 soil vapor probes, with PCE and TCE detected above their respective AGVs of 2 ug/m^3 and 30 ug/m^3 at all locations except SV-03. The highest PCE and TCE concentrations of 881 ug/m^3 and 859 ug/m^3, respectively, were detected at soil vapor probe SV-02, located in the area where VOC contamination was documented during the previous investigations, and where chlorinated VOCs were detected in soil and groundwater during this RI. The second highest VOC concentrations were detected at soil vapor probe SV-01, located approximately 50 feet to the west and downgradient of the SV-02 location with respect to groundwater flow direction. Soil vapor probe SV-03 exhibited the lowest VOC concentrations, with only TCE detected marginally above the AGV. SV-03 is located to the east and upgradient of SV-02, between SV-02 and the closest structure (the LIRR Engineering Support Building).

As indicated on Table E-11, the sub-slab soil vapor sample (SV-06) collected from the LIRR Engineering Support Building in August 2016 exhibited VOCs at concentrations below the AGVs, except for TCE detected at a concentration of 5 ug/m^3. During the February 2017 resample (Table E-12), no VOCs were detected above AGVs in SV-06, including TCE.

As indicated on Table E-10 for the August 2016 results, the outdoor ambient air sample exhibited VOC concentrations that were comparable or above the indoor air sample concentrations, and all concentrations were below AGVs. In addition, a comparison of the results for the sub-slab soil vapor sample and the indoor air sample from August 2016 using the NYSDOH decision matrices suggest that sub-slab soil vapor is not expected to significantly affect indoor air quality, and no further action is needed to address human exposures. Similar results were found for the February 2017 heating season data provided on Table E-12, with all concentrations below AGVs. Note that the indoor air sample was collected in the office area of the Engineering Support Building, in the same vicinity of the sub-slab sample.

3.6 Exposure Assessment

The purpose of this exposure assessment is to determine how and when an individual may be exposed to contaminants of potential concern (COPCs) associated with NYSDEC VCA Site No. V00733 at the LIRR Arch Street Yard. A COPC is any chemical detected above the NYSDEC cleanup guidelines in a medium, which could produce adverse health effects under the right conditions of dose and exposure. For exposure to occur there must be a complete "pathway of exposure" where a person can come into contact with COPCs. For a pathway to be complete, there must be: (1) a source or medium containing the COPCs; (2) a location where human contact can take place (i.e., an exposure point); and (3) a feasible means for the COPC to enter the person's body. The person who could come into contact with the COPC at an exposure point is called a "receptor." The ways in which the COPC can enter the body are called “routes of exposure.” Ingestion (by mouth), dermal (contact with skin) and inhalation (breathing into the lungs) are the routes of exposure considered in this and other human health risk assessments. This assessment considers both current and potential future exposures.

As with any exposure assessment, this assessment is not intended to predict disease outcome, but rather, is meant to be used as a tool to make decisions regarding the need for remediation or the institution of precautionary measures, such as limiting the affected area to non-residential land uses. Given the available information for the Site, and keeping the purpose of this assessment in mind, the following evaluation is qualitative in nature. Consistent with the previous presentation of the analytical data, the exposure assessment below is presented by medium of interest.

General Site Conditions

The Site being investigated under the VCP (NYSDEC Site No. V00733) is an approximately 2.7 acre portion of the 8 acre LIRR Arch Street Yard. The Yard was previously utilized to perform maintenance on passenger rail cars until December 2009. As of September 2016, the Maintenance Facility building located east of the Site is leased to Metro North Railroad (MNR) and Bombardier to install Positive Train Control in their trains. The southern side of the Maintenance Facility building was previously leased for truck parking from August 2012 through August 2015, located outside of the Site. On-site buildings currently include a Maintenance of Equipment building on the northern end of the Site and an Engineering Support Building on the southern end of the Site. These buildings are utilized for storage and are not occupied on a regular basis. The northern building on-site was leased to MNR and Bombardier as part of the September 2016 agreement. Several sets of inactive train tracks traverse the Site. The surface is generally bluestone or soil, although portions of the Site near the buildings are paved.

The Site is approximately 10 to 15 feet lower than the surrounding streets, and access is restricted by a retaining wall on the western, southern and northern sides. Access to the remainder of the Yard is restricted by a fence, and an electronic gate which requires valid identification to open. A security guard is stationed at the gate during business hours. Concentrations of chlorinated VOCs in soil exceeding Protection of Groundwater, Restricted-Residential and Industrial Use SCOs at depths exceeding 8 feet below grade, and in groundwater exceeding Class GA standards, have been detected in the southern portion of the Site south of the tracks. This area of contamination is enclosed within a chain link fence, with a locked gate.

Given that access to the Yard is restricted to authorized personnel, the general public does not have the potential to be exposed to on-site contamination. Since the known area of contamination within the Site is separately fenced, the only potential receptors of on-site contamination would be LIRR workers or their contractors who may periodically enter the Site and this separately fenced area. However, potential exposure is significantly minimized by the below grade nature of the contamination. In addition, excavations do not routinely take place on-site and no excavations are planned for the foreseeable future. Any future excavations will be completed under proper health and safety protocols and as per the requirements of the LIRR's EPC-03-001 document entitled *Excavating Soils at Railroad Locations*, dated August 11, 2003 and revised March 2015.

Soil

The chemical analysis of the 59 subsurface soil samples found concentrations of chlorinated VOCs exceeding Protection of Groundwater and Restricted-Residential Use SCOs at depths exceeding 8 feet below grade in the southern portion of the Site south of the tracks. Lead and mercury were also detected slightly above Restricted-Residential Use SCOs in one sample each in this area at similar depths. Several PAHs were detected at concentrations above their respective Restricted-Residential Use SCOs at shallower depths of 2 to 5 feet below grade. Concentrations exceeding Industrial Use SCOs were limited to PCE at a depth of 13 to 15 feet below grade, and benzo(a)pyrene at a depth of 3 to 5 feet below grade.

Exposure to contaminants within subsurface soil on-site is not a significant potential route of exposure to site workers during routine site operations. There is the potential for on-site workers to be exposed to these contaminants through dermal contact or inhalation of windblown dust during any future excavation activities. However, as stated above, excavations do not routinely take place on-site and no excavations are planned for the foreseeable future. Any future excavations will be completed under proper health and safety protocols and as per the requirements of the LIRR's EPC-03-001 document entitled *Excavating Soils at Railroad Locations*, dated August 11, 2003 and revised March 2015.

Groundwater

The completed groundwater sampling identified VOCs at concentrations above their respective Class GA Standards in verification borings VB-01 and VB-02, and monitoring wells GW-02S, GW-02D, MW-1 and MW-3, located in the southern portion of the Site south of the tracks. The highest chlorinated VOCs were detected in verification boring VB-01 and monitoring wells GW-02S and GW-02D, located in the vicinity of soil borings which exhibited chlorinated VOCs in subsurface soil at concentrations above SCOs.

Downgradient monitoring wells located west of this area exhibited concentrations of VOCs below Class GA Standards, including MW-2, GW-03, GW-04S and GW-04D, suggesting that the observed groundwater contamination has not migrated to downgradient locations. It is likely that the clay-rich unit present throughout the Site helps limit the overall migration of contaminants. Given that the contamination has not migrated and the below grade nature of the groundwater contamination, direct exposure of the public and on-site workers to these groundwater contaminants would not be expected under current conditions.

In addition, groundwater in this area of Queens is not utilized as a potable water supply source.

Air

Soil vapor sampling results suggest that the chlorinated VOCs detected in soil and groundwater in the on-site area south of the tracks have volatilized into the soil gas at concentrations above NYSDOH Air Guideline Values (AGVs). However, there are no structures built over the area of soil and groundwater contamination, and there is no evidence that downgradient migration of the contamination is occurring. Therefore, direct exposure by inhalation of the chlorinated VOCs detected in soil gas would not be expected under current conditions.

In addition, indoor air sampling completed within the closest on-site structure (the LIRR Engineering Support Building) exhibited VOC concentrations below AGVs and comparable to outdoor concentrations. Comparison of the results for the sub-slab soil vapor sample and the indoor air sample using the NYSDOH decision matrices suggest that no action is needed to address human exposures.

Future Use and Potential Exposure Routes

Currently, the LIRR does not have any plans to change the industrial nature of the LIRR Arch Street Yard. As a result, the Yard will remain an industrial property for the foreseeable future and all future excavations, if any, will be completed under proper health and safety protocols and as per the requirements of the LIRR's EPC-03-001 document entitled *Excavating Soils at Railroad Locations*, dated August 11, 2003 and revised March 2015. In addition, the LIRR does not have any plans to construct any structures in the area where soil and groundwater contamination was observed during the RI. Therefore, on-site environmental conditions will not change and the potential for on-site receptors to be exposed to on-site contamination will remain very low.

3.7 Conceptual Summary

Based on the site history, it appears that chlorinated VOCs were spilled in a limited area on-site under the 21st Street Bridge sometime prior to December 2003 when a LIRR contractor discovered contaminated soil while excavating a utility trench. Due to its discrete location under the bridge and the fact that there is no evidence that the LIRR has utilized, disposed or accidentally spilled chlorinated VOCs at the Yard, it is possible that the chlorinated VOCs were dumped onto the Site by an outside party during a "one-time event" or over a limited period of time. Follow-up investigations found chlorinated VOC contamination in soil and groundwater, but determined that the majority of impacted surface/shallow subsurface soil had been excavated and removed during utility trenching. However, records of the limits of excavation and soil quantities that were removed during the trenching are not available.

The results of the RI described in this report indicate that the chlorinated VOC contamination is present in a limited area of the Site south of the tracks, with the majority of the soil contamination currently observed at depths greater than 8 feet below grade. This distribution would be expected if the majority of surface and shallow contamination had previously been removed, leaving only deeper residual contamination. Based on previous investigations and the results of the RI, the approximate remaining residual contamination source area or "hot-spot" is depicted on **Figure 2-1**.

The deep contamination does not appear to have migrated downgradient to the west with the direction of groundwater flow, possibly due in part to the fine grained nature and high organic content of the soil matrix below a depth of 10 feet below grade. It is likely that the clay-rich unit present throughout the Site helps limit the overall migration of contaminants.

Unless actively remediated, the residual contamination will naturally degrade over time with continued localized impacts to soil, groundwater and soil gas.

Historical data also indicates that surface soil and shallow subsurface soil PCB contamination was previously observed within the track area to the northwest of the chlorinated VOC contamination area. However, the RI sampling program did not detect any PCB concentrations above Restricted-Residential Use SCOs. Given that the tracks were installed following the initial discovery of elevated PCBs in 2000, and the current presence of up to two feet of bluestone in the track area, it is likely that the majority of the shallow PCB contaminated soil was excavated during construction activities, similar to the shallow chlorinated VOC contamination.

4.0 CONCLUSIONS AND RECOMMENDATIONS

This section of the report presents the conclusions and recommendations of the Remedial Investigation with respect to the nature and extent of contamination associated with NYSDEC VCA Site No. V00733 at the LIRR Arch Street Yard. The conclusions and recommendations are based on the comparison of chemical constituents detected in soil and groundwater during the RI to appropriate criteria, including Protection of Groundwater, Restricted-Residential and Industrial Use SCOs for soil, and Class GA Standards for groundwater. Note that the recommendations have been developed in the anticipation that the LIRR Arch Street Yard will continue to be utilized for industrial purposes. Sample locations discussed below are depicted on Figure 2-1 and Figure 2-2.

4.1 Conclusions

Subsurface Soil

Based on the findings of the RI, the Site is underlain by a layer of fill with a minimum thickness of 5 feet. A native clay-rich unit was encountered below the fill layer starting at a depth of 10 to 15 feet below grade. During the MIP study completed during the RI, chlorinated VOCs were only detected at location MIP-2, which was completed in the southern portion of the Site south of the tracks in the area where chlorinated VOC contamination was identified during previous construction activities and investigations. The VOC detections at MIP-2 started at a depth of 10 feet below grade and the highest concentrations were found at approximately 12 to 16 feet below grade. The water table was observed at a depth of approximately 3 to 5 feet below grade. Although generally limited visual evidence of contamination was observed during the soil boring program, elevated PID readings, slight staining and odors were detected in verification boring VB-01 and soil boring SB-05 completed in the vicinity of MIP-2 at a depth of 10 to 13 feet below grade, immediately above the clay-rich unit.

As part of the RI, a total of two MIP verification borings, eight soil borings and three monitoring well soil borings were completed to define the limits of the chlorinated VOC contamination. Four of the 29 subsurface soil samples selected for chemical analysis showed concentrations of chlorinated VOCs exceeding Protection of Groundwater, Restricted-Residential and/or Industrial Use SCOs at depths exceeding 8 feet below grade in the southern portion of the Site south of the tracks, including PCE, TCE, 1,2-DCE and VC. The four samples were collected from verification boring VB-01 and soil boring SB-05 and SB-06. However, concentrations of chlorinated VOCs above Restricted-Residential Use SCOs were limited to SB-05, and Industrial Use SCOs to PCE at VB-01.

Lead and mercury were also detected slightly above Restricted-Residential Use SCOs in one sample each in this area at similar depths to the chlorinated VOCs. Several PAHs were detected at concentrations above their respective Restricted-Residential Use SCOs at shallower depths of 2 to 5 feet below grade. Benzo(a)pyrene also exceeded its Industrial Use SCO in subsurface soil sample SB-04 (3 to 5 feet).

In addition to the chlorinated VOC investigation, a total of nine soil borings were completed to confirm and define the limits of the previously identified surface and shallow subsurface soil PCB contamination in the track area. All PCB concentrations were either not detected or were detected below Restricted-Residential and Industrial Use SCOs.

Based on the subsurface soil results, we can conclude the following:

- A localized source area or "hot-spot" of chlorinated VOC contamination is present in a discrete area south of the tracks within the Site, at a depth of approximately 8 to 16 feet below grade immediately above and within the uppermost portion of the clay-rich unit. The approximate area based on the results of the RI and previous investigations is depicted on Figure 2-1, encompassing approximately 680 square feet.

- Based on surrounding subsurface soil data, the presence and extent of residual chlorinated VOC contamination has been adequately delineated.

- The chlorinated VOCs were spilled in this area sometime prior to December 2003 when they were discovered by a LIRR contractor excavating a utility trench. Due to its discrete location under the bridge and the fact that there is no evidence that the LIRR has utilized, disposed or accidentally spilled chlorinated VOCs at the Yard, the chlorinated VOCs may have been dumped onto the Site by an outside party during a "one-time event" or over a limited period of time.

- The results of the RI showing the presence of fill material and limited shallow impacts by chlorinated VOCs are consistent with previous reports indicating that the majority of impacted surface/shallow subsurface soil was excavated and removed during the utility trenching.

- The RI results did not confirm the presence of PCB contamination within surface and shallow subsurface soil in the track area to the northwest of the chlorinated VOC contamination area, as depicted on **Figure 2-2**. Given that the tracks and the approximately one to two feet of bluestone now present in the area were installed following the initial discovery of the elevated PCB concentrations in 2000, it is likely that the majority of the PCB contaminated soil was previously removed.

- Given that access to the Yard is restricted to LIRR personnel, the general public does not have the potential to be exposed to on-site contamination. In addition, exposure to contaminants within subsurface soil on-site is not a significant potential route of exposure to site workers during routine site operations. Any future excavations, if any, will be completed under proper health and safety protocols. Therefore, the potential for on-site receptors to be exposed to contamination will remain very low.

Groundwater

Clay and silt with peat and organic material was observed throughout the Site starting at a depth of approximately 10 to 15 feet below grade. Deep wells screened within or below this material, such as GW-02D, GW-03 and GW-04D, exhibited apparent confined groundwater conditions with the water level depressed approximately 4 to 5 feet as compared with unconfined, water table conditions. Groundwater flow was determined to be in a west-northwesterly direction for both the water table and deep zones. There was no evidence of tidal influence on groundwater elevation or flow direction on-site.

Three of the 9 groundwater monitoring well samples (GW-02S, GW-02D and MW-3) collected during the RI exhibited chlorinated VOCs at concentrations exceeding Class GA standards. These wells are located in the area where chlorinated VOC contamination was identified during previous investigations and during RI activities, including the MIP study and soil boring program. The highest concentrations were detected at deep monitoring well GW-02D, screened from 10 to 20 feet below grade, where PCE, TCE, 1,2-DCE and VC were detected above Class GA standards, as well as 1,1-dichloroethene, and trans-1,2-dichloroethene. Groundwater samples from verification boring VB-01 also exhibited chlorinated VOCs at concentrations well above Class GA standards. However, neither the upgradient well GW-01 nor any of the downgradient wells exhibited chlorinated VOCs above Class GA standards. Note that MTBE was also detected above Class GA standards in existing well MW-1. NAPL was not identified in any of the groundwater monitoring wells.

SVOCs were either not detected or were detected below Class GA standards in the groundwater samples selected for analysis. Pesticides and PCBs were not detected in any of the groundwater samples. Total metals exceeding Class GA standards included iron, manganese and sodium. These metals are typically detected at elevated concentrations in urban settings.

Based on the groundwater results, we can conclude the following:

- The presence of chlorinated VOCs at concentrations above Class GA standards in groundwater is consistent with the discrete residual source area or "hot-spot" defined earlier and depicted on **Figure 2-1**.
- Based on current and historical sampling from newly installed wells GW-01, GW-03, GW-04S and GW-04D, and existing wells MW-1 and MW-2, the chlorinated VOC contamination appears limited to the residual source area and does not

appear to have migrated downgradient in groundwater. The clay-rich unit present throughout the Site likely helps limit the overall migration of contaminants.

- Groundwater flow appears to be in a general west-northwesterly direction on-site in both shallow and deep zones, and there is no discernable tidal influence. Therefore, these factors are not anticipated to have a significant effect on contaminant migration.

- Given that the contamination has not migrated and the below grade nature of the documented groundwater contamination, direct exposure of the public and on-site workers to these contaminants would not occur under current conditions. In addition, groundwater in this area of Queens is not utilized as a potable water supply source.

Air

Soil vapor sampling results suggest that the chlorinated VOCs detected in soil and groundwater in the on-site area south of the tracks have volatilized into the soil gas at concentrations above NYSDOH Air Guideline Values (AGVs), including PCE and TCE. However, soil vapor concentrations were lowest to the east and upgradient of the residual source area, in the direction of the closest on-site structure (the LIRR Engineering Support Building). Indoor air sampling completed within this building exhibited VOC concentrations below AGVs and comparable to outdoor concentrations.

Based on the air results, we can conclude the following:

- The detection of chlorinated VOCs in soil gas in the vicinity of the residual source area was expected, especially given the shallow depth to groundwater. However, there are no structures built over the area of soil and groundwater contamination, and there is no evidence that downgradient migration of the contamination is occurring. Therefore, direct exposure by inhalation of the chlorinated VOCs detected in soil gas would not be expected under current conditions.

- Comparison of the results for the sub-slab soil vapor sample and the indoor air sample using the NYSDOH decision matrices suggest that sub-slab soil vapor is not expected to significantly affect indoor air quality, and no further action is needed to address human exposures.

4.2 Recommendations

The recommendations detailed below are provided based on the findings of this Remedial Investigation and previous investigations for NYSDEC VCA Site No. V00733 at the LIRR Arch Street Yard. A residual source area or "hot-spot" of chlorinated VOC contamination exists in subsurface soil and groundwater in a discrete on-site area to the south of the tracks, which may have been dumped onto the Site by an outside party. As depicted on **Figure 2-1**, the source area encompasses approximately 680 square feet and is located approximately 8 to 16 feet below grade, and below the water table. It appears that the majority of shallow chlorinated VOC contamination was previously removed, and the current contamination is not migrating. The completed RI has adequately defined the nature and extent of contamination to allow the development of an appropriate remedy for the defined chlorinated VOC contamination. Therefore, the following is recommended:

- Given the nature of the contamination, D&B recommends that the LIRR draft a Remedial Action Work Plan (RAWP) to evaluate the feasibility of various remedial options for the chlorinated VOCs, and select the most feasible remedy for the Site. Additional investigation or delineation sampling is not recommended at this time.

- PCB contamination was not detected on-site during the RI, and was likely previously removed. Therefore, further investigation and remediation of the historical PCB contamination located in the track area is not warranted.

APPENDIX A

WORK PLAN MODIFICATIONS

Jamaica Station
Jamaica, NY 11435-4380
718 558-7405

Patrick Nowakowski
President

Long Island Rail Road

December 2, 2015

Ioana Munteanu-Ramnic, P.E.
Environmental Engineer
New York State Department of Environmental Conservation
Division of Environmental Remediation, Region 2
Hunters Point Plaza
47-40 21st Street
Long Island City, NY 11101-5401

Re: LIRR Arch Street Yard (NYSDEC VCA Site No. V00733)
Remedial Investigation
MIP Discussion and Proposed Scope of Work

Dear Ms. Munteanu-Ramnic:

D&B Engineers and Architects, P.C. (D&B) has prepared this letter on behalf of the Long Island Rail Road (LIRR) to discuss the results of the completed Membrane Interface Probe (MIP) phase of the Remedial Investigation (RI) being conducted at the LIRR Arch Street Yard (the Yard), and to propose a scope of work for the second phase of the RI, including the installation and sampling of soil borings and monitoring wells. The RI is being conducted at the 2.7 acre portion of the Yard that is subject to the Voluntary Cleanup Agreement, designated as New York State Department of Environmental Conservation (NYSDEC) Site No. V00733 (the Site).

The implementation of the MIP phase of the RI was completed in October 2015 in accordance with the NYSDEC-approved Remedial Investigation Work Plan, dated July 2015. As required by the RI Work Plan, daily reports were provided to NYSDEC during the MIP work, which included the MIP results. The summary of Completed Field Activities below also serves as the monthly progress report for October.

Completed Field Activities

The field activities for the MIP study were completed between October 5 and October 9, 2015 and between October 28 and October 30, 2015, consisting of the completion of 11 MIP locations (MIP-1 through MIP-11) and two verification borings (VB-01 and VB-02). Note that this phase of the RI was intended to be a 3-day study. However, difficult subsurface conditions required additional equipment in order to complete the hand clearing, resulting in additional field days and a delay in the field program. A completed sample location map is provided as **Figure 1** in **Attachment 1**. Daily Field Activity Reports for each day of field work were previously provided to NYSDEC and are included in **Attachment 2**.

As described in the RI Work Plan, MIP technology can detect the presence and relative concentration of chlorinated and non-chlorinated volatile organic compounds (VOCs) in both soil and groundwater by advancing instruments including: soil conductivity (SC) detector; photoionization detector (PID); flame-ionization detector (FID); and a halogen specific detector (XSD). The PID is used for the detection of aromatic VOCs (such as benzene), the FID is used for the detection of straight-chain alkanes (such as methane), and the XSD is utilized for the detection of halogenated organics including chlorinated VOCs. The objective of the MIP Study was to define the current limits of VOC contamination in the Site prior to the installation of soil borings and permanent groundwater monitoring wells.

Prior to intrusive activities, utility clearance procedures were followed, including the One-Call markouts, LIRR markouts, a geophysical study and hand clearing all locations to 5 feet. Following utility clearance, the MIPs were advanced into the subsurface using Geoprobe equipment. The logs for the completed MIPs are provided as **Attachment 3**. Each MIP location was completed until refusal, which was encountered at a depth between 20 and 30 feet below grade at all locations except for MIP-11 where refusal was encountered at a depth of 15 feet below grade. Based on USGS data for this area of Queens, it is suspected that the refusal is bedrock-related. Groundwater was observed at a depth of approximately 3 to 5 feet below grade.

Two Geoprobe verification borings (VB-01 and VB-02) were completed at two MIP locations (MIP-2 and MIP-6, respectively), that were selected by D&B in order to collect subsurface soil and groundwater samples for analysis to verify the MIP results. Verification boring VB-01 was completed at the MIP-2 location to confirm the XSD/PID/FID detections at this location. Verification boring VB-02 was completed at the MIP-6 location to investigate the FID-only detections found at the remaining MIP locations. Boring logs are provided as **Attachment 4**.

Subsurface soil samples were collected for analysis using the Encore sampling method in accordance with USEPA Method 5035. Groundwater samples were collected by driving probe rods to the designated sample depth and installing a temporary well point. A portable peristaltic pump with disposable tubing was used to purge and sample using USEPA low-flow sampling techniques, and new tubing was used between each interval. The purge water was monitored in the field for the following parameters utilizing a calibrated multiple parameter water quality instrument: pH, conductivity, turbidity, dissolved oxygen, temperature and oxidation-reduction potential. After stabilization, groundwater samples were collected for laboratory analysis.

One subsurface soil sample and two groundwater samples were collected from each verification boring for laboratory analysis for Target Compound List (TCL) VOCs by USEPA Method 8260. Data summary tables are provided as **Attachment 5**. The following samples were collected:

- Subsurface soil samples: VB-01 (13 to 15 feet) and VB-02 (12 to 14 feet)
- Groundwater samples: VB-01 (15 to 16 feet), VB-01 (26 to 27 feet), VB-02 (5 feet) and VB-02 (12 to 14 feet)

Findings

As indicated on the MIP logs provided in **Attachment 3**, only MIP-2 exhibited evidence of chlorinated VOCs, with elevated XSD detections above background. There were no XSD detections above background at MIP-2 until a depth of approximately 10 feet below grade, which is approximately 6 feet below the water table. The maximum XSD detection of 794 mV was observed at a depth of approximately 12.5 feet below grade, above the background level of 17 mV. The XSD detections then slowly decreased with depth until refusal at 23 feet below grade, suspected to be bedrock. The PID and FID results showed a similar pattern, hitting the maximum detection limit of 5,000 mV at a depth of approximately 14.5 to 15 feet below grade.

The results of verification boring VB-01 confirmed the presence of chlorinated VOCs at MIP-2. As indicated on the boring log provided in **Attachment 4**, a maximum PID reading of 250 ppm and a hydrocarbon-like odor were observed in VB-01 from approximately 12 to 13 feet below grade. As indicated on the data summary tables provided in **Attachment 5**, subsurface soil sample VB-01 (13 to 15 feet) exhibited a tetrachloroethene (PCE) concentration of 1,160.9 mg/kg, above the Restricted-Residential Use SCO of 19 mg/kg and the Industrial Use SCO of 300 mg/kg. Groundwater samples VB-01 (15 to 16 feet) and (26 to 27 feet) exhibited PCE, trichloroethene (TCE), cis-1,2-dichloroethene (1,2-DCE) and vinyl chloride (VC) at concentrations well above Class GA groundwater standards. The highest concentrations were detected in groundwater sample VB-01 (15 to 16 feet), with PCE exhibiting the maximum individual concentration of 17,600 ug/l, above the groundwater standard of 5 ug/l.

The other MIP locations did not exhibit elevated XSD detections above background. Although some spikes in PID detections above background were observed at MIP-1, MIP-4, MIP-5 and MIP-6, these detections were not sustained and were at least one order of magnitude lower than those detected at MIP-2. Some peaks in FID detections were observed in most MIP locations. However, in the absence of XSD or PID detections, it is likely that the FID detections are related to methane derived from organic decomposition. Note that verification boring VB-02, completed in the location of MIP-6, exhibited clay with peat and organic material at depths coinciding with FID peaks, with no indication of contamination.

The analytical results from verification boring VB-02 were consistent with the MIP findings, with significantly lower chlorinated VOC concentrations compared with verification boring VB-01. Subsurface soil sample VB-02 (12 to 14 feet) exhibited detectable concentrations of several VOCs, including chlorinated VOCs such as PCE, TCE and 1,2-DCE, but at concentrations well below Restricted-Residential Use and Industrial Use SCOs. Groundwater sample VB-02 (5 feet), collected at the water table, exhibited 1,2-DCE and VC at concentrations of 36 ug/l and 17.9 ug/l, respectively, above their respective Class GA groundwater standards of 5 ug/l and 2 ug/l. VOCs were not detected above Class GA groundwater samples in the deeper groundwater sample, VB-02 (12 to 14 feet).

Proposed Scope of Work

MIP-2 and the follow-up verification boring VB-01 identified a chlorinated VOC hot-spot between a depth of 10 feet below grade and refusal at 23 to 27 feet below grade, with the highest concentrations found at approximately 12 to 16 feet below grade. Based on the lack of response in the XSD detector at the other MIPs, this hot-spot appears to be localized to the immediate vicinity of MIP-2. Therefore, the majority of soil borings to be completed as part of the next investigation phase should be placed in close proximity of MIP-2 to better define the source area for remediation purposes. Eight soil borings (SB-01 through SB-08) are proposed to be completed at this time, keeping four soil borings as a contingency in the event that additional delineation is necessary. The proposed soil borings are depicted on **Figure 1** provided in **Attachment 1**.

With regard to the monitoring wells, the RI Work Plan calls for a maximum of seven wells to be installed. However at this phase of the project, the LIRR proposes to install four monitoring wells (GW-01 through GW-04). The proposed monitoring well locations are depicted on **Figure 1** provided in **Attachment 1**. The remaining three monitoring wells would be installed at a later date if necessary. Each well would be installed with 10 feet of screen below the water table at a depth of approximately 10 to 20 feet below grade in order to intercept the highest chlorinated VOC concentrations observed at MIP-2/VB-01. The screen zones may be modified in the field in consultation with the NYSDEC depending on findings from the planned soil borings.

Assuming a westerly groundwater flow direction, which has not been confirmed, monitoring well GW-01 will be completed upgradient of the area of contamination, and wells GW-03 and GW-04 will completed downgradient of the area of contamination. Monitoring well GW-02 will be completed in the vicinity of the area of contamination. Note that three existing monitoring wells MW-1 through MW-3 were observed in the locations depicted on Figure 1. Existing well MW-4 could not be located. The four newly installed and three existing monitoring wells will be developed and sampled to determine groundwater quality. In addition, these wells will be surveyed and water levels collected to confirm groundwater flow direction and any tidal influence on groundwater flow.

As described in the RI Work Plan, soil samples will be collected for characterization and analysis during the installation of the monitoring wells, except for monitoring well GW-02 which will be completed in the location of soil boring SB-06. The PCB soil investigation will also be completed as part of this next phase of the RI in accordance with the NYSDEC-approved RI Work Plan.

If you have any questions or comments, please do not hesitate to call me at (347) 494-6034.

Sincerely,

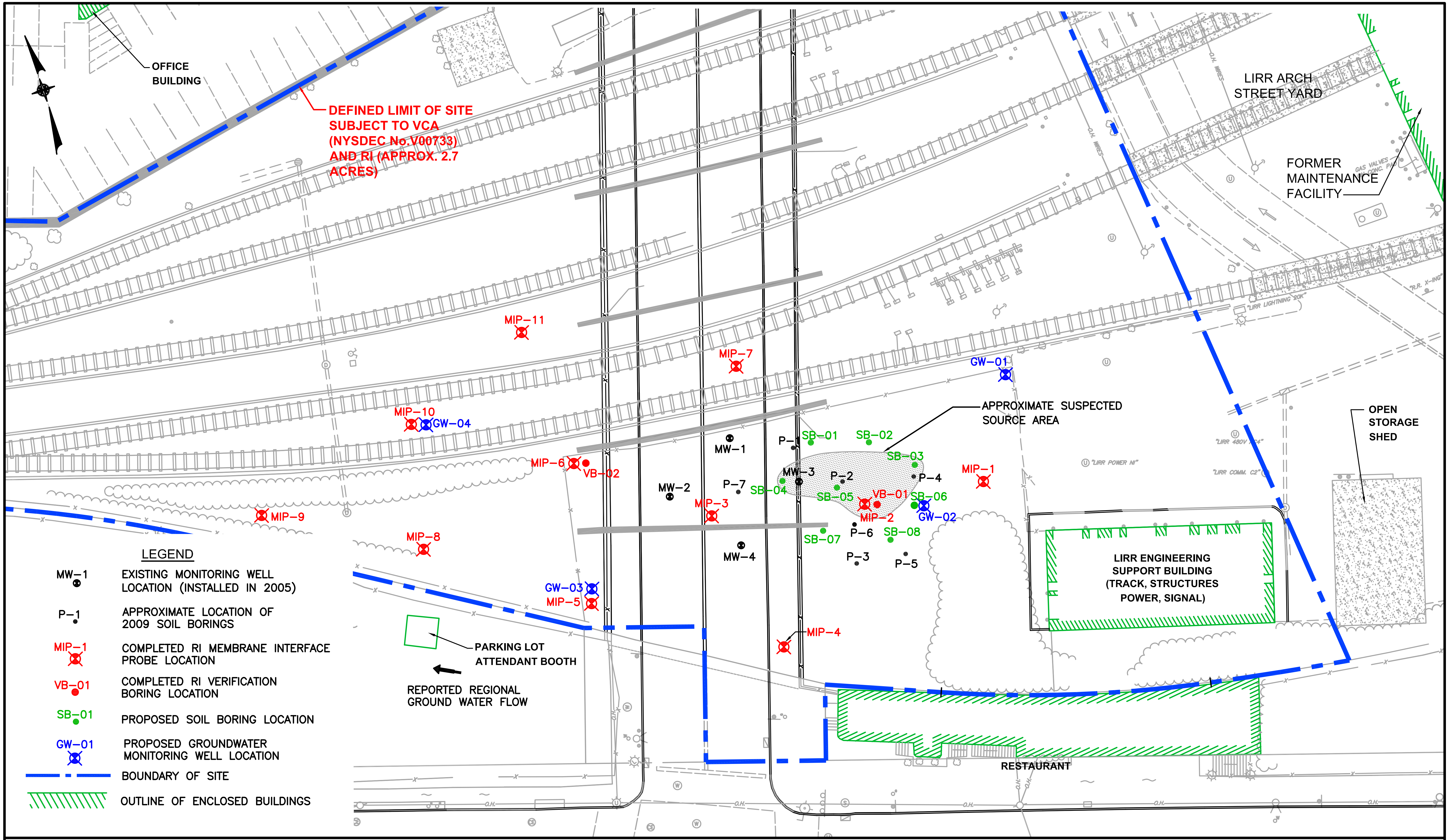
Gloria Russo

Gloria Russo
Manager - Environmental
Planning & Compliance

GR/AMC(t)/nc
Attachment
cc: K. Green (LIRR)
T. Fox (D&B)
A. Caniano (D&B)

ATTACHMENT 1

SAMPLE LOCATION MAP



D&B ENGINEERS AND ARCHITECTS, P.C.

LONG ISLAND RAILROAD - ARCH STREET YARD
LONG ISLAND CITY, NY - REMEDIAL INVESTIGATION

SAMPLE LOCATION MAP

SCALE: 1"=30'

FIGURE 1

F:\3455\MTA\Dwg\FIGURES\3455-FIG-1 SAMPLE LOCATION MAP_2.dwg, 12/2/2015 1:38:38 PM, Adobe PDF.pc3

ATTACHMENT 2

DAILY FIELD ACTIVITY REPORTS

D&B ENGINEERS
AND
ARCHITECTS, P.C.

DAILY FIELD ACTIVITY REPORT
10/5/15

Report Date : 10/5/2015 Project Number: 3455-2D

Field Log Book Page Number: 1

Project: LIRR – Arch Street Yard Remedial Investigation, NYSDEC VCA Site No. V00733

Address: Arch Street Yard, Long Island City, New York

Weather: (AM)	Overcast	Rainfall: (AM)	None	Inch
(PM)	Clear	(PM)	None	Inches

Temperature: (AM)	60	ºF	Wind Speed: (AM)	0-5	MPH	Wind Direction: (AM)	SW
(PM)	70	ºF	(PM)	0-5	MPH	(PM)	SW

Site Condition: Gravel service yard, railroad tracks, track beds.

Personnel On Site:	Name	Affiliation	Arrival Time	Departure Time
	Anthony Caniano	D&B	1045	1230
	Paul Barusich	D&B	1045	1230
	Kathleen Green	LIRR	1100	1230

Subcontractor Work Commencement:	(AM)	--	(PM)	--
Subcontractor Work Completion:	(AM)	--	(PM)	--

DAILY FIELD ACTIVITY REPORT
10/5/15

Three existing on-site wells were located, including MW-1, MW-2 and MW-3. Existing well MW-4 could not be located.

Site access was discussed, including access to the site through the entrance gate and guard booth, and use of combination lock to access fenced area. An equipment/IDW storage area within the fenced area was selected. The completion of some LIRR markouts were verified with the remaining markouts to be completed before intrusive work begins.

The MIP locations (MIP-1 through MIP-11) and shallow PCB soil boring locations (SB-13 to SB-21) were measured, located and marked with survey flags. MIP locations MIP-8 and MIP-9, and soil boring location SB-19 will require cutting of the chain link fence at the western end of the fenced area in order to obtain access. These locations may also need to be moved several feet to avoid the thick vegetation in the area.

Locations in the track areas may require moving several feet in order to avoid track infrastructure, such as the de-energized third rail. Site photos and measurements of work area were taken, and have been sent to drilling contractor to verify access.

Site activities tomorrow, 10/6/15, will include a geophysical survey by D&B's contractor to mark out utilities and clear the selected locations.

MIP locations will begin on Wednesday, 10/7/15.

D&B ENGINEERS
AND
ARCHITECTS, P.C.

DAILY FIELD ACTIVITY REPORT
10/6/15

Report Date : 10/6/2015 Project Number: 3455-2D

Field Log Book Page Number: 2

Project: LIRR – Arch Street Yard Remedial Investigation, NYSDEC VCA Site No. V00733

Address: Arch Street Yard, Long Island City, New York

Weather: (AM) Clear Rainfall: (AM) None Inch
(PM) Clear (PM) None Inches

Temperature: (AM) 60 ºF Wind Speed: (AM) - MPH Wind Direction: (AM) -
(PM) 70 ºF (PM) - MPH (PM) -

Site Condition: Gravel service yard, railroad tracks, track beds.

Personnel On Site:

Name	Affiliation	Arrival Time	Departure Time
Paul Barusich	D&B	0650	1120
Greg Gournier	AGS	0800	1120

Subcontractor Work Commencement: (AM) 0800 (PM) --

Subcontractor Work Completion: (AM) -- (PM) 1120

DAILY FIELD ACTIVITY REPORT
10/6/15

Advanced Geological Services (AGS) conducted a geophysical survey of the Site, including the planned MIP locations (MIP-1 through MIP-11) and shallow PCB soil boring locations (SB-13 to SB-21). AGS marked out utilities and cleared the sample locations. In addition, LIRR utility markouts were proceeding.

All locations were found to be clear of utilities. Currently, none of the locations have had to be relocated due to the presence of utilities.

Site activities tomorrow, 10/7/15, will include the start of the MIP locations.

D&B ENGINEERS
AND
ARCHITECTS, P.C.

DAILY FIELD ACTIVITY REPORT
10/7/15

Report Date : 10/7/2015 Project Number: 3455-2D

Field Log Book Page Number: 3

Project: LIRR – Arch Street Yard Remedial Investigation, NYSDEC VCA Site No. V00733

Address: Arch Street Yard, Long Island City, New York

Weather: (AM)	Clear	Rainfall: (AM)	None	Inch
(PM)	Clear	(PM)	None	Inch

Temperature: (AM)	60	ºF	Wind Speed: (AM)	0-5	MPH	Wind Direction: (AM)	NW
(PM)	70	ºF	(PM)	0-5	MPH	(PM)	NW

Site Condition: Gravel service yard, railroad tracks, track beds.

Personnel On Site:

Name	Affiliation	Arrival Time	Departure Time
Anthony Caniano	D&B	1145	1315
Paul Barusich	D&B	0645	1530
Mike Ryan	Zebra	0700	1530
John Rizio	Zebra	0700	1530

Subcontractor Work Commencement:	(AM)	0700	(PM)	--
Subcontractor Work Completion:	(AM)	--	(PM)	1530

DAILY FIELD ACTIVITY REPORT
10/7/15

Zebra attempted to hand-clear Membrane Interface Probe (MIP) locations MIP-1 through MIP-6 within the fenced area using hand tools, but a thick layer of concrete was encountered anywhere from 5 to 10 inches below grade at these locations. At location MIP-7, the bluestone at the surface was found to be at least 2 feet thick, and caving-in prevented hand clearing at this location.

Zebra utilized the Geoprobe drill steel to break through the concrete layer at location MIP-2 to complete hand clearing to 5 feet. Groundwater was present at approximately 3 to 4 feet below grade. MIP-2 was completed with readings collected to 23 feet below grade where refusal was encountered. Based on bedrock data for this area of Queens from the USGS, this refusal is possibly bedrock.

Attached is the MIP log for MIP-2. As indicated, there was a strong detection of VOCs by the XSD, PID and FID sensors starting approximately 12 to 13 feet below grade, approximately 8 to 10 feet below the water table. The signal declined slowly over depth but was still detected at the refusal depth of 23 feet below grade. Note that the XSD probe detects chlorinated solvents.

After completing the MIP-2 location, Zebra attempted break through the concrete layer at location MIP-1, using the Geoprobe drill steel. However, the drill steel became stuck within the thick concrete layer, and could not be retrieved. D&B, Zebra and LIRR discussed that the potential origin of this concrete layer is unknown, but that it may be related to the footings for the current or a former bridge. Utilities were marked out by LIRR and the geophysical contractor and are being avoided during the MIP program.

Site activities on 10/8/15, will include hand-clearing and concrete coring using additional equipment that Zebra will bring on-site (air compressor, core drill, and additional hand tools) for the MIP borings, as well as the retrieval of the Geoprobe drill steel from location MIP-1. The focus will be on clearing the locations, and most likely MIP work will not be completed. The MIP work will resume Friday assuming the locations can be successfully cleared.

DAILY FIELD ACTIVITY REPORT
10/8/15

Report Date : 10/8/2015 Project Number: 3455-2D

Field Log Book Page Number: 13

Project: LIRR – Arch Street Yard Remedial Investigation, NYSDEC VCA Site No. V00733

Address: Arch Street Yard, Long Island City, New York

Weather: (AM) Clear Rainfall: (AM) None Inch

(PM) Clear (PM) None Inch

Temperature: (AM) 65 ºF Wind Speed: (AM) 0-5 MPH Wind Direction: (AM) NW

(PM) 70 ºF (PM) 0-10 MPH (PM) NW

Site Condition: Gravel service yard, railroad tracks, track beds.

Personnel On Site:

Name	Affiliation	Arrival Time	Departure Time
Paul Barusich	D&B	0650	1600
Mike Ryan	Zebra	0730	1600
Alex Elhedity	Zebra	0730	1600
John Diamond	Zebra	0810	1600
Ioana Munteanu-Ramnic	NYSDEC	1010	1020
Gloria Russo	LIRR	1035	1045
Kathleen Green	LIRR	1035	1045

Subcontractor Work Commencement: (AM) 0730 (PM) --

Subcontractor Work Completion: (AM) -- (PM) 1600

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DAILY FIELD ACTIVITY REPORT
10/8/15

The MIP contractor, Zebra, utilized hand tools, an air-knife and mini-vacuum powered by compressed air, and completed hand-clearing of the remaining MIP locations inside the Site's fenced area from 0 to 5 feet below grade. These locations included MIP-1 and MIP-3 through MIP-6. The Geoprobe drill steel which was previously stuck at the MIP-1 location was removed from the ground.

In addition to concrete and coarse fill, soil conditions consisted of very dense, dark brown sandy soil, with some gravel and a trace of silt. All photoionization detector (PID) readings were non-detect from the hand cleared zones. No staining or odors were noted.

Outside the fenced area, Zebra was able to determine the bluestone layer at the MIP-7 location (in the track areas) was approximately 2.25 ft. thick, and underlain by a hard surface, possibly concrete.

Site activities on 10/9/15 will include completing the MIP locations within the fenced area of the Site that have now been hand cleared, including MIP-1 and MIP-3 through MIP-6. Additional locations will be hand cleared and completed as time allows.

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DAILY FIELD ACTIVITY REPORT
10/9/15

Report Date : 10/9/2015 Project Number: 3455-2D

Field Log Book Page Number: 20

Project: LIRR – Arch Street Yard Remedial Investigation, NYSDEC VCA Site No. V00733

Address: Arch Street Yard, Long Island City, New York

Weather: (AM) Overcast Rainfall: (AM) None Inch
(PM) Overcast (PM) None Inch

Temperature: (AM) 65 ºF Wind Speed: (AM) 0 MPH Wind Direction: (AM) ---
(PM) 70 ºF (PM) 0-5 MPH (PM) NW

Site Condition: Gravel service yard, railroad tracks, track beds.

Personnel On Site:

Name	Affiliation	Arrival Time	Departure Time
Paul Barusich	D&B	0645	1215
Mike Ryan	Zebra	0700	1500
John Diamond	Zebra	0700	1500
Ioana Munteanu-Ramnic	NYSDEC	1040	1110

Subcontractor Work Commencement: (AM) 0700 (PM) --

Subcontractor Work Completion: (AM) -- (PM) 1500

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DAILY FIELD ACTIVITY REPORT
10/9/15

The MIP contractor, Zebra, utilized the Geoprobe to complete the MIP locations within the fenced area of the Site that have been hand cleared to 5 feet below grade. These locations included MIP-1 and MIP-3 through MIP-6. MIP-1, MIP-3, MIP-4, MIP-5 and MIP-6 were completed with readings collected to 26 feet below grade, 23.45 feet below grade, 25.25 feet below grade, 26.8 feet below grade and 26.05 feet below grade, respectively where refusal was encountered. Based on bedrock data for this area of Queens from the USGS, this refusal is possibly bedrock.

D&B gauged depth to water from three ground water monitoring wells within the fenced area of the Site. The groundwater monitoring wells gauged were MW-1 through MW-3. Depth to water at well MW-1, MW-2 and MW-3 were at 3.56 feet, 4.65 feet and 5.19 feet, respectively from the top of the casing.

Attached are the MIP logs for MIP-1 and MIP-3 through MIP-6. As indicated, for MIP-1 there was a slight detection of VOCs by the PID and FID sensors starting approximately 12 to 13 feet below grade. The signal declined quickly after 16 feet below grade but was still detected at the refusal depth of 23.45 feet below grade. For MIP-3 and MIP 5, there was a strong detection of VOCs by the FID sensor starting approximately 14 feet below grade, then the signal declined quickly at approximately 16 feet below grade. For MIP-4, there was a strong detection of VOCs by the PID and FID sensors starting at the refusal depth of 25 feet below grade. For MIP-6, there was a strong detection of VOCs by the PID and FID sensors starting at approximately 13-14 feet below grade, then the signal declines quickly at approximately 15-16 feet below grade. VOCs were not detected by the XSD sensor in any of the above MIP locations. Note that the XSD probe detects chlorinated solvents.

Outside the fenced area, Zebra, attempted to hand-clear location MIP-8 using hand tools, refusal was encountered at 24 inches below grade. In addition to concrete and coarse fill, soil conditions consisted of medium dense, dark brown sandy soil, with some gravel and a trace of silt. The PID reading was non-detect from the hand cleared zone. No staining or odors were noted.

Site activities on 10/13/15 will include completing hand clearing of the MIP locations outside the fenced area of the Site, including MIP-7 through MIP-11.

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DAILY FIELD ACTIVITY REPORT
10/28/15

Report Date : 10/28/2015 Project Number: 3455-2D

Field Log Book Page Number:

Project: LIRR – Arch Street Yard Remedial Investigation, NYSDEC VCA Site No. V00733

Address: Arch Street Yard, Long Island City, New York

Weather:	(AM)	Cloudy, Rain	Rainfall: (AM)	0.5	Inch
	(PM)	Cloudy, Rain	(PM)	0.5	Inch

Temperature: (AM)	60	ºF	Wind Speed: (AM)	10-20 MPH	Wind Direction: (AM)	SE
(PM)	65	ºF	(PM)	10-20 MPH	(PM)	SE

Site Condition: Gravel service yard, railroad tracks, track beds.

Personnel On Site:

Name	Affiliation	Arrival Time	Departure Time
Keith Robins	D&B	0715	1600
John Puzio	Zebra	0700	1600
Alex Elhadidy	Zebra	0700	1600
Kathleen Green	LIRR	0820	1400

Subcontractor Work Commencement:	(AM)	0700	(PM)	--
Subcontractor Work Completion:	(AM)	--	(PM)	1600

D&B ENGINEERS AND ARCHITECTS, P.C.

DAILY FIELD ACTIVITY REPORT
10/28/15

The MIP contractor, Zebra, utilized hand tools, an air-knife and mini-vacuum powered by compressed air, and completed hand-clearing of the remaining MIP locations from 0 to 5 feet below grade. These locations included MIP-8 through MIP-11. MIP-7 was cleared to 3 feet and will require some additional clearance activities before completing the MIP. An additional location next to previously completed MIP-2 within the fenced area was also cleared to 5 feet in anticipation of completing a verification boring at this location.

Up to 2 feet of bluestone was encountered at locations MIP-7, MIP-10 and MIP-11. In addition to brick, concrete and coarse fill, soil conditions consisted of compacted dark brown sandy soil, with some gravel and a trace of silt. In general, no staining or odors were noted.

Site activities on 10/29/15 will include completing the remaining MIP locations that have now been hand cleared, including MIP-7 through MIP-11. Additional locations will be hand cleared and completed as time allows, as will the verification borings.

DAILY FIELD ACTIVITY REPORT
10/29/15

Report Date : 10/29/2015 Project Number: 3455-2D

Field Log Book Page Number:

Project: LIRR – Arch Street Yard Remedial Investigation, NYSDEC VCA Site No. V00733

Address: Arch Street Yard, Long Island City, New York

Weather:	(AM)	Partly Cloudy	Rainfall:	(AM)	None	Inch
	(PM)	Partly Cloudy		(PM)	None	Inch

Temperature:	(AM)	65	ºF	Wind Speed:	(AM)	10-15	MPH	Wind Direction:	(AM)	SW
	(PM)	70	ºF		(PM)	10-15	MPH		(PM)	SW

Site Condition: Gravel service yard, railroad tracks, track beds.

Personnel On Site:

Name	Affiliation	Arrival Time	Departure Time
Carl Schmidlapp	D&B	0645	1300
John Puzio	Zebra	0700	1230
Mike Ryan	Zebra	0700	1230

Subcontractor Work Commencement:	(AM)	0700	(PM)	--
Subcontractor Work Completion:	(AM)	--	(PM)	1230

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DAILY FIELD ACTIVITY REPORT
10/29/15

The MIP contractor, Zebra, utilized the Geoprobe to complete the five remaining MIP locations outside the fenced area of the Site that have been hand cleared to 5 feet below grade. These locations included MIP-7 through MIP-11. The MIP logs are attached. Refusal was encountered between 20 and 30 feet below grade except for MIP-11 where refusal was encountered at approximately 15 feet below grade. Based on bedrock data for this area of Queens from the USGS, this refusal is possibly bedrock.

As indicated, there were detections by the FID at MIP-7 through MIP-11, which is similar to the results for MIP-1 through MIP-6. Since there were generally no corresponding detections by the PID or XSD, it is possible that the FID detections are related to the matrix (e.g., methane in a former wetland area) rather than contamination. Two verification borings are planned for 10/30/15 as described below and a soil boring/monitoring well program is the next phase of work for the RI.

With this work, the MIP program is complete.

Site activities on 10/30/15 will include completing two verification soil borings at two of the MIP locations to confirm the MIP findings. Soil and groundwater samples will be collected for VOCs as per the Work Plan. Verification borings are planned for MIP-2 to confirm the XSD/PID/FID detections at the location, and MIP-6 to investigate the FID-only detections found at the remaining locations.

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DAILY FIELD ACTIVITY REPORT
10/30/15

Report Date : 10/30/2015 Project Number: 3455-2D

Field Log Book Page Number:

Project: LIRR – Arch Street Yard Remedial Investigation, NYSDEC VCA Site No. V00733

Address: Arch Street Yard, Long Island City, New York

Weather: (AM)	Clear	Rainfall: (AM)	None	Inch
(PM)	Clear	(PM)	None	Inch

Temperature: (AM)	55	ºF	Wind Speed: (AM)	10-15	MPH	Wind Direction: (AM)	NW
(PM)	60	ºF	(PM)	10-15	MPH	(PM)	NW

Site Condition: Gravel service yard, railroad tracks, track beds.

Personnel On Site:

Name	Affiliation	Arrival Time	Departure Time
Carl Schmidlapp	D&B	0655	1530
John Puzio	Zebra	0730	1530
Quincy Brandt	Zebra	0750	1530

Subcontractor Work Commencement:	(AM)	0800	(PM)	--
Subcontractor Work Completion:	(AM)	--	(PM)	1530

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DAILY FIELD ACTIVITY REPORT
10/30/15

The MIP contractor, Zebra, utilized the Geoprobe to complete two verification soil borings at two of the MIP locations to confirm the MIP findings. Continuous soil sampling was completed to refusal and soil and groundwater samples were collected for VOC analysis as per the work plan.

Verification boring VB-01 was completed at the MIP-2 location to confirm the XSD/PID/FID detections at this location. Refusal was encountered at approximately 27 feet below grade where a rock was found in the end of the point (refusal had been at approximately 24 feet below grade during the MIP). At approximately 12 to 13 feet below grade, a maximum PID reading of 250 ppm was observed with a petroleum-like odor immediately above a finer organic-rich clay zone. This depth is similar to where the MIP exhibited the highest XSD/PID/FID detection. A soil and groundwater sample were collected from this zone for VOC analysis, and a groundwater sample was also collected from the base of the boring.

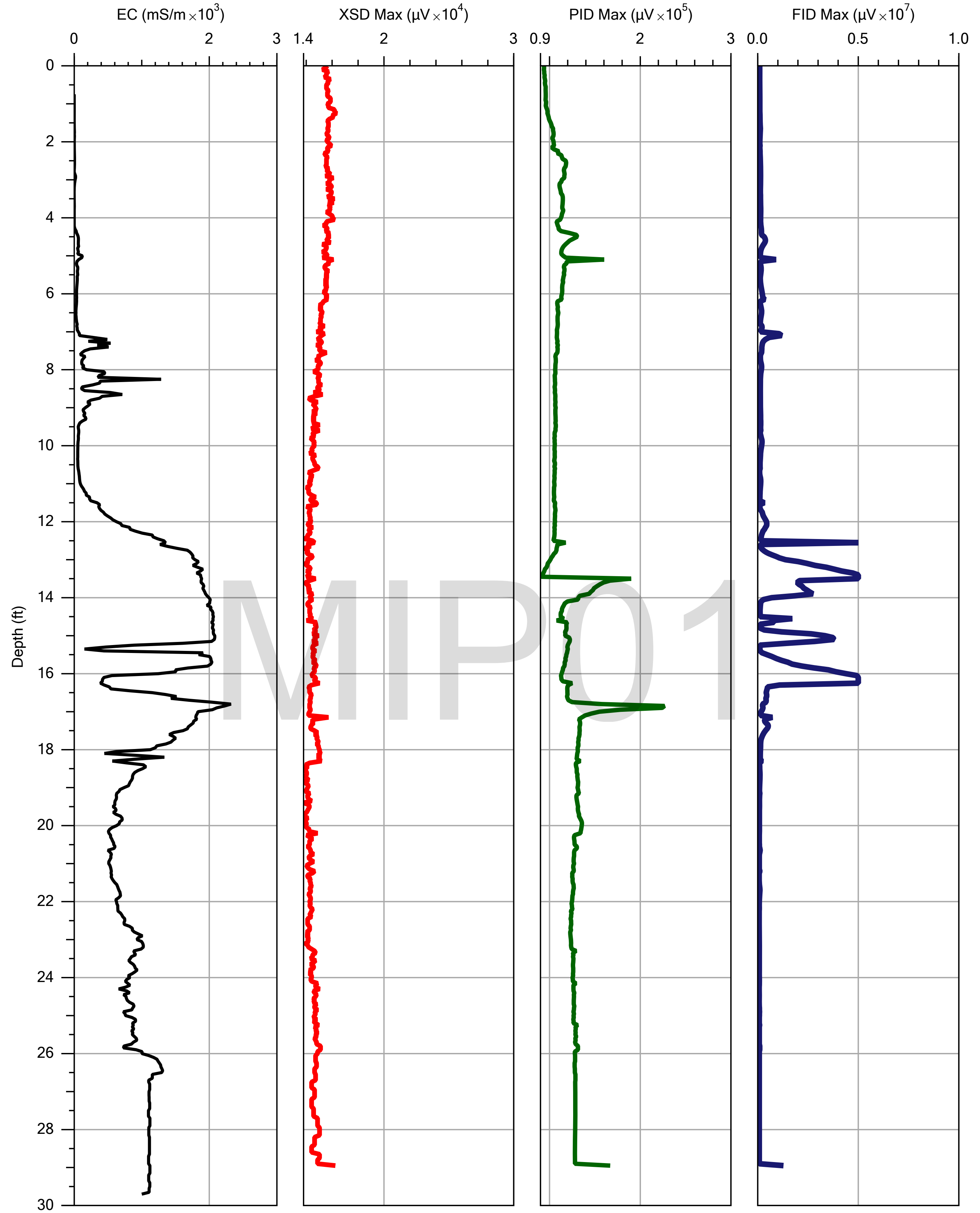
Verification boring VB-02 was completed at the MIP-6 location to investigate the FID-only detections found at the remaining MIP locations. Refusal was encountered at approximately 26-27 feet below grade (same depth as during the MIP). No evidence of contamination was observed, and the only odor was organic (natural). A soil sample and groundwater sample was collected for VOC analysis at 12 to 14 feet below grade where there was a small PID and FID detection during the MIP. Clay and organic material were observed at this zone. A water table groundwater sample was also collected at approximately 5 feet below grade.

With this work, the verification boring program is complete.

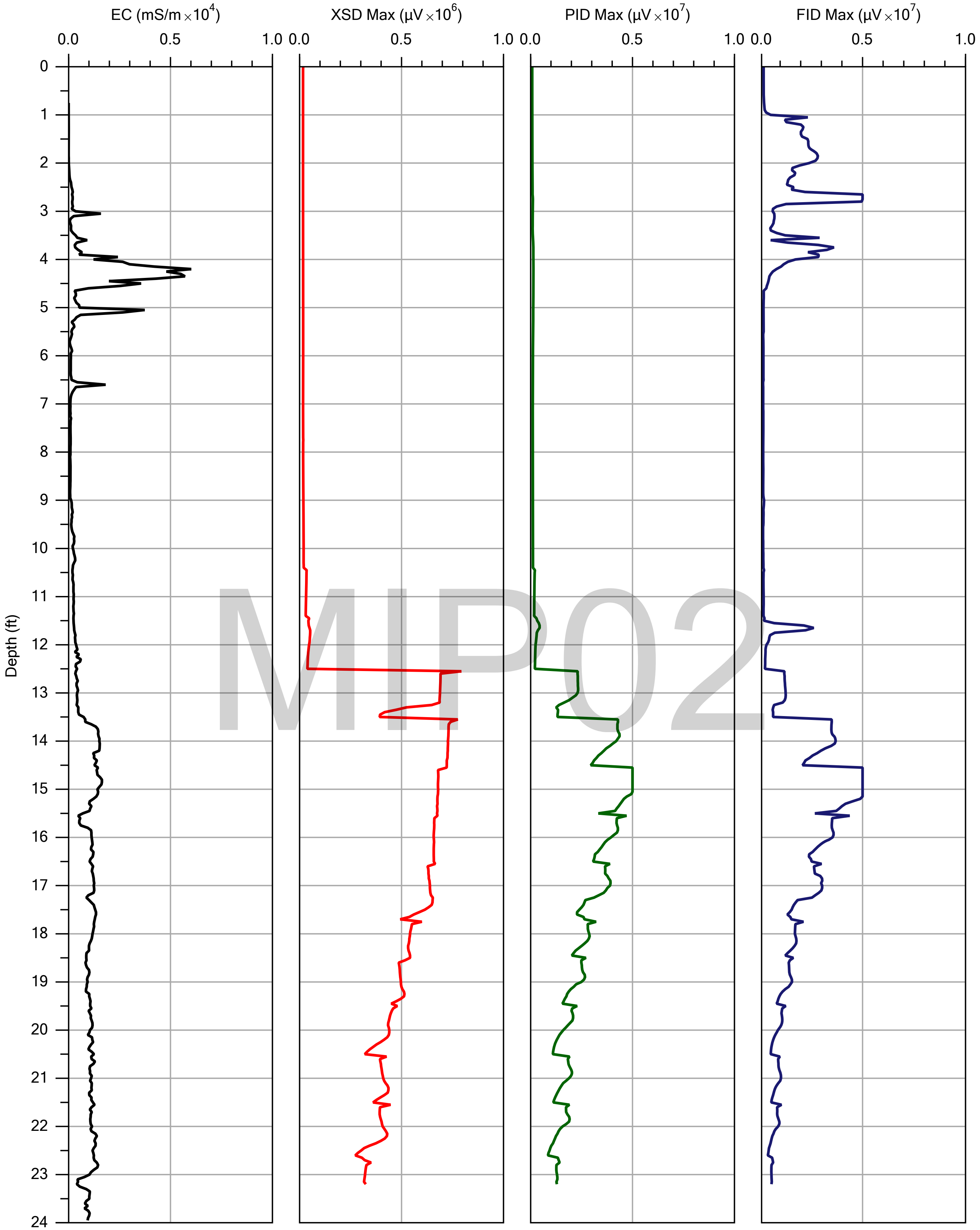
The next phase of fieldwork (soil borings/monitoring wells) is not currently scheduled pending analysis of the MIP and verification boring results. The analysis of the results will determine where soil borings and monitoring wells are to be installed.

ATTACHMENT 3

MIP LOGS

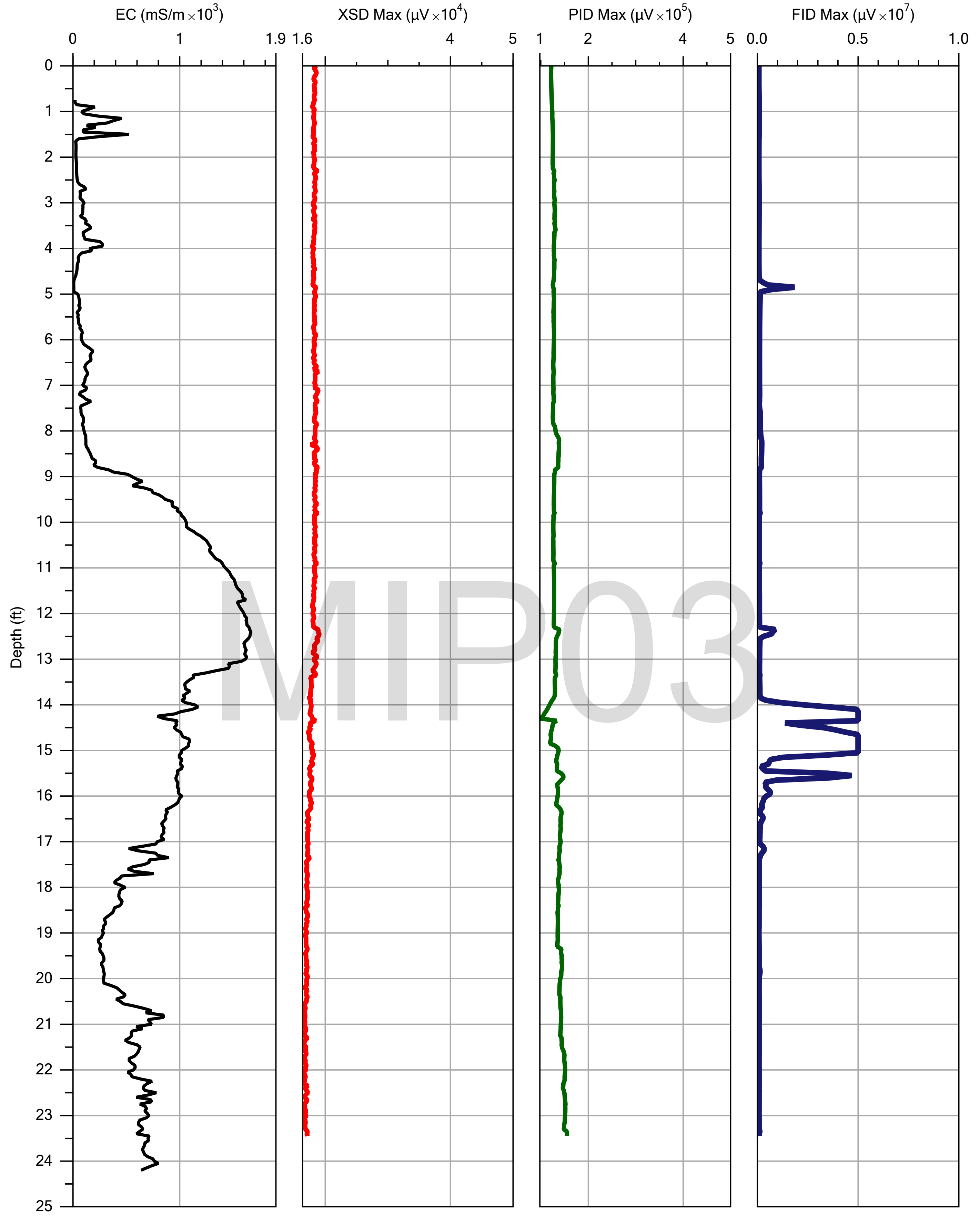


		File: MIP1.MIP
Company: ZTS	Operator: Mike Ryan	Date: 10/9/2015
Project ID: LIRR Arch Street Yard	Client: D&B Engineers and Architects	Location:



		File: MIP2.MIP
Company: ZTS	Operator: MR	Date: 10/7/2015
Project ID: LIRR Arch Street Yard	Client: D&B Engineers and Architects,	Location:

ZEBRA Technical Services - Subsurface Sampling, Injections and Data Collection for Environmental Professionals Since 1992.



File: MIP3.MIP

Company: ZTS

Operator: Mike Ryan

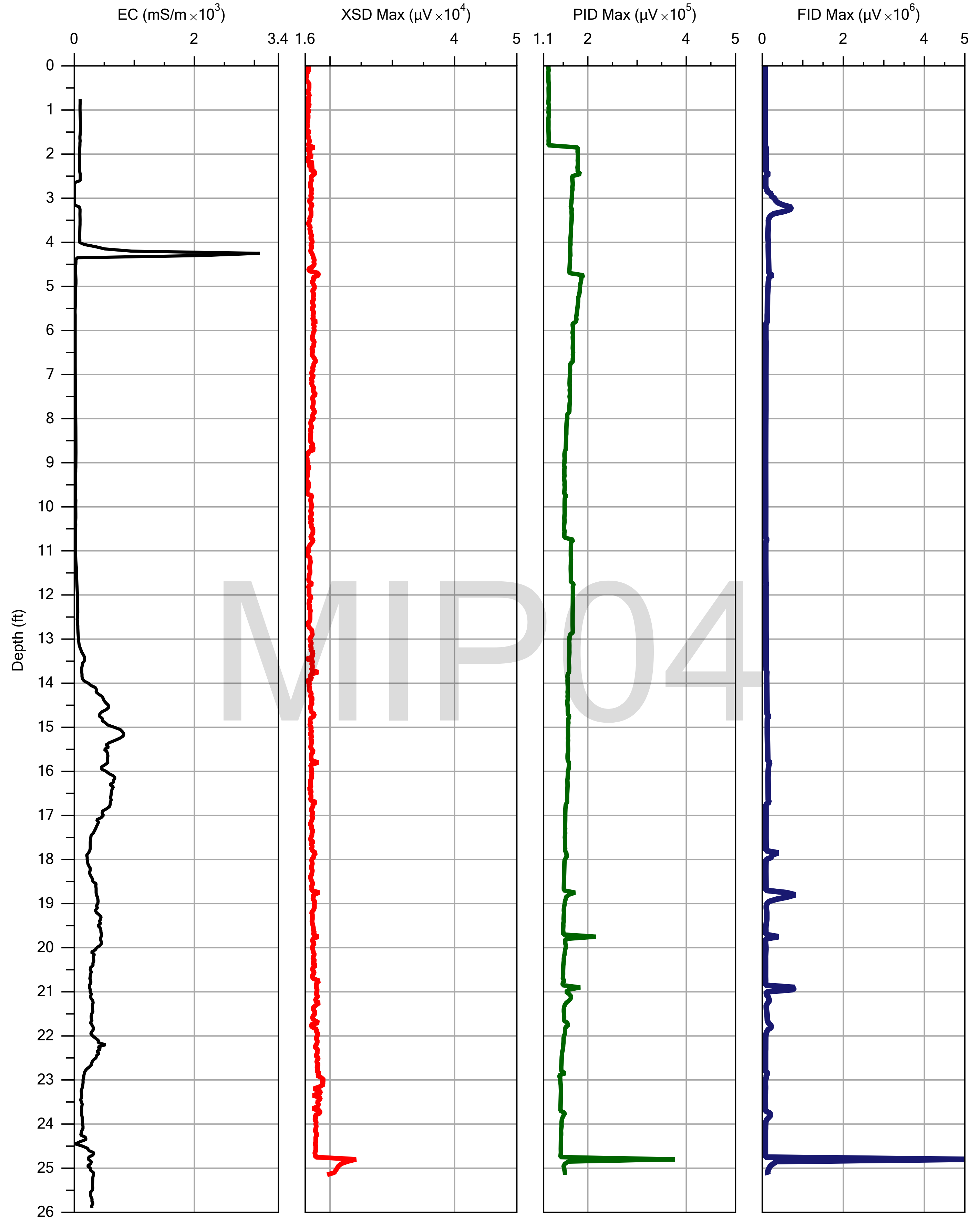
Date: 10/9/2015

Project ID: LIRR Arch Street Yard

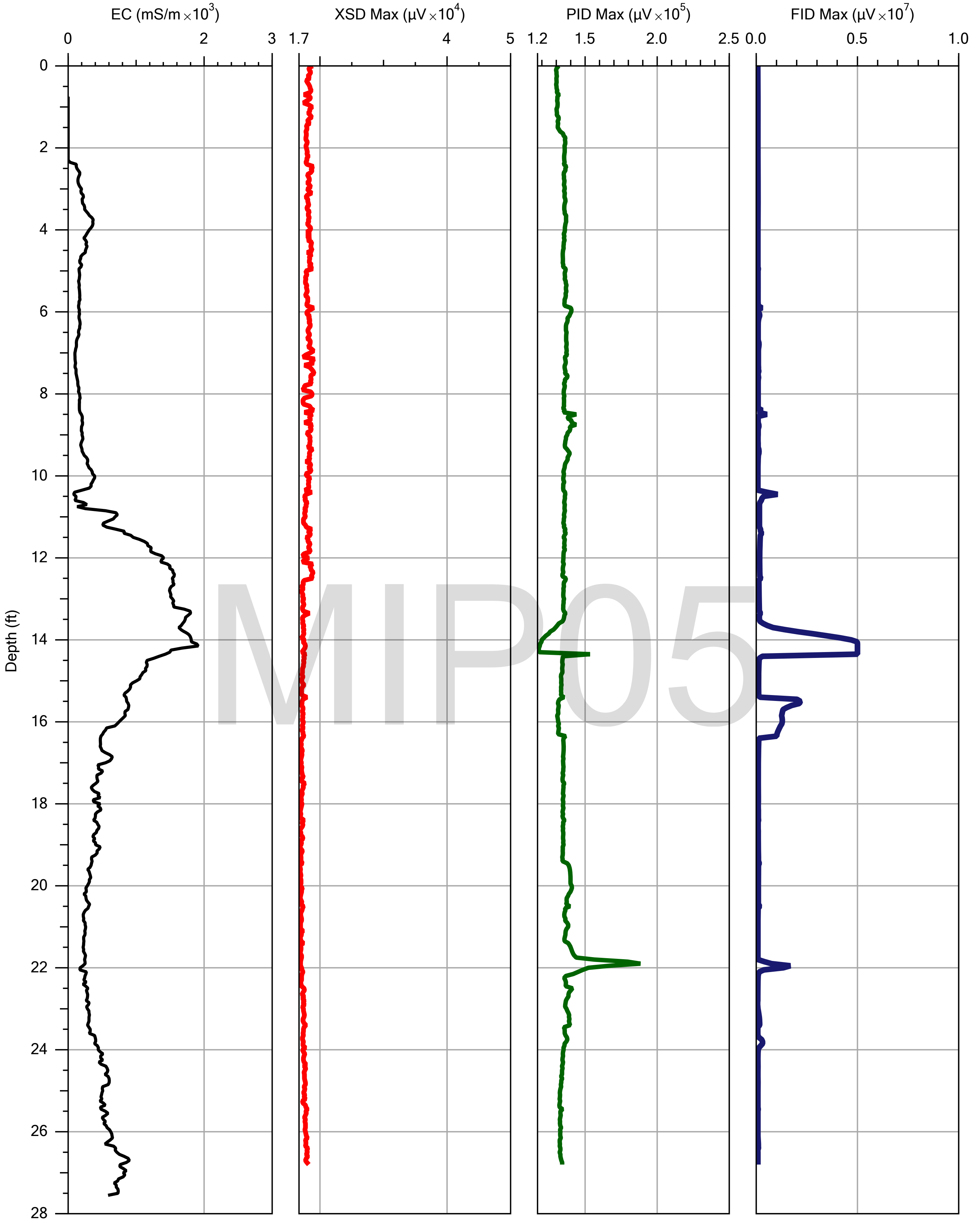
Client: D&B Engineers and Architects

Location:

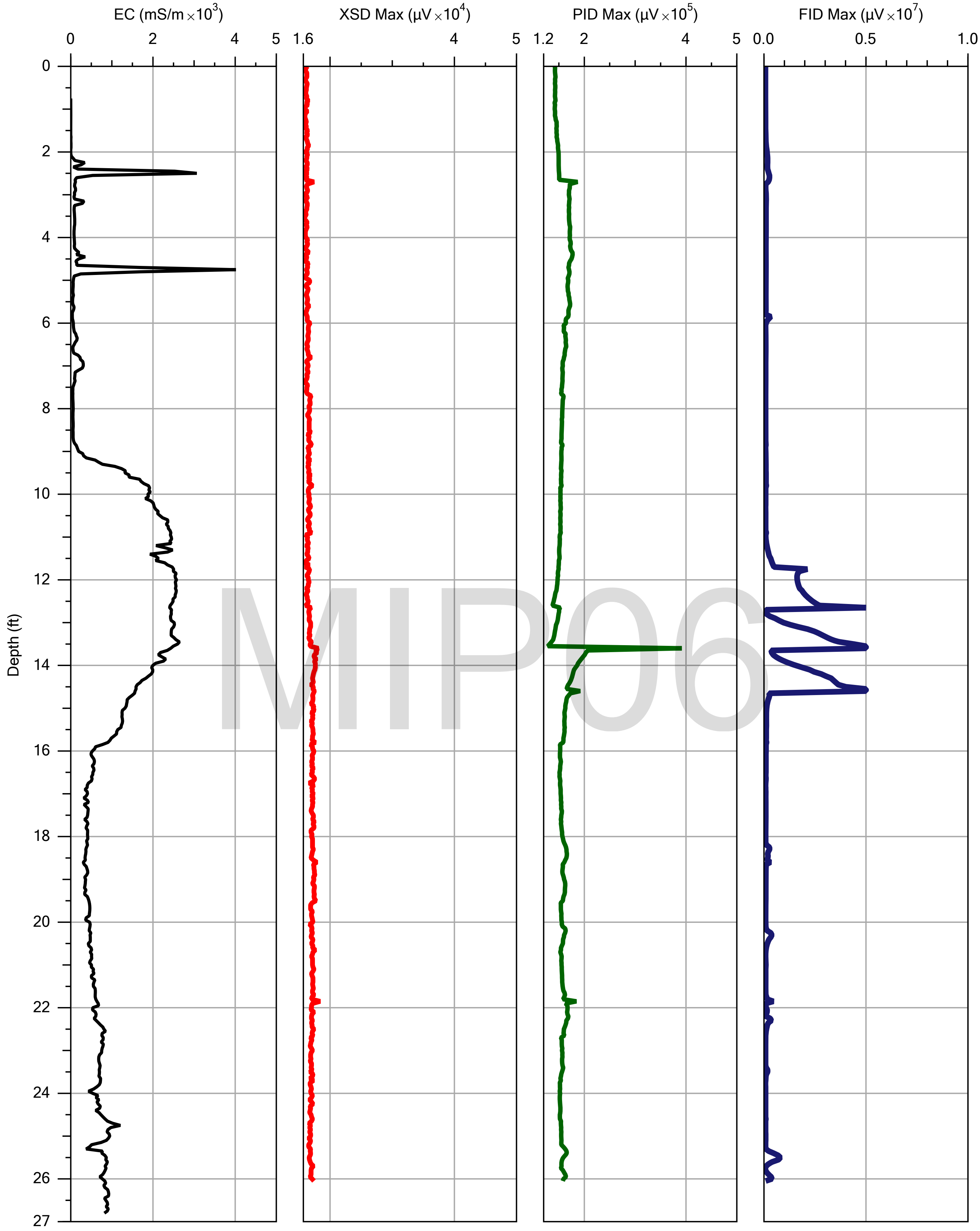
ZEBRA Technical Services - Subsurface Sampling, Injections and Data Collection for Environmental Professionals Since 1992.



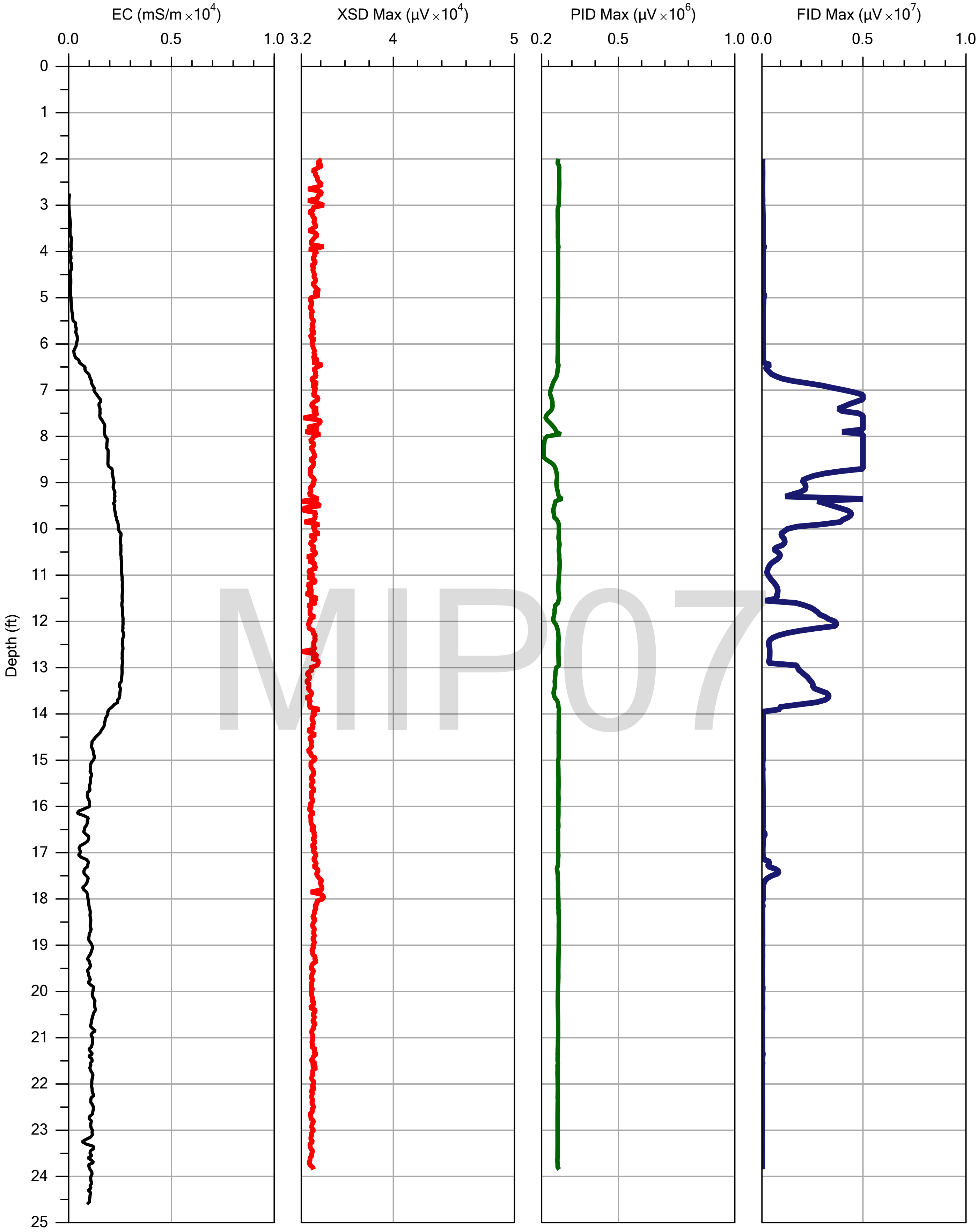
		File: MIP4.MIP
Company: ZTS	Operator: Mike Ryan	Date: 10/9/2015
Project ID: LIRR Arch Street Yard	Client: D&B Engineers and Architects	Location:



		File: MIP5.MIP
Company: ZTS	Operator: Mike Ryan	Date: 10/9/2015
Project ID: LIRR Arch Street Yard	Client: D&B Engineers and Architects	Location:



		File: MIP6.MIP
Company: ZTS	Operator: Mike Ryan	Date: 10/9/2015
Project ID: LIRR Arch Street Yard	Client: D&B Engineers and Architects	Location:



File: MIP-07.MIP

Company: ZTS

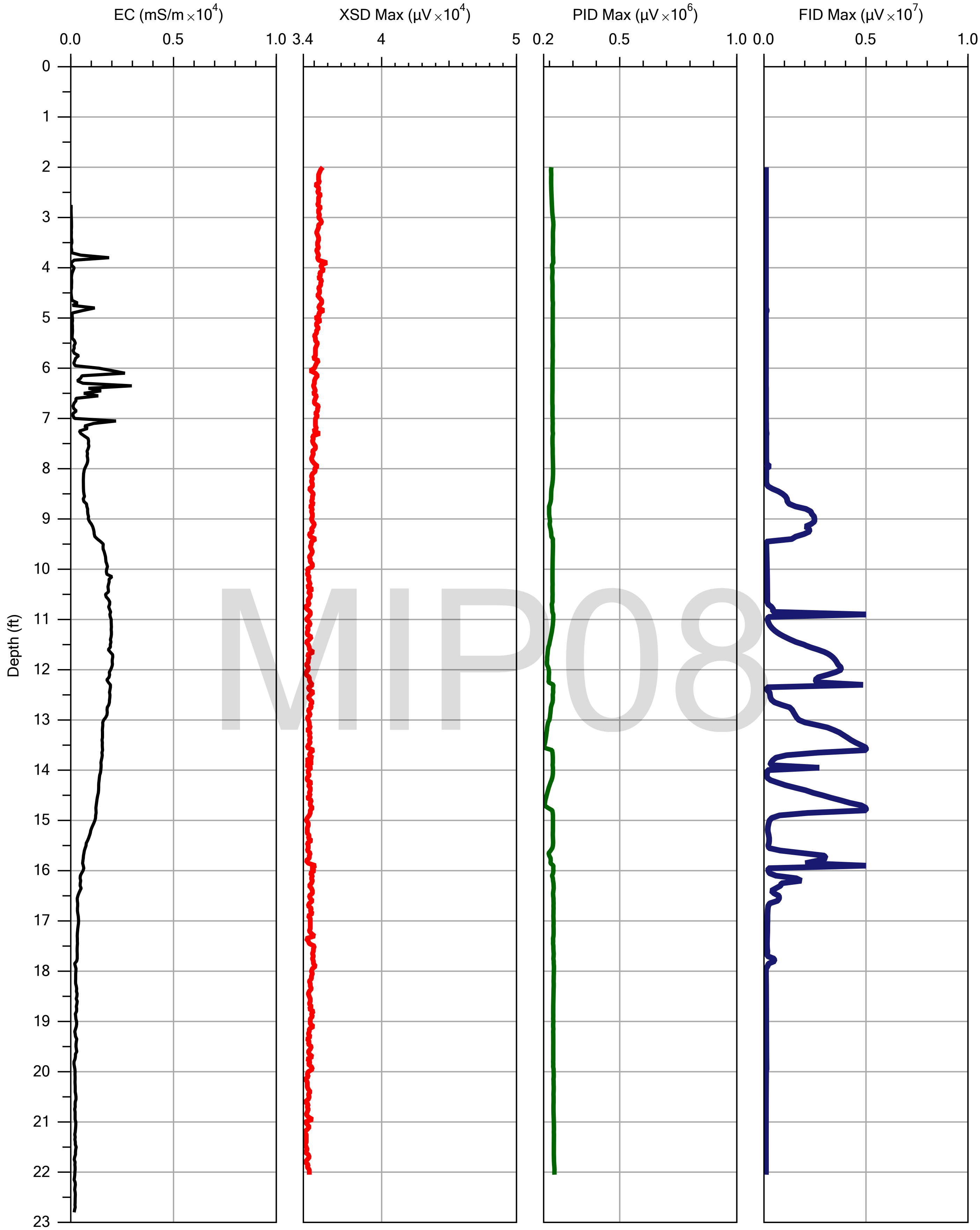
Operator: MR

Date: 10/29/2015

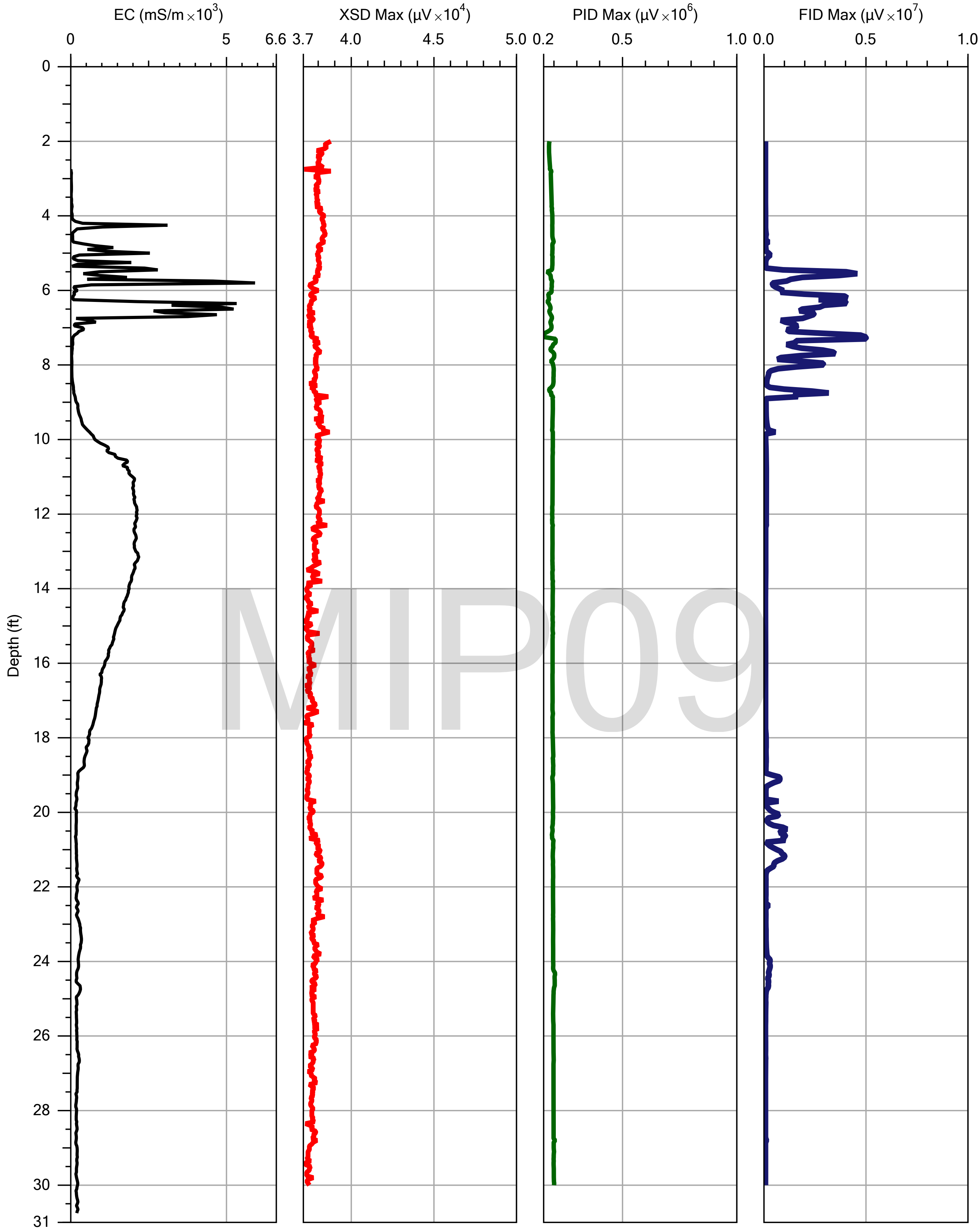
Project ID: LIRR Arch Street Yard

Client: D&B Engineers and Architects,

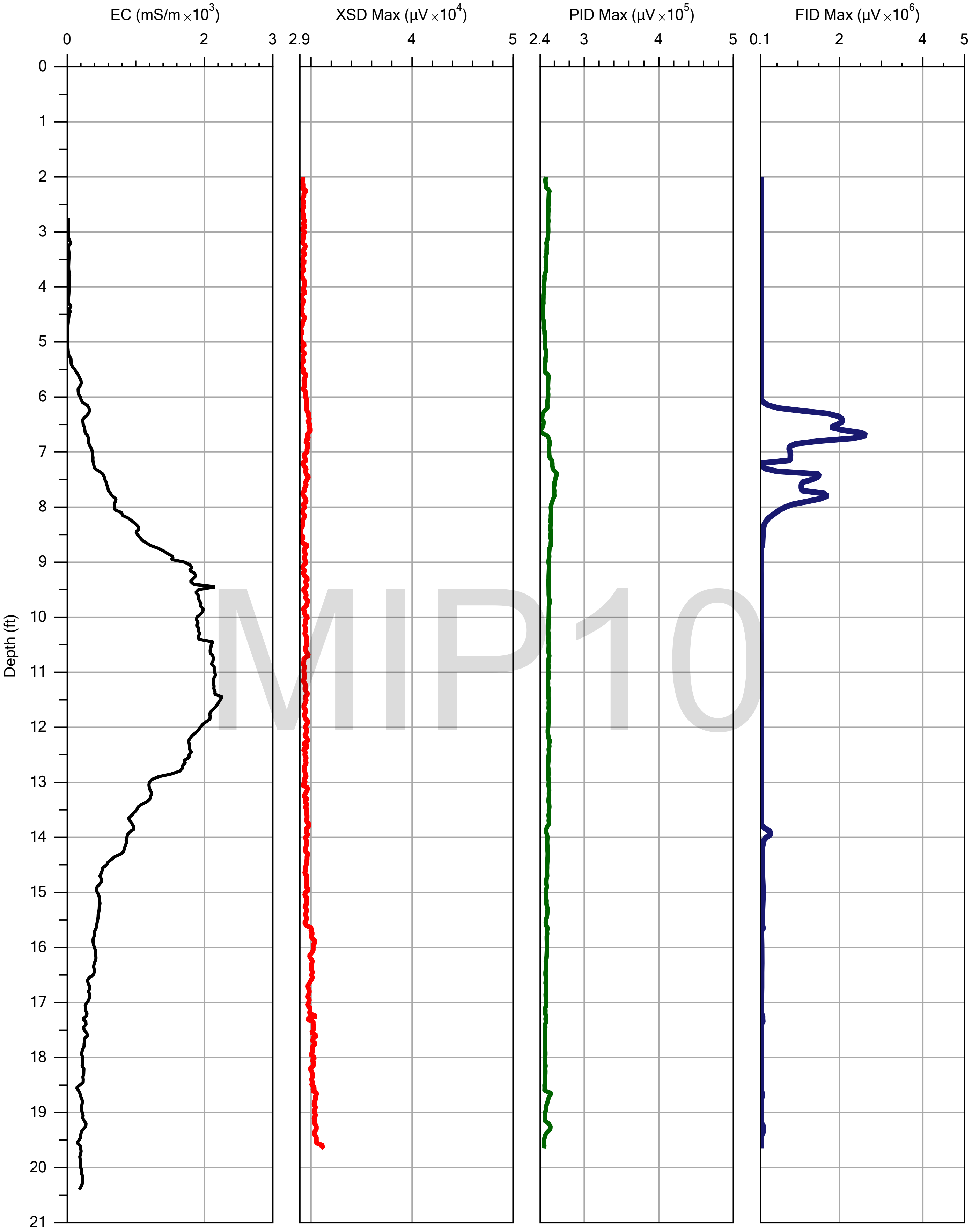
Location:



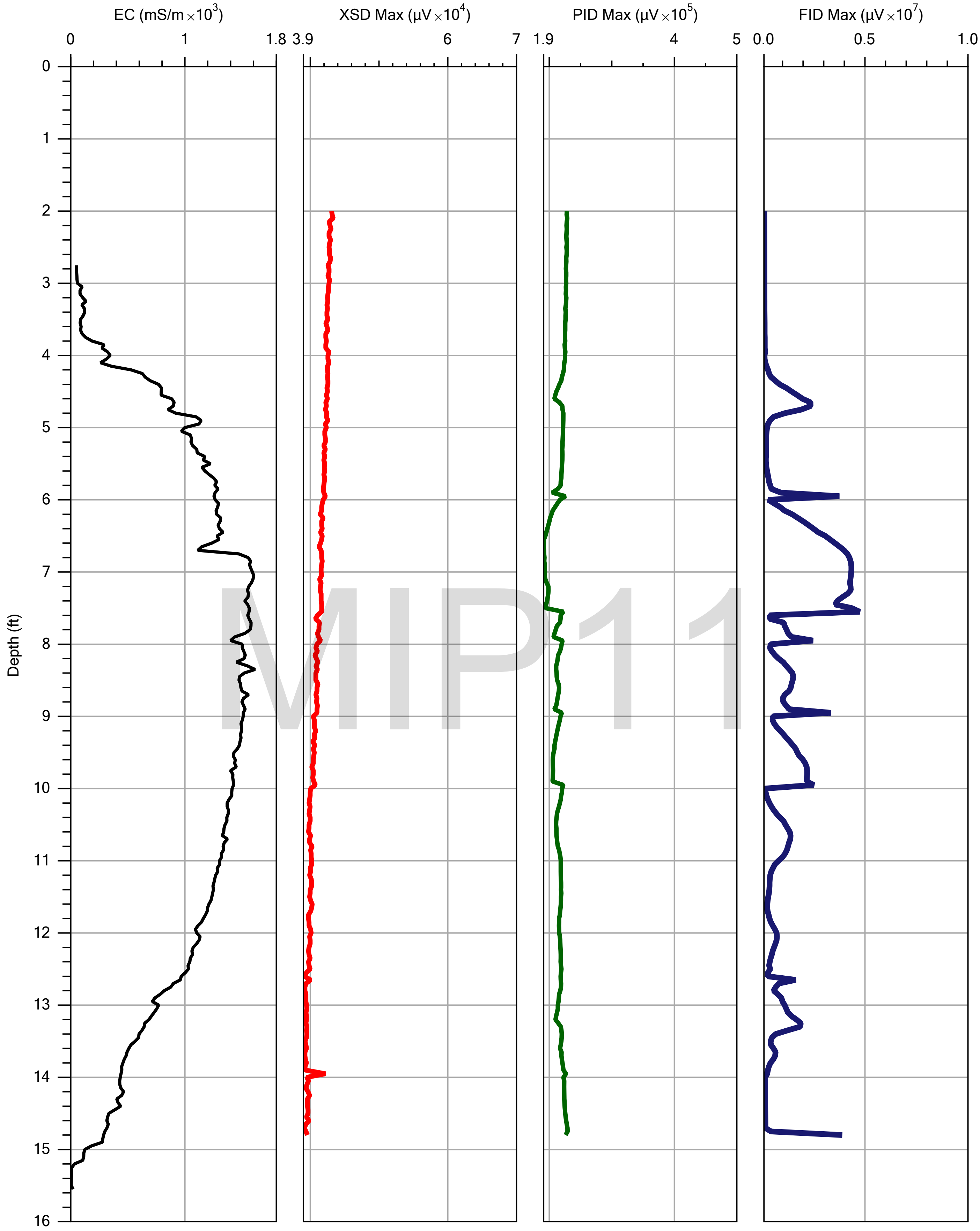
		File: MIP 8.MIP
Company: ZTS	Operator: MR	Date: 10/29/2015
Project ID: LIRR Arch Street Yard	Client: D&B Engineers and Architects,	Location:



		File: MIP-9.MIP
Company: ZTS	Operator: MR	Date: 10/29/2015
Project ID: LIRR Arch Street Yard	Client: D&B Engineers and Architects,	Location:



		File: MIP-10.MIP
Company: ZTS	Operator: MR	Date: 10/29/2015
Project ID: LIRR Arch Street Yard	Client: D&B Engineers and Architects,	Location:



File: MIP-11.MIP

Company: ZTS

Operator: MR

Date: 10/29/2015

Project ID: LIRR Arch Street Yard

Client: D&B Engineers and Architects,

Location:

ATTACHMENT 4

VERIFICATION BORING LOGS

D&B ENGINEERS AND ARCHITECTS, P.C.

Project No.: 3455-2
Project Name: LIRR – Arch Street Yard RI

Boring No.: VB-01
Sheet 1 **of** 1
By: Carl Schmidlapp

Drilling Contractor: Zebra
Drill Rig: Geoprobe 6620DT
Date Started: 10/30/15

Geologist: Carl Schmidlapp
Drilling Method: Macrocore
Drive Hammer Weight: N/A
Date Completed: 10/30/15

Boring Completion Depth: 27’
Ground Surface Elevation: ---
Boring Diameter: 2”

Depth (ft.)	No.	Type	Rec.	PID Per 6" (ppm)	Sample Description
0’-5’	1	HA	60”	0.0 0.7	0-3”: Bluestone 3”-60”: Dark brown, fine-medium SAND, some fine to medium subangular gravel, trace silt, concrete, medium dense, moist, no odor, no staining.
5’-10’	2	MC	38”	0.0 0.0 62 64	0-11”: Dark brown to black, fine to medium SAND, trace subrounded gravel, moist, no odor, no staining. 11”-24”: Brown to light brown, medium to fine SAND, trace silt, wet, no odor, no staining. 24”-38”: Brown to dark brown, medium to fine SAND, trace silt, wet, no odor, no staining.
10’-15’	3	MC	57”	10 0.0 0.0 150 250 40 0.0	0-7”: Black, fine SAND, trace subangular gravel, no odor, slight staining. 7”-24”: Dark brown to black, fine SAND, trace subangular gravel, wet, no odor, no staining. 24”-36”: Black/gray, fine SAND, trace clay, moist, hydrocarbon-like odor, no staining. 36”-47”: Gray, CLAY, slightly plastic, trace organics(shells), moist, no odor, no staining. 47”-57”: Gray, CLAY, dense, trace organics (shells), dense, moist, no odor, no staining.
15’-20’	4	MC	29”	0.0 0.0 18 12.5	0-12”: Brown, fine SAND, trace SILT, trace fine subangular gravel, wet, loose, no odor, no staining. 12”-24”: Gray, CLAY, slightly plastic, dry, no odor, no staining. 24”-29”: Gray to black, CLAY, dense to slightly plastic, dry, no odor, no staining.
20’-25’	5	MC	28”	0.0 0.0 0.0 0.0	0-13”: Green to brown, fine to medium SAND, trace medium to coarse gravel, dense, dry, no odor, no staining. 13”-28”: Green to brown, medium to coarse SAND, trace medium to coarse gravel, dense, moist, no odor, no staining.
25’-30	6	MC	24”	0.0 0.0	0-24”: Brown to gray, fine to medium SAND, trace fine to medium subangular gravel, poorly sorted, moist, no odor, no staining.

Sample Types:
HA = Hand Auger
MC = Macrocore

NOTES: Refusal encountered at 27’
Soil sample VB-01 (13-15’) and groundwater samples VB-01 (15-16’) and VB-01 (26-27’) collected for VOC analysis.

D&B ENGINEERS AND ARCHITECTS, P.C.

Project No.: 3455-2
Project Name: LIRR – Arch Street Yard RI

Boring No.: VB-02
Sheet 1 **of** 1
By: Carl Schmidlapp

Drilling Contractor: Zebra
Drill Rig: Geoprobe 6620DT
Date Started: 10/30/15

Geologist: Carl Schmidlapp
Drilling Method: Macrocore
Drive Hammer Weight: N/A
Date Completed: 10/30/15

Boring Completion Depth: 26.5’
Ground Surface Elevation: ---
Boring Diameter: 2”

Depth (ft.)	No.	Type	Rec.	PID Per 6" (ppm)	Sample Description
0’-5’	1	HA	60”	0.0	0-36”: Bluestone
				0.0, 0.0 0.0, 0.0	36”-60”: Dark brown, fine to medium SAND, trace concrete, trace silt, dense, poorly sorted, moist, no odor, no staining.
5’-10’	2	MC	28”	0.0	0-5”: Black-dark brown, medium to coarse SAND, some medium to coarse subangular gravel, moist, no odor, no staining.
				0.0 0.0	5”-19”: Black-brown, medium to fine SAND, trace medium to coarse gravel, loose, moist, no odor, no staining.
				0.0	19”-23”: Black-brown, medium to fine SAND, dense, moist, no odor, no staining.
				0.0	23”-28”: Gray, fine to medium SAND, trace SILT, loose, dry, no odor, no staining.
10’-15’	3	MC	32”	0.0, 0.0 0.0, 0.0	0”-22”: Gray, CLAY, trace organics and peat, slightly plastic, moist, organic odor, no staining.
				0.0 0.0	22”-32”: Gray-brown, CLAY, some peat and organics, slightly dense, organic odor, no staining.
15’-20’	4	MC	41”	0.0	0-9”: Dark gray, medium to fine SAND, trace silt, trace subangular medium-fine gravel, moist, no odor, no staining.
				0.0, 0.0 0.0	9”-27” Gray, CLAY, some peat and organics, plastic, loose, no odor, no staining.
				0.0 0.0	27”-36”: Gray, medium to coarse SAND, some medium to coarse subangular gravel, rock fragments 34”-36”, poorly sorted, dense, no odor, no staining.
				0.0	36”-41”: Brown-green, medium to coarse SAND, some large rock fragments, dense, poorly sorted, dry, no odor, no staining.
20’-25’	5	MC	42”	0.0, 0.0 0.0, 0.0	0-22”: Green-brown, medium to fine SAND, trace subrounded gravel, dense, well sorted, dry, no odor, no staining.
				0.0	22”-26”: Brown-dark brown/green, medium to fine SAND, poorly sorted, dry, no odor, no staining.
				0.0 0.0	26”-42”: Green to brown, fine to medium SAND, trace subangular gravel, trace rock fragments, well sorted, dense, dry, no odor, no staining.
25’-30’	6	MC	0”	N/A	No Recovery

Sample Types:
HA = Hand Auger
MC = Macrocore

NOTES: Refusal encountered at 26.5’.
Soil sample VB-02 (12-14’) and groundwater samples VB-02 (5’) and VB-02 (12-14’) collected for VOC analysis.

ATTACHMENT 5

VERIFICATION BORING
SAMPLE RESULTS

Table 1
Long Island Rail Road
Arch Street Yard RI
Soil Samples
TCL Volatile Organic Compounds

Sample ID	VB-01(13-15)	VB-02(12-14)	NYCRR 6 Part375	NYCRR 6 Part375
Sampling Date	10/30/15	10/30/15	Industrial	Restricted-
Start Depth in Feet	13	12	Use Soil Cleanup	Residential
End Depth in Feet	15	14	Objectives	Use
Dilution Factor	100	1	SCO	SCO
Units	mg/kg	mg/kg	mg/kg	mg/kg
VOLATILE COMPOUNDS				
1,1,1-Trichloroethane	66.9 U	0.0075 U	1000	100
1,1,2,2-Tetrachloroethane	66.9 U	0.0075 U	--	--
1,1,2-Trichloroethane	66.9 U	0.0075 U	--	--
1,1,2-Trichlorotrifluoroethane	66.9 U	0.0075 U	--	--
1,1-Dichloroethane	66.9 U	0.0075 U	480	26
1,1-Dichloroethene	66.9 U	0.0075 U	1000	100
1,2,3-Trichlorobenzene	66.9 U	0.0075 U	--	--
1,2,4-Trichlorobenzene	66.9 U	0.0075 U	--	--
1,2-Dibromo-3-Chloropropane	66.9 U	0.0075 U	--	--
1,2-Dibromoethane	66.9 U	0.0075 U	--	--
1,2-Dichlorobenzene	66.9 U	0.0075 U	1000	100
1,2-Dichloroethane	66.9 U	0.0075 U	60	3.1
1,2-Dichloropropane	66.9 U	0.0075 U	--	--
1,3-Dichlorobenzene	66.9 U	0.0075 U	560	49
1,4-Dichlorobenzene	66.9 U	0.0075 U	250	13
1,4-Dioxane	1338.7 U	0.15 U	250	13
2-Butanone	334.7 U	0.0148 J	1000	100
2-Hexanone	334.7 U	0.0377 U	--	--
4-Methyl-2-Pentanone	334.7 U	0.0377 U	--	--
Acetone	334.7 U	0.0916	1000	100
Benzene	66.9 U	0.0075 U	89	4.8
Bromochloromethane	66.9 U	0.0075 U	--	--
Bromodichloromethane	66.9 U	0.0075 U	--	--
Bromoform	66.9 U	0.0075 U	--	--
Bromomethane	66.9 U	0.0075 U	--	--
Carbon Disulfide	66.9 U	0.0735	--	--
Carbon Tetrachloride	66.9 U	0.0075 U	44	2.4
Chlorobenzene	66.9 U	0.0075 U	1000	100
Chloroethane	66.9 U	0.0075 U	--	--
Chloroform	66.9 U	0.0075 U	700	49
Chloromethane	66.9 U	0.0075 U	--	--
Cis-1,2-Dichloroethylene	66.9 U	0.0758	1000	100
Cis-1,3-Dichloropropene	66.9 U	0.0075 U	--	--
Cyclohexane	66.9 U	0.0075 U	--	--
Dibromochloromethane	66.9 U	0.0075 U	--	--
Dichlorodifluoromethane	66.9 U	0.0075 U	--	--
Ethylbenzene	66.9 U	0.0075 U	780	41
Isopropylbenzene	66.9 U	0.0075 U	--	--
m,p-Xylene	133.9 U	0.0151 U	1000	100
Methyl Acetate	66.9 U	0.0075 U	--	--
Methyl tert-butyl Ether	66.9 U	0.0089	1000	100
Methylcyclohexane	66.9 U	0.0075 U	--	--
Methylene Chloride	66.9 U	0.0075 U	1000	100
O-Xylene	66.9 U	0.0075 U	1000	100
Styrene	66.9 U	0.0075 U	--	--
Trans-1,3-Dichloropropene	66.9 U	0.0075 U	--	--
Tetrachloroethylene	***1160.9***	0.0173	300	19
Toluene	66.9 U	0.0075 U	1000	100
Trans-1,2-Dichloroethene	66.9 U	0.0038 J	1000	100
Trichloroethylene	66.9 U	0.0104	400	21
Trichlorofluoromethane	66.9 U	0.0075 U	--	--
Vinyl Chloride	66.9 U	0.0075 U	27	0.9
Total Volatile Compounds	1160.9	0.2961	--	--

Footnotes/Qualifiers: ***Exceeds Restricted-residential and industrial SCO***

mg/kg: Milligrams per kilogram

--: No standard or not analyzed

U: Analyzed for but not detected

J: Estimated value or limit

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Table 2
Long Island Rail Road
Arch Street Yard RI
Groundwater Samples
TCL Volatile Organic Compounds

Sample ID	VB-01(15-16)	VB-01(26-27)	VB-02(5)	VB-02(12-14)	TRIPBLANK	NYSDEC Class GA
Sampling Date	10/30/15	10/30/15	10/30/15	10/30/15	10/30/15	Standard or
Start Depth in Feet	15	26	5	12		Guidance Value
End Depth in Feet	16	27	5	14		
Dilution Factor	200	100	1	1	1	
Units	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
VOLATILE COMPOUNDS						
1,1,1-Trichloroethane	200 U	100 U	1 U	1 U	1 U	5
1,1,2,2-Tetrachloroethane	200 U	100 U	1 U	1 U	1 U	5
1,1,2-Trichloroethane	200 U	100 U	1 U	1 U	1 U	1
1,1,2-Trichlorotrifluoroethane	200 U	100 U	1 U	1 U	1 U	5
1,1-Dichloroethane	200 U	100 U	1 U	1 U	1 U	5
1,1-Dichloroethene	200 U	100 U	1 U	1 U	1 U	5
1,2,3-Trichlorobenzene	200 U	100 U	1 U	1 U	1 U	5
1,2,4-Trichlorobenzene	200 U	100 U	1 U	1 U	1 U	5
1,2-Dibromo-3-Chloropropane	200 U	100 U	1 U	1 U	1 U	0.04
1,2-Dibromoethane	200 U	100 U	1 U	1 U	1 U	0.0006
1,2-Dichlorobenzene	200 U	100 U	1 U	1 U	1 U	3
1,2-Dichloroethane	200 U	100 U	1 U	1 U	1 U	0.6
1,2-Dichloropropane	200 U	100 U	1 U	1 U	1 U	1
1,3-Dichlorobenzene	200 U	100 U	1 U	1 U	1 U	3
1,4-Dichlorobenzene	200 U	100 U	1 U	1 U	1 U	3
1,4-Dioxane	20000 U	10000 U	100 U	100 U	100 U	--
2-Butanone	1000 U	500 U	5 U	5 U	5 U	50
2-Hexanone	1000 U	500 U	5 U	5 U	5 U	50
4-Methyl-2-Pentanone	1000 U	500 U	5 U	5 U	5 U	--
Acetone	1000 U	500 U	5 U	5 U	5 U	50
Benzene	200 U	100 U	1 U	1 U	1 U	1
Bromochloromethane	200 U	100 U	1 U	1 U	1 U	5
Bromodichloromethane	200 U	100 U	1 U	1 U	1 U	50
Bromoform	200 U	100 U	1 U	1 U	1 U	50
Bromomethane	200 U	100 U	1 U	1 U	1 U	5
Carbon Disulfide	200 U	100 U	1 U	1 U	1 U	60
Carbon Tetrachloride	200 U	100 U	1 U	1 U	1 U	5
Chlorobenzene	200 U	100 U	1 U	1 U	1 U	5
Chloroethane	200 U	100 U	1 U	1 U	1 U	5
Chloroform	200 U	100 U	1 U	1 U	1 U	7
Chloromethane	200 U	100 U	1 U	1 U	1 U	5
Cis-1,2-Dichloroethylene	***6900***	***1800***	***36***	1.2	1 U	5
Cis-1,3-Dichloropropene	200 U	100 U	1 U	1 U	1 U	0.4
Cyclohexane	200 U	100 U	1 U	1 U	1 U	--
Dibromochloromethane	200 U	100 U	1 U	1 U	1 U	50
Dichlorodifluoromethane	200 U	100 U	1 U	1 U	1 U	5
Ethylbenzene	200 U	100 U	1 U	1 U	1 U	5
Isopropylbenzene	200 U	100 U	1 U	1 U	1 U	5
m,p-Xylene	400 U	200 U	2 U	2 U	2 U	5
Methyl Acetate	200 U	100 U	1 U	1 U	1 U	50
Methyl tert-butyl Ether	200 U	100 U	1.6	1.6	1 U	10
Methylcyclohexane	200 U	100 U	1 U	1 U	1 U	--
Methylene Chloride	200 U	100 U	1 U	1 U	1 U	5
O-Xylene	200 U	100 U	1 U	1 U	1 U	5
Styrene	200 U	100 U	1 U	1 U	1 U	5
Trans-1,3-Dichloropropene	200 U	100 U	1 U	1 U	1 U	0.4
Tetrachloroethylene	***17600***	***4500***	0.71 J	1.5	1 U	5
Toluene	200 U	100 U	1 U	1 U	1 U	5
Trans-1,2-Dichloroethene	200 U	100 U	2.5	1 U	1 U	5
Trichloroethylene	***1000***	***1100***	2.2	0.93 J	1 U	5
Trichlorofluoromethane	200 U	100 U	1 U	1 U	1 U	5
Vinyl Chloride	***4900***	***560***	***17.9***	1 U	1 U	2
Total Volatile Compounds	30400	7960	61	5.2	0	--

Footnotes/Qualifiers:

ug/L: Micrograms per liter
--: No standard or not analyzed
U: Analyzed for but not detected
J: Estimated value or limit

Exceeds Class GA Standard or Guidance Value

D&B ENGINEERS
AND
ARCHITECTS, P.C.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Environmental Remediation, Region 2
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February 11, 2016

Gloria Russo, M.S., LEED Green Associate
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Jamaica, NY 11435
Via e-mail: ggrusso@lirr.org

Re: Arch Street Yards (LIRR) Site
NYSDEC Site No. V00733
Proposed modifications to RIWP

Dear Ms. Russo:

The New York State Department of Environmental Conservation (the Department), in consultation with the New York State Department of Health (NYSDOH), has completed its review of the December 2, 2015 letter and the January 11, 2016 e-mail proposing modifications to the Remedial Investigation Work Plan (RIWP), which were prepared by D&B Engineers and Architects, P.C. (D&B), on behalf of MTA Long Island Rail Road (the Volunteer).

The modification consists of installation of eight (8) soil borings (SB-01 to SB-08) and four (4) contingency soil borings (if necessary) around the chlorinated VOC hot spot instead of twelve (12) soil borings; and installation of four (4) monitoring wells (GW-01 to GW-04) and three (3) contingency monitoring wells (if necessary) instead of a total of seven (7) monitoring wells. The January 11, 2016, e-mail described relocation of two of the previously proposed monitoring wells (one shallow and one cluster) within the chlorinated VOC hot spot instead of outside the hot spot.

The Department has determined that these modifications to the RIWP are acceptable and are hereby approved.

In accordance with the requirements of the Voluntary Cleanup Agreement, the approved modifications to the RIWP must be placed by the Volunteer in all publicly accessible repositories for the project within 5 business days. A certification that this documents have been placed in project repositories, and that the repositories are complete with all project documents, must be submitted to the NYSDEC project manager.

The Volunteer and its contractors are solely responsible for safe execution of all invasive and other field work performed under the modified RIWP. The Volunteer and its contractors must obtain all local, state, and/or federal permits or approvals that may be required to perform work under the modified RIWP. Further, the Volunteer and its contractors are solely responsible for the identification of utilities that might be affected by work under this RIWP and, implementation of all required, appropriate, or necessary health and safety measures during performance of work under the modified RIWP.

If you have any questions, please call me at (718) 482-4065 or email me at ioana.munteanu-ramnic@dec.ny.gov.

Sincerely,

Ioana Munteanu-Ramnic, P.E.
Environmental Engineer II

ec: J. O'Connell – NYSDEC
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Patrick A. Nowakowski
President

Long Island Rail Road

August 5, 2016

Ioana Munteanu-Ramnic, P.E.
Environmental Engineer
New York State Department of Environmental Conservation
Division of Environmental Remediation, Region 2
Hunters Point Plaza
47-40 21st Street
Long Island City, NY 11101-5401

Re: LIRR Arch Street Yard (NYSDEC VCA Site No. V00733)
Remedial Investigation
Soil/Groundwater Data Discussion and Proposed Scope of Work
Originally Issued July 13, 2016, Revised August 5, 2016

Dear Ms. Munteanu-Ramnic:

D&B Engineers and Architects, P.C. (D&B) has prepared this letter on behalf of the Long Island Rail Road (LIRR) to discuss the results of the completed second phase of the Remedial Investigation (RI) being conducted at the LIRR Arch Street Yard (the Yard), and to propose a scope of work for the third and final phase of the RI, including the collection of soil vapor, indoor air, ambient air and sub-slab soil vapor samples. Note that this letter and third phase scope of work has been revised from our original July 13, 2016 letter and scope to address New York State Department of Environmental Conservation (NYSDEC) comments provided to the LIRR on July 25, 2016.

Background and Completed Field Activities

The second phase of the RI included the installation of soil borings and groundwater monitoring wells, and the collection of subsurface soil and groundwater samples for analysis. The RI is being conducted at the 2.7 acre portion of the Yard that is subject to the Voluntary Cleanup Agreement, designated as NYSDEC Site No. V00733 (the Site).

The first phase of the RI was the Membrane Interface Probe (MIP) study completed in October 2015, and summarized in a letter report to the NYSDEC dated December 2, 2015. The December 2, 2015 letter report outlined a proposed scope of work for the second phase of the RI that was approved by the NYSDEC in a letter dated February 11, 2016. The second phase of the RI discussed in this report was completed from March through May 2016 in accordance with the NYSDEC-approved RI Work Plan, dated July 2015, and the scope of work outlined in the December 2, 2015 letter report. As required by the RI Work Plan, daily and monthly reports were provided to NYSDEC during the implementation of the RI, including air monitoring data and photographs.

The field activities for the second phase of the RI consisted of the following:

- Installation of 17 soil borings (SB-01 through SB-17) and the collection of subsurface soil samples for analysis. Deep soil borings SB-01 through SB-08 were completed to define the limits of the volatile organic compound (VOC) contamination identified by the MIP study at MIP-2, and shallow polychlorinated biphenyl (PCB) soil borings SB-09 through SB-17 were completed to confirm and define the previously identified PCB contamination at the Site.

- Installation of two water table monitoring wells (GW-02S and GW-04S) and four deep monitoring wells (GW-01, GW-02D, GW-03 and GW-04D) to determine impacts to groundwater from VOCs.
- Collection of subsurface soil samples for analysis during monitoring well installation;
- Sampling of the six newly installed and three existing groundwater monitoring wells (MW-1, MW-2 and MW-3) for analysis;
- Collection of two rounds of synoptic water levels from all newly installed and existing monitoring wells at high, low and mid-tide; and
- Completion of a 48-hour tidal study utilizing pressure transducers.

Completed sample location maps are provided as **Figure 1** and **Figure 2** in **Attachment 1**. **Figure 1** depicts all existing and newly installed sample locations, with the exception of the PCB soil borings, which are depicted on **Figure 2**. All depicted sample locations were surveyed by a New York State-licensed surveyor. **Table 1** in **Attachment 2** provides a summary of the RI scope of work, including a summary of sample depths and analyses, analytical methods, sample point objectives, field observations and modifications to the approved scope of work. Note that Quality Assurance (QA)/Quality Control (QC) samples were collected in accordance with the RI Work Plan, including matrix spike (MS) and matrix spike duplicate (MSD) samples, blind duplicate samples, field blanks and trip blanks.

Soil Borings and Subsurface Soil Sampling

Soil borings were completed using direct-push technology. Prior to intrusive activities, utility clearance procedures were followed, including markouts and hand clearing. The deep Geoprobe soil borings were completed to a depth of 25 feet below grade, and the shallow PCB soil borings to 6 or 8 feet below grade. Deep soil boring SB-04 was completed until refusal at 29 feet below grade, suspected to be bedrock. Soil boring logs are provided as **Attachment 3**.

A total of 27 subsurface soil samples were collected for analysis from the 8 deep soil borings (SB-01 through SB-08) and 3 of the 4 monitoring well locations (GW-01, GW-03 and GW-04). Subsurface soil samples were not collected at GW-02 since verification soil boring VB-01 was previously completed in the vicinity of GW-02. At a minimum, soil samples were collected for analysis at the most impacted zone and the first clean zone below the impacted zone at each soil boring. Each soil sample was submitted for analysis of Target Compound List (TCL) VOCs, and TCL semivolatile organic compounds (SVOCs). Eight of the selected soil samples were also analyzed for Target Analyte List (TAL) metals, PCBs and TCL pesticides, biased towards visually impacted samples.

A total of 30 subsurface soil samples were collected for PCB analysis from the 9 shallow PCB soil borings (SB-09 through SB-17). Note that approximately 12 to 24 inches of bluestone was present at all shallow PCB soil boring locations, and soil samples were collected for analysis from below the bluestone layer. Validated data summary tables for subsurface soil are provided as **Table 2** through **Table 6** in **Attachment 4**.

Groundwater Monitoring Wells and Groundwater Sampling

Groundwater monitoring wells were installed as 1-inch diameter pre-packed wells by direct-push technology. Shallow wells GW-02S and GW-04S were installed with 5 feet of screen to intercept the water table, observed at a depth of 3 to 5 feet below grade. Deep wells GW-01, GW-02D, GW-03 and GW-04D were installed with 10 feet of screen below the water table in order to intercept the highest chlorinated VOC concentrations previously observed at MIP-2/VB-01. Well construction logs detailing the construction of each well are provided in **Attachment 3**.

Following installation, all newly installed and existing wells were successfully developed by the pump and surge method. Groundwater samples were collected from the six newly installed and three existing wells a minimum of one week following development. A portable peristaltic pump with disposable tubing was used to purge and sample using USEPA low-flow sampling techniques, and new tubing was used between each well. The purge water was monitored in the field for the following parameters utilizing a calibrated multiple parameter water quality instrument: pH, conductivity, turbidity, dissolved oxygen, temperature and oxidation-reduction potential. After stabilization, groundwater samples were collected for laboratory analysis. Each groundwater sample was submitted for analysis of TCL VOCs and TCL SVOCs. Two of the groundwater samples were also analyzed for TAL metals, PCBs and TCL pesticides, biased towards impacted samples. Validated data summary tables for groundwater are provided as **Table 7** through **Table 10** in **Attachment 4**. Note that all purge water was collected and contained on-site in DOT-approved 55-gallon drums for characterization and proper off-site disposal.

Water Level Measurements and Tidal Survey

D&B collected two rounds of synoptic water levels from all 9 monitoring wells at the approximate time of low, mid and high tides in the nearest water bodies (East River and Newtown Creek). Light non-aqueous phase liquid (LNAPL) or dense non-aqueous phase liquid (DNAPL) was not detected in any of the monitoring wells. The water level measurements and calculated groundwater elevations are provided on **Table 11** in **Attachment 5**. Groundwater contour maps for the shallow (water table) wells and the deep wells are provided as **Figure 3** and **Figure 4** in **Attachment 5**.

In addition, D&B completed a 48-hour tidal survey between May 4 and May 6, 2016 to determine the degree of tidal influence associated with the nearby East River and Newtown Creek. As part of the tidal survey, D&B selected three monitoring wells (GW-01, GW-03 and MW-3) for the installation of pressure transducer/data loggers which convert water pressure into water level elevation. The pressure transducers were configured to record water levels every 15 minutes over the 48-hour test period, and D&B collected manual water levels before and after the tidal survey. Provided as **Figure 5** through **Figure 7** in **Attachment 6**, D&B plotted the generated water level data over time and compared the data to the tidal cycle of the two nearest water bodies as measured at the NOAA Hunters Point, Newtown Creek tidal gauge station to determine the degree of tidal influence.

Findings

Groundwater Flow

The water table was observed at a depth of 3 to 5 feet below grade. As indicated on **Figure 3**, shallow groundwater generally flows in a west-northwesterly direction, consistent with the reported regional groundwater flow direction. However, clay and silt with peat and organic material was observed throughout the Site below a depth of approximately 10 feet. As indicated on **Table 11**, deep wells screened within or below this material, such as GW-02D, GW-03 and GW-04D, exhibited apparent confined groundwater conditions with the water level depressed approximately 4 to 5 feet as compared to unconfined, water table conditions. The groundwater contour map for these deep wells provided on **Figure 4** shows that groundwater generally flows in a westerly direction in this zone, similar to the water table.

The synoptic water elevation data summarized on **Table 11** showed no discernable tidal fluctuation. Analysis of the synoptic water level data suggests that groundwater flow remains in a general west-northwesterly direction during all stages of the tidal cycle. These results are supported by the findings of the tidal survey depicted on **Figure 5** through **Figure 7**. The graphs of the water levels in the wells over time as compared to the nearest tidal gauge station do not show a tidal fluctuation in groundwater at the Site.

Subsurface Soil Quality

VOCs were detected in all 27 subsurface soil samples. However, as indicated on **Table 2** in **Attachment 4**, VOC concentrations were generally detected well below Restricted-Residential Use Soil Cleanup Objectives (SCOs) and all concentrations were below Industrial Use SCOs. Detections of VOCs above Restricted-Residential Use SCOs were limited to the following:

Compound	Concentration (ug/kg)		Restricted-Residential Use SCO (ug/kg)
	SB-05 (10 to 11 feet)	SB-05 (11 to 13 feet)	
Tetrachloroethene	**20,900**	**31,300**	19,000
Vinyl Chloride	560	**2,200**	900

Bold/shading=exceeds SCO

Note that an elevated PID reading of 250 ppm and a solvent odor were noted in subsurface soil sample SB-05 (10 to 11 feet). Soil boring SB-05 was completed within the approximate suspected source area of chlorinated VOCs, depicted on **Figure 1**, and located below a depth of 10 feet below grade. The remaining soil borings completed around the suspected source area did not exhibit chlorinated VOCs at concentrations above SCOs.

Several SVOCs, consisting of polycyclic aromatic hydrocarbons (PAHs), were detected at concentrations above Restricted-Residential Use SCOs in subsurface soil samples SB-04 (3 to 5 feet) and GW-04 (2 to 3 feet). The highest concentrations were detected in SB-04 (3 to 5 feet), with benzo(a)anthracene detected at a concentration of 5,300 ug/kg, above the Restricted-Residential Use SCO of 1,000 ug/kg. All SVOC concentrations were below Industrial Use SCOs, except for benzo(a)pyrene in SB-04 (3 to 5 feet) at 2,900 ug/kg, above the SCO of 1,100 ug/kg. A sheen, petroleum odor and PID reading of 7.8 ppm was noted in this soil sample.

PCBs were either not detected or were detected at concentrations below Restricted-Residential Use and Industrial Use SCOs, including the samples collected from the shallow PCB borings. A maximum PCB concentration of 310 ug/kg was detected in subsurface soil sample SB-14 (0 to 1 foot), well below the Restricted-Residential SCO of 1,000 ug/kg. Pesticides were not detected in any of the subsurface soil samples.

Metals were detected at concentrations below Restricted-Residential Use SCOs, except for lead detected at a concentration of 483 mg/kg in subsurface soil sample SB-06 (8 to 10 feet) above the SCO of 400 mg/kg, and mercury detected at 0.949 mg/kg in SB-07 (12 to 14 feet) above the SCO of 0.81 mg/kg. All metals concentrations were below Industrial Use SCOs.

Groundwater Quality

VOCs were detected in all 9 groundwater samples. However, as indicated on **Table 7** in **Attachment 4**, VOC concentrations were generally detected below Class GA groundwater standards and guidance values (Class GA groundwater standards). Detections of VOCs above Class GA groundwater standards were limited to the following:

Compound	**Concentration (ug/l)**				**Class GA Groundwater Standard (ug/l)**
	GW-02S	**GW-02D**	**MW-1**	**MW-3**	
1,1-Dichloroethene	3.9	**23.6**	ND	3.2	5
cis-1,2-Dichloroethene	**1,700**	**8,100**	ND	**510**	5
trans-1,2-Dichloroethene	**27.5**	**68.7**	ND	2	5
Tetrachloroethene	**69.4**	**5,900**	ND	**78.9**	5
Trichloroethene	**25.3**	**1,400**	ND	**34.8**	5
Vinyl Chloride	**1,500**	**5,300**	ND	**240**	2
MTBE	ND	ND	**26.2**	0.74	10

Bold/shading=exceeds standard
ND=Not Detected

Note that monitoring wells GW-02S, GW-02D and MW-3, which exhibited chlorinated VOC concentrations well above Class GA groundwater standards, are located within the approximate suspected source area of chlorinated VOCs, depicted on **Figure 1**. Neither the upgradient well GW-01 nor any of the downgradient wells exhibited chlorinated VOCs above Class GA groundwater standards.

SVOCs were either not detected or detected below Class GA groundwater standards. PCBs and pesticides were not detected in any groundwater samples.

The following metals were detected at concentrations above Class GA standards in the total (unfiltered) analysis: iron in GW-02D and MW-3, manganese in GW-02D and sodium in GW-02D and MW-3. The concentrations of these metals are typically elevated in urban settings. Turbidity was low in these samples, and a filtered analysis was not completed.

Conclusions

As discussed earlier, the detection of chlorinated VOC contamination in subsurface soil and groundwater at concentrations above Restricted-Residential Use SCOs and Class GA groundwater standards was limited to soil boring SB-05, and monitoring wells GW-02S, GW-02D and MW-3, respectively. These soil borings and monitoring wells are located within the approximate source area or “hot-spot” depicted on **Figure 1**, which was originally defined following completion of the MIP/verification boring phase of the RI. Based on the surrounding subsurface soil data from soil borings SB-01 to SB-04, and SB-06 to SB-08, and groundwater monitoring well data from wells GW-01, GW-03, GW-04S, GW-04D, MW-1 and MW-2, the chlorinated VOC contamination appears limited to the source area and does not appear to have migrated downgradient in groundwater, perhaps due to the fine grained nature and high organic content of the soil matrix below a depth of 10 feet. In summary, the first two phases of the RI have defined the limits of the chlorinated VOC source area as shown on **Figure 1**.

Previous sampling from 2000 and 2001 found elevated PCB concentrations in shallow soil in the track area on-site, as depicted on **Figure 2**. However, subsurface soil samples collected from the shallow PCB borings during the RI did not confirm the presence of PCBs at concentrations above Restricted-Residential Use SCOs.

Proposed Scope of Work

Note the proposed scope of work has been revised to address NYSDEC comments presented to the LIRR on July 27, 2016. To determine if soil vapor intrusion is a potential exposure pathway, the RI Work Plan calls for up to four soil vapor samples, two indoor air samples and one outdoor ambient air sample to be collected to be collected, with the final number and location of samples to be determined based on the findings of the soil and groundwater sampling. As part of the third and final investigation phase of the RI, and in order to address NYSDEC comments, the LIRR proposes to collect five soil vapor samples (SV-01 through SV-05), one indoor air sample (IA-01) and one sub-slab soil vapor sample (SV-06). The proposed sampling locations are depicted on **Figure 1** provided in **Attachment 1**.

One soil vapor sample will be completed within the chlorinated VOC “hot-spot” (SV-02). Although there is no indication that chlorinated VOC contamination has migrated from the source area, soil vapor samples will also be collected around the source area, as follows: to the west of the source area in the downgradient direction (SV-01), to the east of the source area in the upgradient direction (SV-03), to the north of the source area in the crossgradient direction (SV-04) and to the south of the source area in the crossgradient direction (SV-05). The upgradient soil vapor sample SV-03 will be completed between the "hot-spot" and the closest building located within the Site (the LIRR Engineering Support Building). The one indoor air sample (IA-01) will be completed within this building. In addition, one sub-slab soil vapor sample will be collected from below the concrete slab of the LIRR Engineering Support Building.

Note that a restaurant is depicted on **Figure 1**, south of the "hot-spot" and the LIRR Engineering Support Building, that is located outside of the Site. As indicated on the figure, this restaurant is closed and has been closed for several years. In addition, the location of the former restaurant is elevated approximately 15 feet above the Site. Therefore, sampling within this structure is not recommended.

All soil vapor and ambient air samples will be collected in certified-clean SUMMA canisters for VOC analysis by USEPA Method TO-15, as outlined in the RI Work Plan.

The collection of the sub-slab soil vapor sample will follow a similar procedure to the soil vapor samples. Prior to installation of the sub-slab vapor probe, the building floor will be inspected for any penetrations to ensure that the installation location of sample provides minimal potential for ambient air infiltration via floor penetrations. The sub-slab soil vapor sample will be collected in the approximate center of the Engineering Support Building from 2 inches beneath the concrete slab of the building. The sample will be collected in an individually certified 6-liter SUMMA canister fitted with a laboratory calibrated low-flow regulator set to collect the sample over a 30 minute period, consistent with the NYSDEC-approved RI work plan. The collected sub-slab sample will be analyzed for VOCs utilizing USEPA Method TO-15, again consistent with the RI work plan.

All sampling protocols will follow the procedures described in the RI Work Plan and will be consistent with the NYSDOH document entitled, "Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York", dated October 2006.

If you have any questions or comments, please do not hesitate to call me at (347) 494-6034.

Sincerely,

Kathleen Green

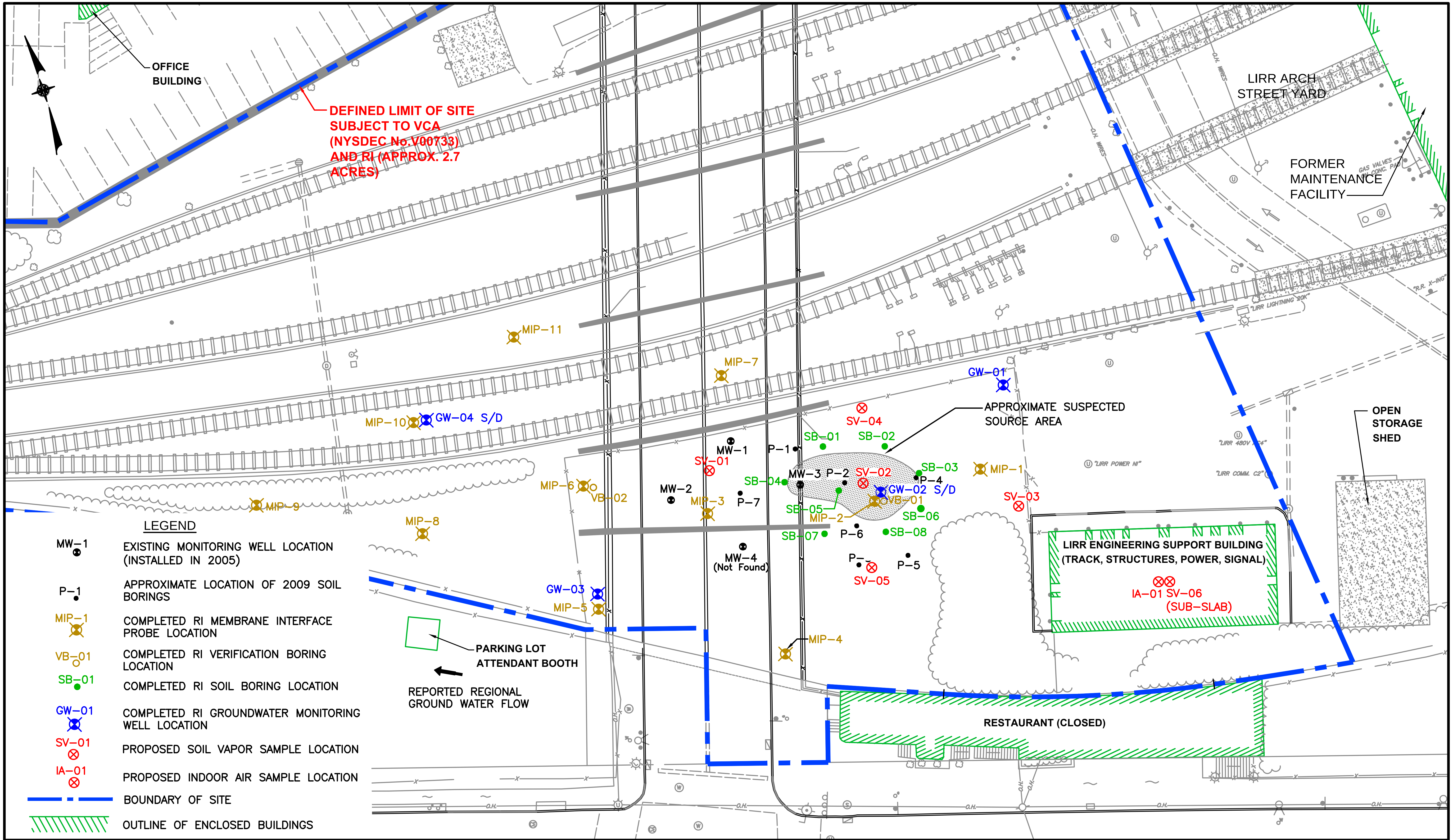
for

Gloria Russo
Director - Environmental
Planning & Compliance

GR/AMC(t)/nc
Attachment
cc: K. Green (LIRR)
T. Fox (D&B)
A. Caniano (D&B)

ATTACHMENT 1

SAMPLE LOCATION MAPS



D&B ENGINEERS AND ARCHITECTS, P.C.

LONG ISLAND RAILROAD - ARCH STREET YARD
LONG ISLAND CITY, NY - REMEDIAL INVESTIGATION

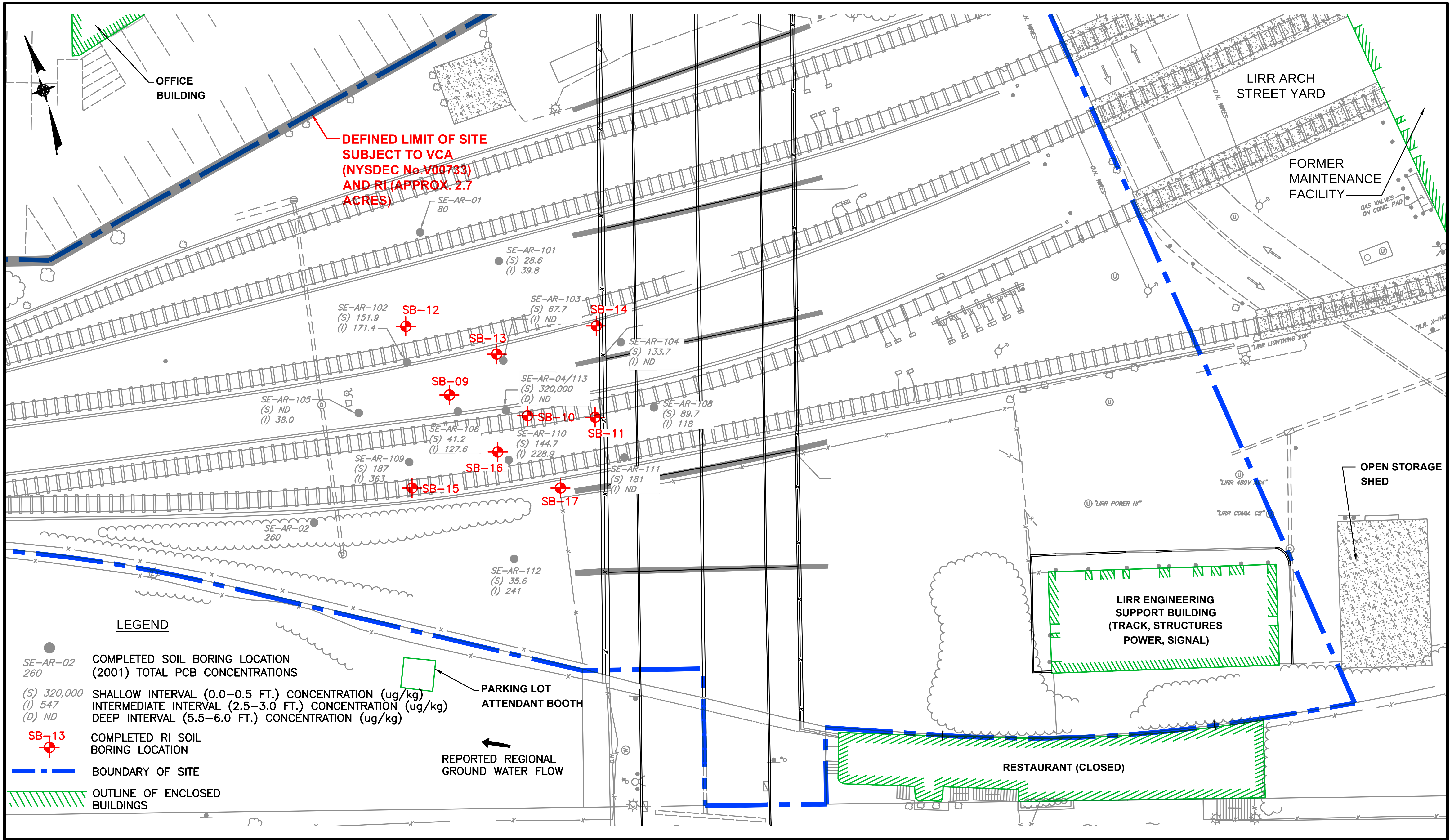
SAMPLE LOCATION MAP

SCALE: 1"=30'

FIGURE 1

F:\3455\MTA\Dwg\FIGURES\3455-FIG-1 Prop SVE-IA SAMPLE LOC MAP.dwg, 8/3/2016 4:52:06 PM, DWG to PDF-OVER.pc3

F:\3455\MTA\Dwg\FIGURES\3455-FIG-2-05-12-16_lp.dwg, 7/13/2016 7:54:41 AM, DWG to PDF.pc3



D&B ENGINEERS AND ARCHITECTS, P.C.

LONG ISLAND RAILROAD - ARCH STREET YARD
LONG ISLAND CITY, NY - REMEDIAL INVESTIGATION WORK PLAN

SAMPLE LOCATION MAP
FOR PCB INVESTIGATION

SCALE: 1"=30'

FIGURE 2

ATTACHMENT 2

COMPLETED WORK SUMMARY TABLE

TABLE 1

Long Island Rail Road
Arch Street Yard (Site No. V00733)
Remedial Investigation

SAMPLING SUMMARY AND RATIONALE

Investigation Method/Media	Sample Point ID	Completion Depth Below Grade (feet)	No. of Samples Selected for Analysis	Sample Depth Below Grade (feet)	Analysis [1]					Installation/ Sample Date	Comments/Deviations from Work Plan	Sample Point Objectives
					TCL VOCs	TCL SVOCs	PCBs	TCL Pesticides	TAL Metals			
Remedial Investigation - First Phase (Completed)												
Verification Borings/ Subsurface Soil	VB-01	27	1	13-15	X	--	--	--	--	10/30/2015	Refusal encountered at 27 feet below grade.	Collect soil samples to verify the results of the MIP study.
	VB-02	26.5	1	12-14	X	--	--	--	--	10/30/2015	Refusal encountered at 26.5 feet below grade.	
Verification Borings/ Groundwater	VB-01	27	2	15-16, 26-27	X	--	--	--	--	10/30/2015	Refusal encountered at 27 feet below grade.	Collect groundwater samples to verify the results of the MIP study.
	VB-02	26.5	2	5, 12-14	X	--	--	--	--	10/30/2015	Refusal encountered at 26.5 feet below grade.	
Remedial Investigation - Second Phase (Completed)												
Deep Soil Borings/ Subsurface Soil	SB-01	25	2	13-15, 23-25	X	X	--	--	--	3/16/2016	--	Characterize soil and collect soil samples to define the limits of the contaminated area, with the primary contaminants of concern being VOCs.
	SB-02	25	2	13-15, 23-25	X	X	--	--	--	3/17/2016	--	
	SB-03	25	2	12-14	X	X	X	X	X	3/17/2016	Moved 4 feet south of planned location due to presence of underground utilities.	
				18-20	X	X	--	--	--			
	SB-04	29	3	3-5	X	X	X	X	X	3/16/2016	Refusal encountered at 29 feet below grade.	
				10-12, 27-29	X	X	--	--	--			
	SB-05	25	2	10-11	X	X	X	X	X	3/16/2016	Blind duplicate collected for sample at 10-11'.	
				11-13	X	X	--	--	--			
	SB-06	25	2	8-10	X	X	X	X	X	3/17/2016	--	
				11-13	X	X	--	--	--			
	SB-07	25	2	12-14	X	X	X	X	X	3/18/2016	--	
				23-25	X	X	--	--	--			
	SB-08	25	3	4-6, 6-8, 13-15	X	X	--	--	--	3/17/2016	--	

TABLE 1

Long Island Rail Road
Arch Street Yard (Site No. V00733)
Remedial Investigation

SAMPLING SUMMARY AND RATIONALE

Investigation Method/Media	Sample Point ID	Completion Depth Below Grade (feet)	No. of Samples Selected for Analysis	Sample Depth Below Grade (feet)	Analysis [1]					Installation/ Sample Date	Comments/Deviations from Work Plan	Sample Point Objectives
					TCL VOCs	TCL SVOCs	PCBs	TCL Pesticides	TAL Metals			
Remedial Investigation - Second Phase (Completed)												
Shallow PCB Soil Borings/ Subsurface Soil	SB-09	8	4	0-1, 2-3 4-5, 7-8	--	--	X	--	--	3/18/2016	Top of boring below 24" of bluestone. Moved 5 feet north of planned location due to presence of underground utilities.	Characterize soil and collect soil samples for PCB analysis to define the limits of shallow soil PCB contamination, identified in 2000.
	SB-10	8	4	0-1, 2-3 4-5, 7-8	--	--	X	--	--	3/18/2016	Top of boring below 18" of bluestone. Blind duplicate collected for sample at 4-5'. Moved southeast of planned location due to presence of third rail.	
	SB-11	8	4	0-1, 2-3 4-5, 7-8	--	--	X	--	--	3/18/2016	Top of boring below 24" of bluestone.	
	SB-12	6	3	0-1, 2-3 5-6	--	--	X	--	--	3/21/2016	Top of boring below 3" of bluestone. Moved 4 feet west of planned location due to presence of underground utilities.	
	SB-13	6	3	0-1, 2-3 5-6	--	--	X	--	--	3/21/2016	Top of boring below 24" of bluestone. Blind duplicate collected for sample at 5-6'.	
	SB-14	6	3	0-1, 2-3 5-6	--	--	X	--	--	3/21/2016	Top of boring below 24" of bluestone.	
	SB-15	6	3	0-1, 2-3 5-6	--	--	X	--	--	3/18/2016	Top of boring below 24" of bluestone. Moved north of planned location due to presence of third rail.	
	SB-16	6	3	0-1, 2-3 5-6	--	--	X	--	--	3/18/2016	Top of boring below 12" of bluestone. Moved 5 feet north of planned location due to presence of underground utilities.	
	SB-17	6	3	0-1, 2-3 5-6	--	--	X	--	--	3/18/2016	Top of boring below 12" of bluestone. Moved 8 feet west of planned location due to equipment access constraints.	

TABLE 1

Long Island Rail Road
Arch Street Yard (Site No. V00733)
Remedial Investigation

SAMPLING SUMMARY AND RATIONALE

Investigation Method/Media	Sample Point ID	Completion Depth Below Grade (feet)	No. of Samples Selected for Analysis	Sample Depth Below Grade (feet)	Analysis [1]					Installation/ Sample Date	Comments/Deviations from Work Plan	Sample Point Objectives
					TCL VOCs	TCL SVOCs	PCBs	TCL Pesticides	TAL Metals			
Remedial Investigation - Second Phase (Completed)												
Groundwater Monitoring Well Borings/ Subsurface Soil	GW-01 (upgradient)	20	3	4-5, 18-20	X	X	--	--	--	3/21/2016	--	Determine background concentrations of contaminants of concern.
				13-15	X	X	X	X	X			
	GW-02	--	--	--	--	--	--	--	--	--	Soil samples not collected since soil boring VB-01 was previously completed in the vicinity of this location.	Determine the presence and extent of soil contamination.
	GW-03	20	3	3-4, 18-20	X	X	--	--	--	3/21/2016	--	
				12-14	X	X	X	X	X			
	GW-04	18	3	2-3, 16-18	X	X	--	--	--	3/23/2016	Top of boring below 24" of bluestone. Refusal encountered at depth of 19 feet. Blind duplicate collected for sample at 12-14'.	
				12-14	X	X	X	X	X			
Newly Installed Groundwater Monitoring Wells/ Groundwater	GW-01 (upgradient)	20	1	Screen interval 10-20	X	X	--	--	--	Sampled 4/7/2016	Installed on 3/22/2016 Developed on 3/24/2016	Determine the presence or absense of contaminants of concern within upgradient groundwater. Confirm groundwater flow direction and the influence of the East River and Newtown Creek.
	GW-02S	7	1	Screen interval 2-7	X	X	--	--	--	Sampled 4/7/2016	Installed on 3/22/2016 Developed on 3/25/2016	Determine the presence and extent of downgradient groundwater contamination. Confirm groundwater flow direction and the influence of the East River and Newtown Creek.
	GW-02D	20	1	Screen interval 10-20	X	X	X	X	X	Sampled 4/7/2016	Installed on 3/22/2016 Developed on 3/24/2016	
	GW-03	19	1	Screen interval 9-19	X	X	--	--	--	Sampled 4/7/2016	Installed on 3/21/2016 Developed on 3/24/2016	
	GW-04S	8	1	Screen interval 3-8	X	X	--	--	--	Sampled 4/7/2016	Installed on 3/23/2016 Developed on 3/25/2016	
	GW-04D	18	1	Screen interval 8-18	X	X	--	--	--	Sampled 4/7/2016	Installed on 3/23/2016 Developed on 3/25/2016	
Existing Groundwater Monitoring Wells/ Groundwater	MW-1	N/A	1	Well depth 12.60	X	X	--	--	--	Sampled 4/7/2016	Developed on 3/24/2016. Blind duplicate collected.	Determine the presence and extent of downgradient groundwater contamination. Confirm groundwater flow direction and the influence of the East River and Newtown Creek.
	MW-2	N/A	1	Well depth 6.85	X	X	--	--	--	Sampled 4/7/2016	Developed on 3/25/2016	
	MW-3	N/A	1	Well depth 12.75	X	X	X	X	X	Sampled 4/7/2016	Developed on 3/24/2016	

TABLE 1

Long Island Rail Road
Arch Street Yard (Site No. V00733)
Remedial Investigation

SAMPLING SUMMARY AND RATIONALE

Investigation Method/Media	Sample Point ID	Completion Depth Below Grade (feet)	No. of Samples Selected for Analysis	Sample Depth Below Grade (feet)	Analysis [1]					Installation/ Sample Date	Comments/Deviations from Work Plan	Sample Point Objectives
					TCL VOCs	TCL SVOCs	PCBs	TCL Pesticides	TAL Metals			
Remedial Investigation - Third Phase (To Be Completed)												
Soil Vapor Probes and Indoor/ Ambient Air	SV-01	TBD	1	TBD	X	--	--	--	--	TBD	TBD	Determine if soil vapor intrusion is a potential exposure pathway.
	SV-02	TBD	1	TBD	X	--	--	--	--	TBD	TBD	
	SV-03	TBD	1	TBD	X	--	--	--	--	TBD	TBD	
	SV-04	TBD	1	TBD	X	--	--	--	--	TBD	TBD	
	SV-05	TBD	1	TBD	X	--	--	--	--	TBD	TBD	
	IA-01	N/A	1	N/A	X	--	--	--	--	TBD	TBD	
	AA-01	N/A	1	N/A	X	--	--	--	--	TBD	TBD	
Sub-Slab Soil Vapor Probe	SV-06	Below Building Slab	1	Below Building Slab	X	--	--	--	--	TBD	TBD	Determine if soil vapor intrusion is a potential exposure pathway.

Notes:

X: Sample selected for analysis.

--: Sample not selected for analysis.

N/A: Not available

[1] As per Work Plan, approximately 20% of the soil and groundwater samples collected from the soil borings and groundwater monitoring wells were analyzed for TAL metals, PCBs and pesticides in addition to VOCs and SVOCs, biased toward visually impacted samples. Analytical methods were as follows:

Target Compound List (TCL) Volatile Organic Compounds (VOCs) by EPA Methods 5035 and 8260 for soil samples, EPA Method 8260 for groundwater samples and EPA Method TO-15 for air samples.

TCL Semivolatile Organic Compounds (SVOCs) by EPA Method 8270.

Polychlorinated Biphenyls (PCBs) by EPA Method 8082.

TCL Pesticides by EPA Method 8081.

Target Analyre List (TAL) metals by EPA Method 6010.

ATTACHMENT 3

BORING LOGS AND WELL CONSTRUCTION LOGS

D&B ENGINEERS AND ARCHITECTS, P.C.

Project No.: 3455-2D
Project Name: LIRR –
Arch Street

Boring No.: SB-01
Sheet _1_ **of** _1
By: Keith Robins

Drilling Contractor: AARCO
Drill Rig: Geoprobe 7822DT
Date Started: 3/15/16

Geologist: Keith Robins
Drilling Method: Macrocore
Drive Hammer Weight: N/A
Date Completed: 3/16/16

Boring Completion Depth: 25‘
Ground Surface Elevation: 7.48’
Boring Diameter: 2”

Depth (ft.)	No.	Type	Rec.	PID Per 6" (ppm)	Sample Description
0’-6”	1	HA	6”	0.0	Bluestone.
6”-1’	2	HA	12”	0.0	Same as above.
1’-2’	3	HA	12”	0.0	Dark gray-brown, medium to coarse SAND and STONE and GRAVEL, trace brick, concrete and wood, dense.
2’-2.5’	4	HA	6”	0.0	Bluestone and felt barrier fabric.
2.5’-3’	5	HA	6”	0.1	Black, silty SAND, organic odor, water encountered at 3’ bgs.
3’-5’	6	MC	16”	0.0	Black, fine to medium SAND, some silt, fine to medium gravel, trace slag, fabric, rock fragments, poorly sorted, loose, wet, no staining, organic odor.
5’-10’	7	MC	30”	0.1 0.1	0”-19”: Black-dark gray, silty SAND, little fine gravel, poorly sorted, loose, wet, no staining, no odor. 19”-30”: Gray-brown, clayey SILT, firm-soft, wet-moist, no staining, organic odor.
10’-15’	8	MC	36”	0.0 0.0	0”-29”: Dark gray, CLAY, trace organic material, slightly plastic-firm, moist, no staining, trace organic odor. 29”-36”: Dark brown-gray, CLAY, some organic material, soft, damp, no staining, organic odor.
15’-20’	9	MC	38”	0.0 0.0 0.0	0”-19”: Gray-silver, silty CLAY, slightly plastic firm, moist. 19”-28”: Gray, fine silty SAND, wet. 28”-38”: Olive-brown, clayey SILT, trace fine sand, fine subrounded gravel, dense, no staining, no odor.
20’-25’	10	MC	34”	0.0 0.0	0”-24”: Olive green-brown, fine to medium SAND, some silt, trace fine subrounded gravel, poorly sorted, medium dense, wet, no staining, no odor. 24”-34”: Gray-light gray, fine SAND, trace silt, well sorted, wet, no staining, no odor.

Sample Types:
HA = Hand Auger
MC = Macrocore

NOTES:
Soil samples from 13’-15’ and 23’-25’ submitted for TCL VOC and TCL SVOC analysis.

D&B ENGINEERS AND ARCHITECTS, P.C.

Project No.: 3455-2D
Project Name: LIRR – Arch Street

Boring No.: SB-02
Sheet 1 **of** 1
By: Keith Robins

Drilling Contractor: AARCO
Drill Rig: Geoprobe 7822DT
Date Started: 3/14/16

Geologist: Keith Robins
Drilling Method: Macrocore
Drive Hammer Weight: N/A
Date Completed: 3/17/16

Boring Completion Depth: 25‘
Ground Surface Elevation: 8.60’
Boring Diameter: 2”

Depth (ft.)	No.	Type	Rec.	PID Per 6" (ppm)	Sample Description
0’-1’	1	HA	12”	0.0	Bluestone.
1’-2’	2	HA	12”	0.0	Gravel, brick, stone, cobbles, no odor, no staining.
2’-3’	3	HA	12”	0.0	Dark gray, fine to medium SAND, some brick, stone, cobbles, dense gravel, no staining, no odor. Water encountered at 3’ bgs.
3’-5’	4	MC	24”	0.0	0”-6”: CONCRETE.
				0.0	6”-24”: Black, fine to medium SAND, some rock, stones, trace silt, fine gravel, trace yellow brick, slag and coal, poorly sorted, loose, wet, no staining, no odor.
5’-10’	5	MC	46”	0.0	0”-12”: Black-brown, ASH, COAL, and Cinders, poorly sorted, loose, wet, no staining, no odor.
				0.0	12”-22”: Olive-gray, fine to medium SAND, some rock, trace fine gravel, stones, poorly sorted, wet, no staining, no odor.
				0.0	22”-46”: Olive-brown, fine to very fine SAND, little silt, trace fine gravel, well sorted, moist, no staining, no odor.
10’-15’	6	MC	44”	0.0	0”-10”: Olive-brown, fine to medium SAND, trace silt, fine subrounded gravel and stone, well sorted, wet, no staining, no odor.
				0.0	10”-18”: Olive-brown, medium to coarse SAND, trace subrounded gravel, poorly sorted, loose, wet, no staining, no odor.
				0.0	18”-44”: Gray, CLAY, some organic matter, trace shells, soft, damp-moist, no staining, organic odor.
15’-20’	7	MC	36”	0.0	0”-8”: Brown, CLAY, trace sand, soft, moist, no staining, no odor.
				0.0	8”-22”: Gray, CLAY, trace fine gravel, dense-firm, damp, no staining, no odor.
				0.0	22”-27”: Brown-light red, fine SAND, well sorted, wet, no staining, no odor.
				0.0	27”-36”: Olive-brown, SILT, trace clay, dense, damp.
20’-25’	8	MC	36”	0.0	0”-24”’: Brown-olive, silty fine SAND, trace fine gravel, poorly sorted, dense, moist, no staining, no odor.
				0.0	24”-36”: Gray, fine to medium SAND, some silt, trace clay, subrounded gravel, rock, poorly sorted, wet, no staining, no odor.

Sample Types:
HA = Hand Auger
MC = Macrocore

NOTES:
Soil samples from 13’-15’ and 23’-25’ submitted for TCL VOC and TCL SVOC analysis.

D&B ENGINEERS AND ARCHITECTS, P.C.

Project No.: 3455-2D
Project Name: LIRR – Arch Street

Boring No.: SB-03
Sheet 1 **of** 1
By: Keith Robins

Drilling Contractor: AARCO
Drill Rig: Geoprobe 7822DT
Date Started: 3/14/16

Geologist: Keith Robins
Drilling Method: Macrocore
Drive Hammer Weight: N/A
Date Completed: 3/17/16

Boring Completion Depth: 25‘
Ground Surface Elevation: 8.72’
Boring Diameter: 2”

Depth (ft.)	No.	Type	Rec.	PID Per 6" (ppm)	Sample Description
0’-6”	1	HA	6”	0.0	Bluestone.
6”-2’	2	HA	1.5”	0.0	Dark gray, fine SAND, some stone, gravel, dense, no staining, no odor.
2’-5’	3	MC	25”	0.0 0.0	0”-16”: Brown, medium to coarse SAND, some fine gravel, cinders, concrete, poorly sorted, loose, wet at 3’ bgs, no staining, no odor. 16”-25”: Black, fine to medium SAND, some cinders, slag, angular gravel, trace ash, poorly sorted, loose, wet, no staining, no odor.
5’-10’	4	MC	36”	0.0 0.0 0.0 0.0	0”-18”: Black, medium to coarse SAND and angular GRAVEL, trace angular rock, brick, poorly sorted, very loose, wet, no staining, no odor. 18”-21”: Black, fine silty SAND, some gravel, wet. 21”-27”: Wood. 27”-36”: Black-gray brown, fine to very fine SAND, trace silt, trace wood, wet, no staining, no odor.
10’-15’	5	MC	36”	0.0 0.0	0”-10”: Black, coarse SAND and GRAVEL, loose, wet. 10”-36”: Brown, fine to very fine silty SAND, well sorted, loose, wet, no staining, no odor.
15’-20’	6	MC	39”	0.0 0.0 0.0	0”-14”: Dark gray, CLAY, trace shells, soft, moist, no staining, organic odor. 14”-27”: Gray-light gray, SILT, trace clay, dense, damp, no staining, no odor. 27”-39”: Brown-olive, SILT, some fine sand, trace fine gravel, damp, dense, no staining, no odor.
20’-25’	7	MC	36”	0.0 0.0 0.0	0”-13”: Brown, fine to medium SAND, trace silt, subrounded gravel, poorly sorted, medium dense, wet, no staining, no odor. 13”-25”: Olive-brown, very fine to fine SAND, trace silt, well sorted, moist, no staining, no odor. 25”-36”: Gray-brown, silty fine SAND, trace subrounded gravel, dense, moist, no staining, no odor.

Sample Types:
HA = Hand Auger
MC = Macrocore

NOTES:
Soil samples from 12’-14’ and 18’-20’ submitted for TCL VOC and TCL SVOC analysis. Soil sample from 12’-14’ also submitted for analysis of TAL metals, TCL Pesticides and PCBs.

D&B ENGINEERS AND ARCHITECTS, P.C.

Project No.: 3455-2D
Project Name: LIRR – Arch Street

Boring No.: SB-04
Sheet 1 **of** 1
By: Keith Robins

Drilling Contractor: AARCO
Drill Rig: Geoprobe 7822DT
Date Started: 3/14/16

Geologist: Keith Robins
Drilling Method: Macrocore
Drive Hammer Weight: N/A
Date Completed: 3/16/16

Boring Completion Depth: 29'
Ground Surface Elevation: 7.46'
Boring Diameter: 2"

Depth (ft.)	No.	Type	Rec.	PID Per 6" (ppm)	Sample Description
0'-6"	1	HA	6"	0.0	Bluestone.
6"-1'	2	HA	6"	0.0	Brown, medium to coarse SAND, some gravel, organic matter, trace silt, dry, no odor.
1'-2'	3	HA	12"	0.0	Gray-light black, medium to coarse SAND and GRAVEL, trace cobbles, stone, brick and concrete, very dense, no odor, no staining.
2'-3'	4	HA	12"	0.0	Black, SAND, ROCK and GRAVEL, dense, organic odor, water encountered at 3' bgs.
3'-5'	5	MC	5"	7.8	Black-dark gray, medium to coarse SAND, some fine to coarse gravel, trace silt, trace stone, concrete and rubber, poorly sorted, loose, wet, no staining, very slight sheen on water, petroleum odor.
5'-10'	6	MC	8"	2.3	Black, medium to coarse SAND and subangular GRAVEL, crushed ROCK, trace wood, poorly sorted, loose, wet, no staining, slight petroleum odor.
10'-15'	7	MC	42"	0.0	0"-33": Dark gray, CLAY, trace organic matter, trace shells, soft, slightly plastic, damp-moist, no staining, organic odor.
				0.0	33"-42": Dark gray-brown, silty CLAY, some organic matter, firm-dense, slightly plastic, no staining, organic odor, moist-wet.
15'-20'	8	MC	40"	0.0	0"-21": Gray, clayey SILT, trace fine gravel, organic matter, firm-dense, damp-moist, no staining, no odor.
				0.0	21"-40": Olive-brown, fine to medium SAND, some silt, subrounded gravel, trace rock, muscovite flakes, poorly sorted, dense-moist, no staining, no odor.
20'-25'	9	MC	6"	0.0	Olive-brown, fine to medium SAND, some silt, subrounded gravel, trace rock, poorly sorted, dense, damp-moist, no staining, no odor. Note large stone stuck in tip of soil sampler.
25'-29'	10	MC	23"	0.0	Gray, fine to medium SAND, trace silt, fine gravel and rock fragments, shale/slate, poorly sorted, loose, wet, no staining, no odor. Encountered refusal at 29'.

Sample Types:
HA = Hand Auger
MC = Macrocore

NOTES:
Soil samples from 3'-5', 10'-12' and 27'-29' submitted for TCL VOC and TCL SVOC analysis. Soil sample from 3'-5' also submitted for analysis of TAL Metals, TCL Pesticides and PCBs.

D&B ENGINEERS AND ARCHITECTS, P.C.

Project No.: 3455-2D
Project Name: LIRR – Arch Street

Boring No.: SB-05
Sheet 1 **of** 1
By: Keith Robins

Drilling Contractor: AARCO
Drill Rig: Geoprobe 7822DT
Date Started: 3/14/16

Geologist: Keith Robins
Drilling Method: Macrocore
Drive Hammer Weight: N/A
Date Completed: 3/16/16

Boring Completion Depth: 25‘
Ground Surface Elevation: 7.94’
Boring Diameter: 2”

Depth (ft.)	No.	Type	Rec.	PID Per 6" (ppm)	Sample Description
0’-6”	1	HA	6”	0.0	Bluestone.
6”-2’	2	HA	18”	0.0	Gray, medium to coarse SAND and GRAVEL, dense, no staining, no odor.
2’-3’	3	HA	12”	0.0	Dark gray, fine SAND and BRICK, some gravel, no staining, no odor. Water encountered at 3’ bgs.
3’-5’	4	MC	21”	0.0	Dark gray-black, medium to coarse SAND, some cinders, slag, brick, trace silt, brick, fine gravel, angular rock, poorly sorted, loose, wet, no staining, no odor.
5’-10’	5	MC	45”	0.0 0.0	0”-18”: Black-dark gray, fine to medium SAND, some silt, trace fine gravel, poorly sorted, loose, wet, no staining, organic odor. 18”-45”’: Gray-olive, silty fine SAND, well sorted, wet, no staining, organic odor.
10’-15’	6	MC	47”	250 0.0 0.0	0”-12”: Black-dark gray, fine to medium SAND, trace silt, fine gravel, poorly sorted, loose, wet, no staining, trace solvent odor. 12”-42”: Gray, CLAY, soft-plastic, damp-moist, no staining, trace organic matter. 42”-47”: Dark gray-brown, CLAY, soft-slightly plastic, some organic matter, dry-damp, no staining.
15’-20’	7	MC	42”	0.0 0.0 0.0	0”-12”: Light gray, CLAY, trace organic matter, dense, moist, no staining, no odor. 12”-24”: Gray-dark gray, silty SAND, wet, no staining, no odor. 24”-42”: Olive-brown, fine to medium SAND, some silt, subrounded gravel, trace clay, poorly sorted, dense, no odor, no staining.
20’-25’	8	MC	44”	0.0 0.0 0.0	0”-20”: Brown-olive, CLAY, trace fine subrounded gravel, rock, dense, damp, no odor, no staining. 20”-32”: Olive-brown, silty SAND, some subrounded gravel, stones, poorly sorted, dense, moist, no staining, no odor. 32”-44”: Gray, fine SAND, trace silt, well sorted, wet, no staining, no odor.

Sample Types:
HA = Hand Auger
MC = Macrocore

NOTES: Soil samples from 10’-11’, 11’-13’ submitted for TCL VOC and TCL SVOC analysis. Soil sample from 10’-11’ also submitted for analysis of TAL metals, TCL Pesticides and PCBs.

D&B ENGINEERS AND ARCHITECTS, P.C.

Project No.: 3455-2D
Project Name: LIRR – Arch Street

Boring No.: SB-06
Sheet 1 **of** 1
By: Keith Robins

Drilling Contractor: AARCO
Drill Rig: Geoprobe 7822DT
Date Started: 3/14/16

Geologist: Keith Robins
Drilling Method: Macrocore
Drive Hammer Weight: N/A
Date Completed: 3/17/16

Boring Completion Depth: 25‘
Ground Surface Elevation: 9.23’
Boring Diameter: 2”

Depth (ft.)	No.	Type	Rec.	PID Per 6" (ppm)	Sample Description
0’-1”	1	HA	1”	0.0	Bluestone.
1”-3’	2	HA	35”	0.0	Dark gray, fine to medium SAND and BRICK, dense, no staining, no odor.
3’-5’	4	MC	13”	0.0	Black-brown, fine to coarse SAND and Stones, Concrete, Gravel, poorly sorted, loose, no staining, no odor. Water encountered at 4.5’ bgs.
5’-10’	5	MC	31”	0.0	0”-19”: Dark brown-black, medium to coarse SAND and CONCRETE, some rock, stone, gravel, trace brick, poorly sorted, loose, wet, no staining, no odor.
				25	19”-31”: Dark black, silty fine SAND, trace fine gravel, well sorted, wet, no staining, no odor.
10’-15’	6	MC	21”	5.0	0”-4”: Black, fine to coarse SAND, trace fine gravel, poorly sorted, wet, no staining, no odor.
				0.0	4”-16”: Dark brown, fine SAND, trace silt, fine gravel, well sorted, wet, no staining, no odor.
				0.0	16”-21”: Black-dark gray, fine SAND, trace silt, well sorted, wet, no staining, no odor.
15’-20’	7	MC	39”	0.0	0”-12”: Dark gray, CLAY, some organic matter and shells, soft, moist, no staining, trace organic odor.
				0.0	12”-31”: Light gray, SILT, trace clay, subrounded gravel, dense, moist, no staining, no odor.
				0.0	31”-39”: Reddish-brown, silty fine SAND, well sorted, medium dense, wet, no staining, no odor.
20’-25’	8	MC	45”	0.0	0”-18”: Olive-brown, CLAY and SILT, trace fine sand seams, dense, damp-moist, no staining, no odor.
				0.0	18”-34”: Olive-brown, fine to medium SAND, some silt, trace rock, fine subrounded gravel, poorly sorted, dense, moist, no staining, no door.
				0.0	34”-45”: Light gray-tan, fine SAND, some silt, trace clay, subrounded gravel, medium dense, damp-moist, no staining, no odor.

Sample Types:
HA = Hand Auger
MC = Macrocore

NOTES:
Soil samples from 8’-10’ and 11’-13’ submitted for TCL VOC and TCL SVOC analysis. Soil sample from 8’-10’ also submitted for analysis of TAL Metals, TCL Pesticides and PCBs.

D&B ENGINEERS AND ARCHITECTS, P.C.

Project No.: 3455-2D
Project Name: LIRR – Arch Street

Boring No.: SB-07
Sheet 1 **of** 1
By: Keith Robins

Drilling Contractor: AARCO
Drill Rig: Geoprobe 7822DT
Date Started: 3/14/16

Geologist: Keith Robins
Drilling Method: Macrocore
Drive Hammer Weight: N/A
Date Completed: 3/18/16

Boring Completion Depth: 25‘
Ground Surface Elevation: 8.10’
Boring Diameter: 2”

Depth (ft.)	No.	Type	Rec.	PID Per 6" (ppm)	Sample Description
0’-8”	1	HA	8”	0.0	Bluestone.
8”-20”	2	HA	12”	0.0	Gray-brown, medium to coarse SAND and GRAVEL, trace stone, poorly sorted, loose, moist.
20”-36”	3	HA	16”	0.0	Black-dark gray, SILT and SAND, some gravel, trace cobbles, trace metal, brick and slag, poorly sorted, loose, moist, no staining, no odor.
36”-42”	4	HA	6”	0.0	Gray-brown, SILT and SAND, some gravel, poorly sorted, loose, wet at 3.8’ bgs.
3.5’-5’	5	MC	7”	0.0	Bluestone/gravel, wet, loose, no staining, no odor.
5’-10’	6	MC	42”	0.3	Gray-brown, fine to medium SAND, trace fine gravel, trace clayey silt, organic matter, poorly sorted, loose, wet, no staining, no odor.
10’-15’	7	MC	36”	0.2 0.3	0”-8”: Gray-brown, fine to medium SAND, trace coarse sand and gravel, well sorted, loose, wet, no staining, no odor. 8”-36”: Dark gray, CLAY, some organic matter and shells, soft, damp, no staining, organic odor.
15’-20’	8	MC	34”	0.3 0.3	0”-22”: Gray, SILT, trace rock, dense, damp-moist. 22”-34”: Brown-olive, silty fine SAND, trace rock and gravel, poorly sorted, dense, moist, no staining, no odor.
20’-25’	9	MC	35”	0.0 0.0	0”-19”: Brown-olive, fine to medium SAND, some silt, trace rock, gravel, poorly sorted, dense, moist-wet, no staining, no odor. 19”-35”: Gray, fine to very fine SAND, trace fine gravel, well sorted, wet, no staining, no odor.

Sample Types:
HA = Hand Auger
MC = Macrocore

NOTES:
Soil samples from 12’-14’ and 23’-25’ submitted for TCL VOC and TCL SVOC analysis. Soil sample from 12’-14’ also submitted for TAL Metals, TCL Pesticides and PCB analysis.

D&B ENGINEERS AND ARCHITECTS, P.C.	**Project No.:** 3455-2D **Project Name:** LIRR – Arch Street	**Boring No.:** SB-08 **Sheet** 1 **of** 1 **By:** Keith Robins
Drilling Contractor: AARCO **Drill Rig:** Geoprobe 7822DT **Date Started:** 3/14/16	**Geologist:** Keith Robins **Drilling Method:** Macrocore **Drive Hammer Weight:** N/A **Date Completed:** 3/17/16	**Boring Completion Depth:** 25‘ **Ground Surface Elevation:** 8.62’ **Boring Diameter:** 2”

Depth (ft.)	**No.**	**Type**	**Rec.**	**PID Per 6" (ppm)**	**Sample Description**
0’-1’	1	HA	12”	0.0	Bluestone.
1’-4’	2	HA	36”	0.0	Dark gray-brown, fine to medium SAND and GRAVEL, no odor, no staining. Water encountered at 4’ bgs.
4’-10’	3	MC	36”	56.0	0”-24”: Black, medium to coarse SAND and fine GRAVEL, some stone, trace clay, coal, cinders, brick, poorly sorted, wet, loose.
				0.0	24”-36”: Dark brown, medium to coarse SAND, Rock and Stones, some gravel, brick, poorly sorted, loose, wet, no staining, no odor.
10’-15’	4	MC	20”	0.0	0”-12”: Black, medium to coarse SAND and fine to coarse angular GRAVEL, some rock, concrete, brick, poorly sorted, very loose, wet, no staining, no odor.
				0.0	12”-20”: Dark brown-gray, silty SAND, some subrounded gravel, trace stone, poorly sorted, wet, no staining, no odor.
15’-20’	5	MC	52”	0.0	0”-12”: Dark gray, CLAY, some organic matter, soft-firm, slightly plastic, moist, no staining, slight organic odor.
				0.0	12”-20”: Dark gray-brown, silty CLAY, moist.
				0.0	20”-40”: Light gray-blue, SILT, trace clay, dense, damp, no staining, no odor.
				0.0	40”-52”: Reddish-olive, silty fine to medium SAND, some fine subrounded gravel, poorly sorted, dense, moist, no staining, no odor.
20’-25’	6	MC	40”	0.0	0”-16”: Olive-brown, SILT, little sand, trace fine gravel, dense, damp, no staining, no odor.
					16”-40”: Olive-brown, silty fine SAND, some subrounded gravel, trace weathered rock, poorly sorted, moist-damp, no staining, no odor.

Sample Types: **HA** = Hand Auger **MC** = Macrocore	**NOTES:** Soil samples from 4’-6’, 6’-8’ and 13’-15’ submitted for TCL VOC and TCL SVOC analysis.

D&B ENGINEERS AND ARCHITECTS, P.C.

Project No.: 3455-2D
Project Name: LIRR – Arch Street

Boring No.: SB-09
Sheet 1 **of** 1
By: Keith Robins

Drilling Contractor: AARCO
Drill Rig: Geoprobe 7822DT
Date Started: 3/18/16

Geologist: Keith Robins
Drilling Method: Macrocore
Drive Hammer Weight: N/A
Date Completed: 3/18/16

Boring Completion Depth: 8'
Ground Surface Elevation: 7.10'*
Boring Diameter: 2"

Depth (ft.)	No.	Type	Rec.	PID Per 6" (ppm)	Sample Description
0'-5'	1	MC	36"	0.3	0"-12": Brown, medium to coarse SAND, crushed ROCK and GRAVEL, poorly sorted, loose, damp to wet.
				0.0	12"-18": Dark gray, silty SAND and STONE, poorly sorted, loose, no staining, no odor.
				0.0	18"-21": Concrete, dry, no staining, no odor.
				0.0	21"-42": Black, fine SAND, SLAG and COAL, trace silt, lumber, poorly sorted, very loose, wet, no staining, no odor.
				0.0	42"-46": Olive-brown, fine SAND, some fine angular gravel, wet, no staining, no odor.
5'-8'	2	MC	34"	0.3	0"-21": Dark gray, fine to medium SAND, trace fine gravel, well sorted, wet, no staining, no odor.
				0.3	21"-30": Brown-olive, fine to medium SAND, trace fine gravel, wet, no staining, no odor.
				0.3	30"-34": Dark gray, very fine SAND, trace silt, wet, no staining, no odor.

Sample Types:
HA = Hand Auger
MC = Macrocore

NOTES:
Soil samples from 0'-1', 2'-3', 4'-5' and 7'-8' submitted for PCBs analysis.

Boring log begins approximately 2 ft. below bluestone.
*Ground surface elevation is from top of bluestone.

D&B ENGINEERS AND ARCHITECTS, P.C.

Project No.: 3455-2D
Project Name: LIRR – Arch Street

Boring No.: SB-10
Sheet 1 **of** 1
By: Keith Robins

Drilling Contractor: AARCO
Drill Rig: Geoprobe 7822DT
Date Started: 3/18/16

Geologist: Keith Robins
Drilling Method: Macrocore
Drive Hammer Weight: N/A
Date Completed: 3/18/16

Boring Completion Depth: 8‘
Ground Surface Elevation: 7.21’*
Boring Diameter: 2”

Depth (ft.)	No.	Type	Rec.	PID Per 6" (ppm)	Sample Description
0’-1’	1	HA	12”	0.0	Dark gray, medium to fine SAND, some brick, rock, no staining, no odor.
1.5’-5’	2	HA	35”	0.3 0.3	0”-17”: Black, medium to coarse SAND, SLAG and GRAVEL, poorly sorted, loose, wet, no staining, no odor. 17”-35”: Black, fine to medium SAND and crushed ROCK, trace gravel, lumber, poorly sorted, wet, no staining, no odor.
5’-8’	3	MC	27”	0.2 0.2	0”-18”: Black, medium to coarse SAND, fine GRAVEL, SLAG and COAL fragments, poorly sorted, loose, wet, no staining, no odor. 18”-27”: Olive-brown, fine SAND, wet, well sorted, wet, no staining, no odor.

Sample Types:
HA = Hand Auger
MC = Macrocore

NOTES:
Soil samples from 2’-3’, 4’-5’ and 7’-8’ submitted for PCBs analysis.

Boring log begins approximately 18” below the bluestone.
*Ground surface elevation is from top of bluestone.

D&B ENGINEERS AND ARCHITECTS, P.C.

Project No.: 3455-2D
Project Name: LIRR – Arch Street

Boring No.: SB-11
Sheet 1 **of** 1
By: Keith Robins

Drilling Contractor: AARCO
Drill Rig: Geoprobe 7822DT
Date Started: 3/18/16

Geologist: Keith Robins
Drilling Method: Macrocore
Drive Hammer Weight: N/A
Date Completed: 3/18/16

Boring Completion Depth: 8'
Ground Surface Elevation: 7.39'*
Boring Diameter: 2"

Depth (ft.)	No.	Type	Rec.	PID Per 6" (ppm)	Sample Description
0'-5'	1	MC	35"	0.2	0"-15": Black, medium to coarse SILT, GRAVEL and STONE, trace brick, poorly sorted, loose, wet, no staining, no odor.
				0.2	15"-35": Olive-brown, fine to medium SAND, some silt, crushed stone, rock, gravel, compacted, dense, wet, no staining, no odor.
5'-8'	2	MC	24"	0.6	0"-12": Black-dark gray, medium to coarse SAND, STONE, ROCK and GRAVEL, poorly sorted, loose, wet, no staining, no odor.
				0.6	12"-24": Brown-gray, organic CLAY and PEAT, damp, slightly plastic, soft, no staining, some organic odors.

Sample Types:
HA = Hand Auger
MC = Macrocore

NOTES:
Soil samples from 0'-1', 2'-3', 4'-5' and 7'-8' submitted for PCBs analysis.

Boring log begins approximately 24" below bluestone.
*Ground surface elevation is from top of bluestone.

D&B ENGINEERS AND ARCHITECTS, P.C.

Project No.: 3455-2D
Project Name: LIRR – Arch Street

Boring No.: SB-12
Sheet 1 **of** 1
By: Keith Robins

Drilling Contractor: AARCO
Drill Rig: Geoprobe 7822DT
Date Started: 3/21/16

Geologist: Keith Robins
Drilling Method: Macrocore
Drive Hammer Weight: N/A
Date Completed: 3/21/16

Boring Completion Depth: 6'
Ground Surface Elevation: 6.89'*
Boring Diameter: 2"

Depth (ft.)	No.	Type	Rec.	PID Per 6" (ppm)	Sample Description
0'-5'	1	HA/ MC	44"	0.5	0"-16": Gray, medium-coarse SAND, GRAVEL, STONES, trace brick, concrete, poorly sorted, loose.
				0.5	16"-39": Black, fine to medium SAND, some slag, trace coal, cinders, gravel, poorly sorted, loose, wet, no staining, no odor.
				0.5	39"-44": Black-brown, fine to medium SAND, trace gravel, well sorted, wet, no staining, no odor.
5'-6'	2	MC	12"	0.5	Dark gray, organic CLAY, soft-slightly plastic, organic odor, moist.

Sample Types:
HA = Hand Auger
MC = Macrocore

NOTES:
Soil samples from 0'-1', 2'-3' and 5'-6' submitted for PCBs analysis.

Boring log begins approximately 3" below bluestone.
*Ground surface elevation is from top of bluestone.

D&B ENGINEERS AND ARCHITECTS, P.C.

Project No.: 3455-2D
Project Name: LIRR – Arch Street

Boring No.: SB-13
Sheet 1 **of** 1
By: Keith Robins

Drilling Contractor: AARCO
Drill Rig: Geoprobe 7822DT
Date Started: 3/21/16

Geologist: Keith Robins
Drilling Method: Macrocore
Drive Hammer Weight: N/A
Date Completed: 3/21/16

Boring Completion Depth: 6'
Ground Surface Elevation: 7.12'*
Boring Diameter: 2"

Depth (ft.)	No.	Type	Rec.	PID Per 6" (ppm)	Sample Description
0'-5'	1	MC	50"	0.4	0"-12": Dark brown-gray, medium to coarse SAND and STONES, some angular gravel, trace concrete, poorly sorted, damp-moist, no staining, no odor.
				0.4	12"-29": Black, medium to coarse SAND, some coarse gravel, slag, poorly sorted, loose, wet, no staining, no odor.
				0.4	29"-50": Dark gray-olive, organic CLAY, soft-slightly plastic, moist, organic odor.
5'-6'	2	MC	10"	0.4	Gray, CLAY, some organic material, soft-slightly plastic, moist, no staining, no odor.

Sample Types:
HA = Hand Auger
MC = Macrocore

NOTES:
Soil samples from 0'-1', 2'-3' and 5'-6' submitted for PCBs analysis.

Boring log begins approximately 24" below bluestone.
*Ground surface elevation is from top of bluestone.

D&B ENGINEERS AND ARCHITECTS, P.C.

Project No.: 3455-2D
Project Name: LIRR – Arch Street

Boring No.: SB-14
Sheet 1 **of** 1
By: Keith Robins

Drilling Contractor: AARCO
Drill Rig: Geoprobe 7822DT
Date Started: 3/21/16

Geologist: Keith Robins
Drilling Method: Macrocore
Drive Hammer Weight: N/A
Date Completed: 3/21/16

Boring Completion Depth: 6‘
Ground Surface Elevation: 7.76’*
Boring Diameter: 2”

Depth (ft.)	**No.**	**Type**	**Rec.**	**PID Per 6" (ppm)**	**Sample Description**
0’-5’	1	HA/ MC	35”	0.3 0.3	0”-17”: Black-dark gray, medium to coarse SAND, some fine gravel, silt, slag, trace silt, brick, poorly sorted, loose, no staining, no odor. 17”-35”: Brown-light orange, medium SAND, trace fine gravel, well sorted, compacted, wet, no staining, no odor.
5’-6’	2	MC	10”	0.3	Light gray, fine to medium SAND, trace silt, gravel, well sorted, wet, no staining, no odor.

Sample Types:
HA = Hand Auger
MC = Macrocore

NOTES:
Soil samples from 0’-1’, 2’-3’ and 5’-6’ submitted for PCBs analysis.

Boring log begins approximately 24 “ below bluestone.
*Ground surface elevation is from top of bluestone.

D&B ENGINEERS AND ARCHITECTS, P.C.

Project No.: 3455-2D
Project Name: LIRR – Arch Street

Boring No.: SB-15
Sheet 1 **of** 1
By: Keith Robins

Drilling Contractor: AARCO
Drill Rig: Geoprobe 7822DT
Date Started: 3/18/16

Geologist: Keith Robins
Drilling Method: Macrocore
Drive Hammer Weight: N/A
Date Completed: 3/18/16

Boring Completion Depth: 6'
Ground Surface Elevation: 6.94'*
Boring Diameter: 2"

Depth (ft.)	No.	Type	Rec.	PID Per 6" (ppm)	Sample Description
1'-5'	1	HA/ MC	36"	0.1	0"-31": Black-dark gray, medium to coarse SAND, some angular gravel, trace silt, cinders, slag, crushed rock poorly sorted, loose, wet, no staining, no odor.
				0.1	31"-36": Olive green-brown, fine to coarse SAND, trace subrounded-flat gravel, well sorted, wet, no staining, no odor.
5'-6'	2	MC	8"	0.1	Olive-brown, SILT, dense, moist, no staining, no odor.

Sample Types:
HA = Hand Auger
MC = Macrocore

NOTES:
Soil samples from 0'-1', 2'-3' and 5'-6' submitted for PCBs analysis.

Boring log begins approximately 24" below bluestone.
*Ground surface elevation is from top of bluestone.

D&B ENGINEERS AND ARCHITECTS, P.C.	**Project No.:** 3455-2D **Project Name:** LIRR – Arch Street	**Boring No.:** SB-16 **Sheet** 1 **of** 1 **By:** Keith Robins
Drilling Contractor: AARCO **Drill Rig:** Geoprobe 7822DT **Date Started:** 3/18/16	**Geologist:** Keith Robins **Drilling Method:** Macrocore **Drive Hammer Weight:** N/A **Date Completed:** 3/18/16	**Boring Completion Depth:** 6' **Ground Surface Elevation:** 7.13'* **Boring Diameter:** 2"

Depth (ft.)	No.	Type	Rec.	PID Per 6" (ppm)	Sample Description
0'-5'	1	HA/ MC	31"	0.3	Black-light gray, fine to medium SAND, some silt, stones, concrete, trace brick, damp-moist, no staining, no odor.
5'-6'	2	MC	10"	0.3	Olive-light black, medium to coarse SAND, some gravel, poorly sorted, medium-loose, moist-wet, no staining, no odor.

Sample Types:
HA = Hand Auger
MC = Macrocore

NOTES:
Soil samples from 0'-1', 2'-3' and 5'-6' submitted for PCBs analysis.

Boring log begins approximately 12" below bluestone.
*Ground surface elevation is from top of bluestone.

D&B ENGINEERS AND ARCHITECTS, P.C.	**Project No.:** 3455-2D **Project Name:** LIRR – Arch Street	**Boring No.:** SB-17 **Sheet** 1 **of** 1 **By:** Keith Robins
Drilling Contractor: AARCO **Drill Rig:** Geoprobe 7822DT **Date Started:** 3/18/16	**Geologist:** Keith Robins **Drilling Method:** Macrocore **Drive Hammer Weight:** N/A **Date Completed:** 3/18/16	**Boring Completion Depth:** 6‘ **Ground Surface Elevation:** 6.41’* **Boring Diameter:** 2”

Depth (ft.)	**No.**	**Type**	**Rec.**	**PID Per 6" (ppm)**	**Sample Description**
0’-1’	1	HA	12”	0.0	Black-dark brown, SAND and GRAVEL, trace brick, wet.
1’-2’	2	HA	12”	0.0	Black, SAND and GRAVEL, poorly sorted, wet.
2’-3’	3	HA	12”	0.0	Black, medium to coarse SAND and subangular GRAVEL, poorly sorted, loose, wet, no staining, no odor.
3’-5’	4	HA	24”	0.0	Black-dark gray, fine to medium SAND, trace gravel, wet, no staining, no odor.
5’-6’	5	HA	12”	0.0	Gray-brown, SILT, some fine to coarse sand, poorly sorted, wet, no staining, no odor.

Sample Types: **HA** = Hand Auger **MC** = Macrocore	**NOTES:** Soil samples from 12’-14’ and 23’-25’ submitted for TCL VOC and TCL SVOC analysis. Soil sample from 23’-25’ also submitted for TAL Metals, TCL Pesticides and PCB analysis. Boring log begins approximately 12” below bluestone. *Ground surface elevation is from top of bluestone.

D&B ENGINEERS AND ARCHITECTS, P.C.

Project No.: 3455-2D
Project Name: LIRR – Arch Street

Boring No.: GW-01
Sheet 1 **of** 1
By: Keith Robins

Drilling Contractor: AARCO
Drill Rig: Geoprobe
Date Started: 3/15/16

Geologist: Keith Robins
Drilling Method: Macrocore
Drive Hammer Weight: N/A
Date Completed: 3/21/16

Boring Completion Depth: 20‘
Ground Surface Elevation: 9.85’
Boring Diameter: 2”

Depth (ft.)	**No.**	**Type**	**Rec.**	**PID Per 6" (ppm)**	**Sample Description**
0’-6”	1	HA	6”	0.0	Bluestone.
6”-1’	2	HA	6”	0.0	Dark brown, medium to coarse SAND, GRAVEL and STONE, dry-damp.
1’-3’	3	HA	2”	0.0	Dark brown-brown, medium to coarse SAND, GRAVEL and STONE, trace brick, concrete, tile, wood, glass, poorly sorted, dense, no staining, no odor.
3’-5’	4	HA	24”	0.0	Black-dark brown, medium to coarse SAND, GRAVEL and STONE, trace silt, trace slag, cinders, poorly sorted, dense, no staining, no odor. Water encountered at 4.5’ bgs.
5’-10’	5	MC	39”	0.4 0.4	0”-19”: Black, medium to coarse SAND and SLAG, ASH, fine to coarse GRAVEL, trace brick, fill material, poorly sorted, very loose, wet, no staining, no odor. 19”-39”: Olive green-light black, fine to medium SAND, trace silt, rock fragments, trace fill material, poorly sorted, wet, no staining, no odor.
10’-15’	6	MC	43”	0.5 0.5 0.5 0.5	0”-11”: Black, fine to medium SAND, trace silt, well sorted, no staining, no odor. 11”-32”: Olive-brown, clayey SILT, slightly firm-soft, slightly plastic, wet, no staining, no odor. 32”-40”: Olive green-brown, fine SAND, well sorted, wet. 40”-43”: Black, fine SAND, trace silt, well sorted, wet, no staining, no odor.
15’-20’	7	MC	42”	0.4 0.4 0.4	0”-16”: Dark gray, CLAY, trace shells, slightly plastic, soft, damp-moist, no staining, no odor. 16”-34”: Gray-light gray, clayey SILT, trace fine subrounded gravel, firm-dense, moist. 34”-42”: Olive green-brown, silty fine SAND, trace fine gravel, poorly sorted, compacted-dense, moist-wet, no staining, no odor.

Sample Types:
HA = Hand Auger
MC = Macrocore

NOTES:
Soil samples from 4’-5’, 13’-15’ and 18’-20’ submitted for TCL VOC and TCL SVOC analysis.

D&B ENGINEERS AND ARCHITECTS, P.C.

Project No.: 3455-2D
Project Name: LIRR – Arch Street

Boring No.: GW-03
Sheet 1 **of** 1
By: Keith Robins

Drilling Contractor: AARCO
Drill Rig: Geoprobe
Date Started: 3/15/16

Geologist: Keith Robins
Drilling Method: Macrocore
Drive Hammer Weight: N/A
Date Completed: 3/21/16

Boring Completion Depth: 20‘
Ground Surface Elevation: 8.23’
Boring Diameter: 2”

Depth (ft.)	**No.**	**Type**	**Rec.**	**PID Per 6" (ppm)**	**Sample Description**
0’-1’	1	HA	12”	0.0	Bluestone.
1’-3’	2	HA	24”	0.0	Black-dark brown, medium to coarse SAND, STONE and GRAVEL, trace concrete, wood, poorly sorted, dense, no staining, no odor.
3’-5’	3	HA	29”	0.7	0”-12”: Black, medium to coarse SAND, some gravel, trace silt, poorly sorted, loose, wet, no staining, no odor.
				0.7	12”-23”: Black, fine to medium SAND, some fine to coarse angular gravel, rock, poorly sorted, very loose, wet, no staining, no odor.
				0.7	23”-29”: Dark brown, medium SAND, trace fine gravel, well sorted, dense, wet, no staining, no odor.
5’-10’	4	MC	52”	0.6	Dark brown-gray, fine to medium SAND, trace silt, coarse subrounded gravel, well sorted, medium compaction, wet, no staining, no odor.
10’-15’	5	MC	52”	0.5	0”-5”: Dark gray-brown, fine to medium SAND, trace fine gravel, coarse sand, poorly sorted, wet, no staining, no odor.
				2.2	5”-48”: Dark gray, CLAY, some organic matter, trace shells, firm, slightly plastic, damp-moist, some organic odor.
				2.2	48”-52”: Dark brown-red, Organic Clay and PEAT, slightly plastic, organic odor, damp.
15’-20’	6	MC	48”	0.6	0”-30”: Gray, silty CLAY, trace subrounded gravel, soft-firm, slightly plastic, damp-moist.
				0.6	30”-48”: Dark brown, SILT and fine SAND, trace black gravel, rock, muscovite flakes, poorly sorted, compacted, wet, no staining, no odor.

Sample Types:
HA = Hand Auger
MC = Macrocore

NOTES:
Soil samples from 3’-4’, 12’-14’ and 18’-20’ submitted for TCL VOC and TCL SVOC analysis.

D&B ENGINEERS AND ARCHITECTS, P.C.

Project No.: 3455-2D
Project Name: LIRR – Arch Street

Boring No.: GW-04D
Sheet 1 **of** 1
By: Keith Robins

Drilling Contractor: AARCO
Drill Rig: Geoprobe
Date Started: 3/15/16

Geologist: Keith Robins
Drilling Method: Macrocore
Drive Hammer Weight: N/A
Date Completed: 3/23/16

Boring Completion Depth: 19‘
Ground Surface Elevation: 7.31’
Boring Diameter: 2”

Depth (ft.)	**No.**	**Type**	**Rec.**	**PID Per 6" (ppm)**	**Sample Description**
0’-2’	1	HA	24”	0.0	Bluestone. Encountered water at 2 feet.
2’-4’	2	HA	24”	0.0	0”-6”: Dark gray, medium to coarse SAND, some silt, gravel and stone, poorly sorted, damp, no staining, no odor.
				0.0	6”-12”: Black, fine to medium SAND, trace fine gravel, cobbles, trace brick, poorly sorted, damp-moist, no staining, no odor.
				0.0	12”-18”: Olive-brown, medium SAND, well sorted, moist-wet.
				0.0	18”-24”: Black, fine to medium SAND, some silt, trace gravel, poorly sorted, dense, moist-wet, no staining, no odor.
4’-5’	3	HA	12”	0.0	Olive green-brown, silty fine SAND, some fine gravel, compacted, well sorted, wet, no staining, no odor.
5’-10’	4	MC	48”	0.2	0”-19”: Olive-dark brown, medium SAND, trace coarse sand, fine to coarse gravel, well sorted, wet, no staining, no odor.
				0.2	19”-40”: Brown, SILT, trace fine sand, well sorted, compacted-dense, wet, no staining, no odor.
				0.2	40”-48”: Dark gray, CLAY, some organic material, slightly plastic-soft, organic odor, moist.
10’-15’	5	MC	45”	0.2	0”-32”: Gray, CLAY, some organic material, trace shells, firm, slightly plastic, no staining, organic odor.
				0.2	32”-45”: Gray-light gray, clayey SILT, trace subrounded stone, slightly plastic-soft, wet-moist, no staining, no odor.
15’-19’	6	MC	48”	0.2	0”-40”: Dark brown-light gray, medium to coarse SAND, well sorted, loose, wet, no staining, no odor.
				0.2	40”-48”: Gray-brown, SILT, trace fine gravel, compact-dense, moist-wet, no staining, no odor.

Sample Types:
HA = Hand Auger
MC = Macrocore

NOTES:
Soil samples from 2’-3’, 12’-14’ and 16’-18’ submitted for TCL VOC and TCL SVOC analysis. Refusal at 19’ below top of bluestone.

D&B ENGINEERS AND ARCHITECTS, P.C.

Well Construction Log

Site LIRR – Arch Street Job Number 3455 Well No. GW-01

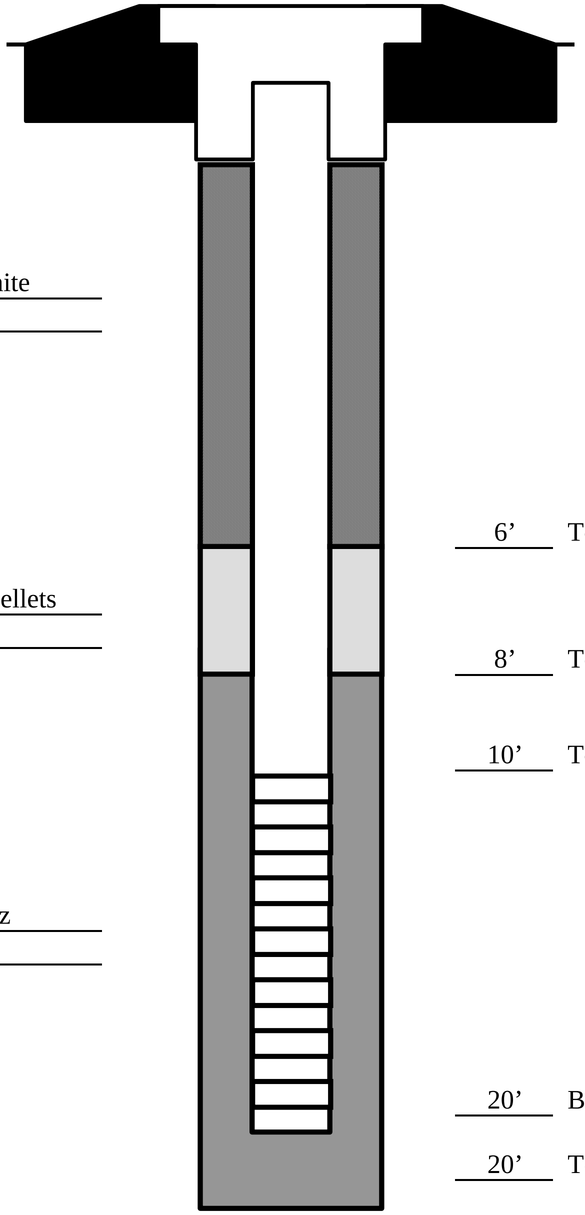
Total Depth 20’ Surface Elevation 12.57’ Top Riser Elevation 12.20’

Water Levels (Depth, Date, Time) 7.65, 4/27/16, 0725 Date Installed 3/22/16

Riser Dia. 1” Material PVC Length 12’
Screen Dia. 1” Material PVC Length 10’ Slot Size 0.010

SCHEMATIC

Surface Seal Type
Concrete
Stickup



Grout Type Cement/bentonite

Seal Type Bentonite pellets

Sand Pack Type Silica quartz
Size #2/ #1/ #00

6’ Top Seal
8’ Top Sand Pack
10’ Top Screen
20’ Bottom Screen
20’ Total Depth of Boring

D&B ENGINEERS AND ARCHITECTS, P.C.

Well Construction Log

Site LIRR – Arch Street Job Number 3455 Well No. GW-02S

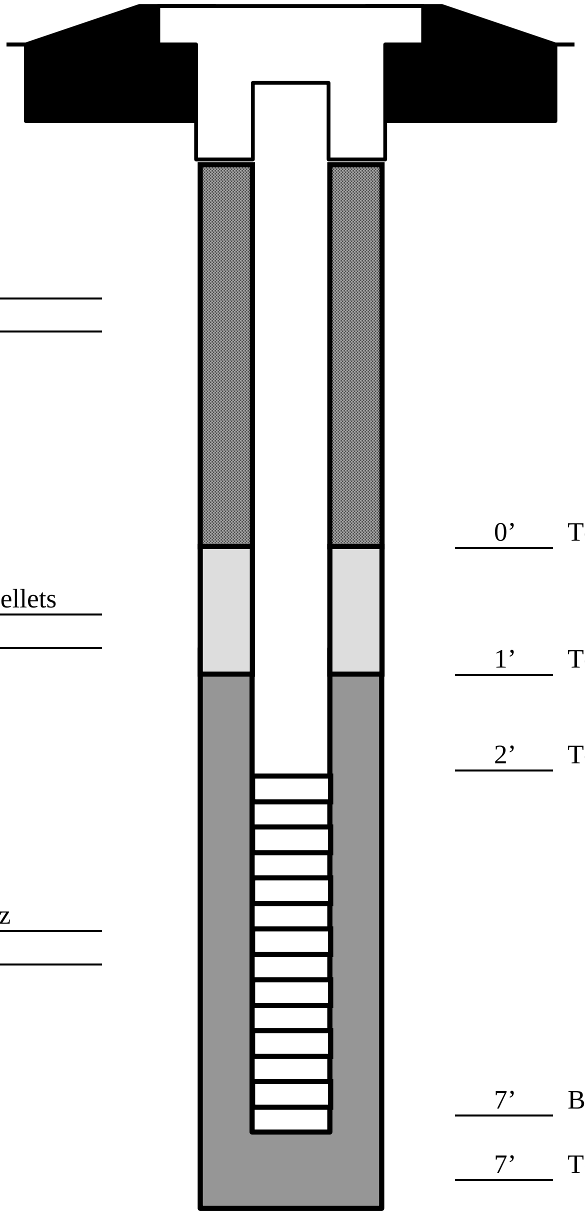
Total Depth 7’ Surface Elevation 11.15’ Top Riser Elevation 10.65’

Water Levels (Depth, Date, Time) 6.15’, 4/27/16, 0726 Date Installed 3/22/16

Riser Dia. 1” Material PVC Length 4’
Screen Dia. 1” Material PVC Length 5’ Slot Size 0.010

SCHEMATIC

Surface Seal Type
Concrete
Stickup



Grout Type --

Seal Type Bentonite pellets

Sand Pack Type Silica quartz
Size #2/ #1/ #00

0’ Top Seal
1’ Top Sand Pack
2’ Top Screen
7’ Bottom Screen
7’ Total Depth of Boring

D&B ENGINEERS
AND
ARCHITECTS, P.C.

Well Construction Log

Site LIRR – Arch Street Job Number 3455 Well No. GW-02D

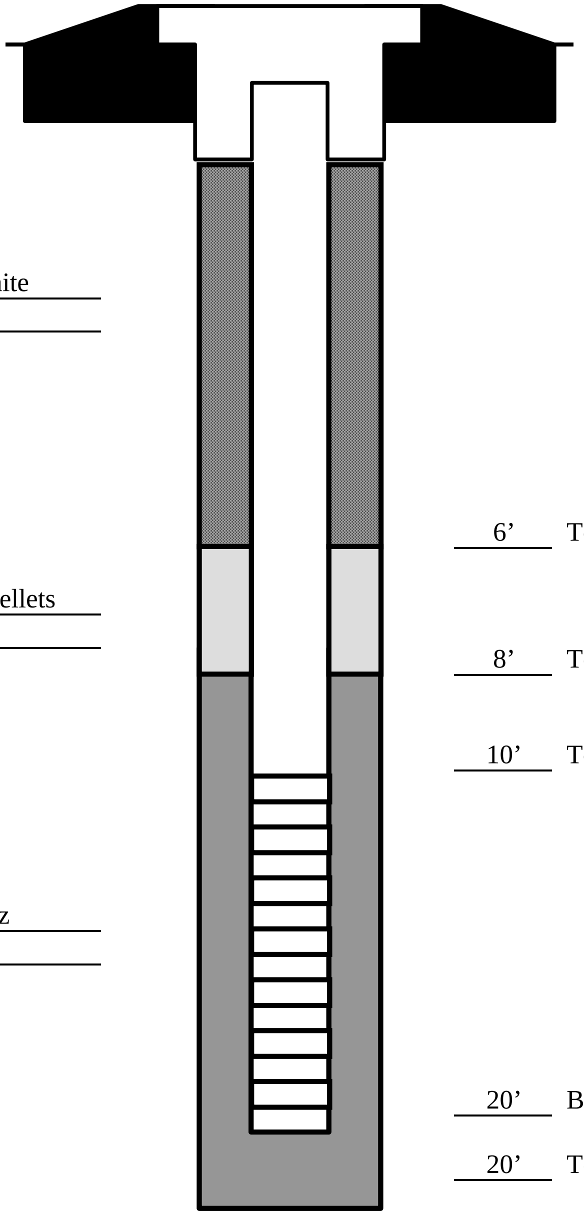
Total Depth 20’ Surface Elevation 11.49’ Top Riser Elevation 11.05’

Water Levels (Depth, Date, Time) 10.71’, 4/27/16, 0726 Date Installed 3/22/16

Riser Dia. 1” Material PVC Length 12’
Screen Dia. 1” Material PVC Length 10’ Slot Size 0.010

SCHEMATIC

Surface Seal Type
Concrete
Stickup



Grout Type Cement/bentonite

6’ Top Seal

Seal Type Bentonite pellets

8’ Top Sand Pack

10’ Top Screen

Sand Pack Type Silica quartz
Size #2/ #1/ #00

20’ Bottom Screen

20’ Total Depth of Boring

D&B ENGINEERS AND ARCHITECTS, P.C.

Well Construction Log

Site LIRR – Arch Street Job Number 3455 Well No. GW-03

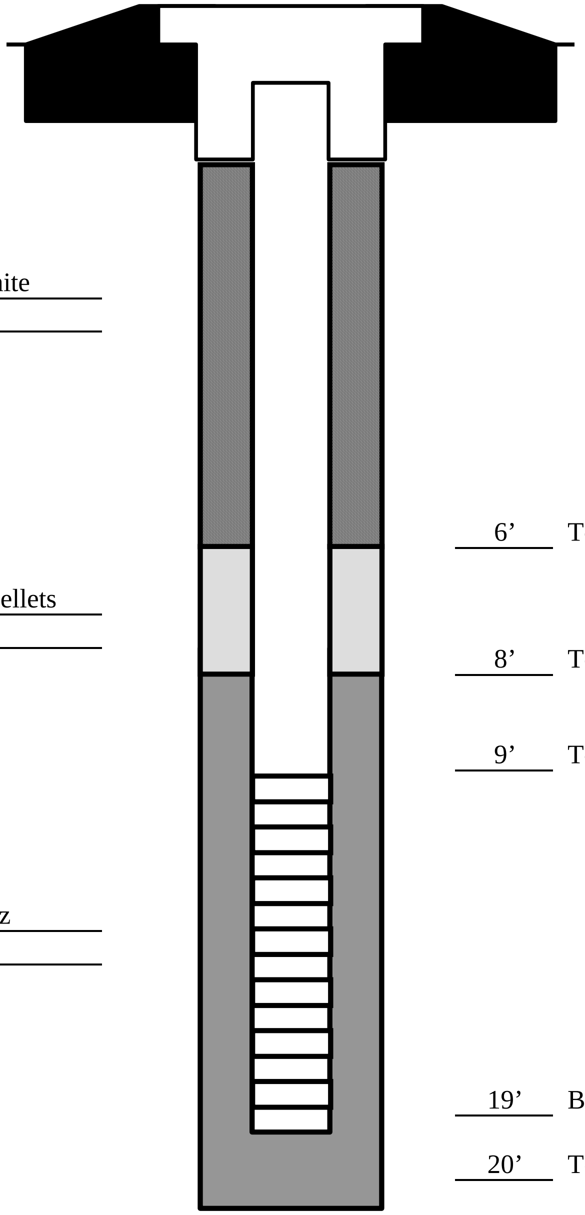
Total Depth 19’ Surface Elevation 10.88’ Top Riser Elevation 10.41’

Water Levels (Depth, Date, Time) 12.13’, 4/27/16, 0730 Date Installed 3/21/16

Riser Dia. 1” Material PVC Length 11’
Screen Dia. 1” Material PVC Length 10’ Slot Size 0.010

SCHEMATIC

Surface Seal Type
Concrete
Stickup



Grout Type Cement/bentonite

6’ Top Seal

Seal Type Bentonite pellets

8’ Top Sand Pack

9’ Top Screen

Sand Pack Type Silica quartz
Size #2/ #1/ #00

19’ Bottom Screen

20’ Total Depth of Boring

D&B ENGINEERS AND ARCHITECTS, P.C.

Well Construction Log

Site LIRR – Arch Street Job Number 3455 Well No. GW-04S

Total Depth 8’ Surface Elevation 7.32’ Top Riser Elevation 7.01’

Water Levels (Depth, Date, Time) 3.28’, 4/27/16, 0730 Date Installed 3/23/16

Riser Dia. 1” Material PVC Length 3’
Screen Dia. 1” Material PVC Length 5’ Slot Size 0.010

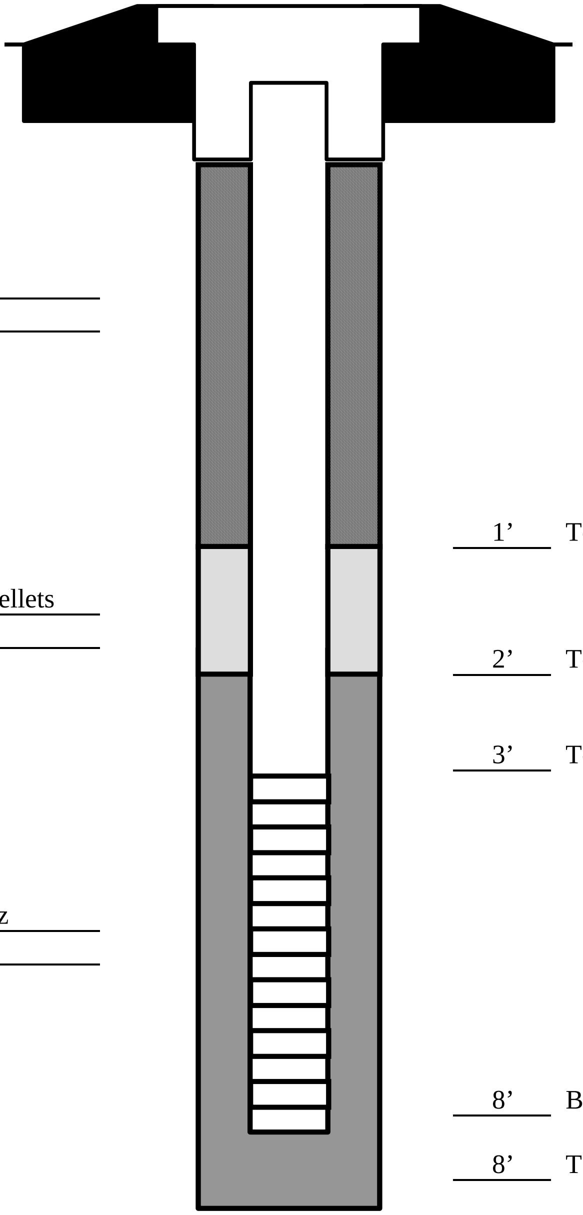
SCHEMATIC

Surface Seal Type
Concrete
Flush-mounted

Grout Type --

Seal Type Bentonite pellets

Sand Pack Type Silica quartz
Size #2/ #1/ #00



1’ Top Seal

2’ Top Sand Pack

3’ Top Screen

8’ Bottom Screen

8’ Total Depth of Boring

D&B ENGINEERS AND ARCHITECTS, P.C.

Well Construction Log

Site LIRR – Arch Street Job Number 3455 Well No. GW-04D

Total Depth 18’ Surface Elevation 7.32’ Top Riser Elevation 7.12’

Water Levels (Depth, Date, Time) 9.18’, 4/27/16, 0728 Date Installed 3/23/16

Riser Dia. 1” Material PVC Length 8’

Screen Dia. 1” Material PVC Length 10’ Slot Size 0.010

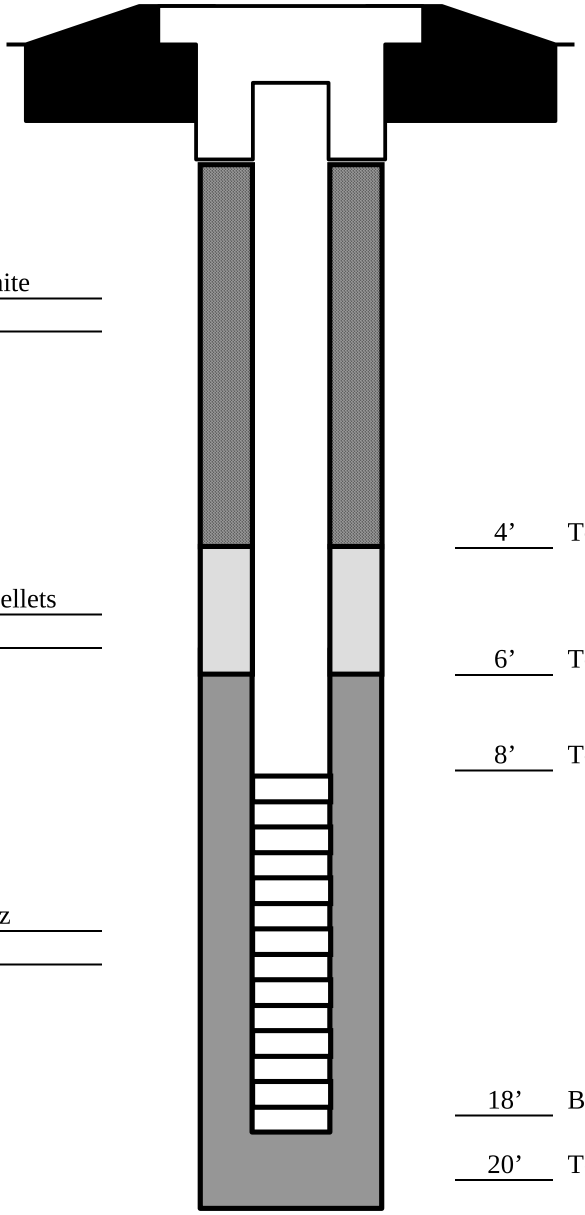
SCHEMATIC

Surface Seal Type
Concrete
Flush mounted

Grout Type Cement/bentonite

Seal Type Bentonite pellets

Sand Pack Type Silica quartz
Size #2/ #1/ #00



4’ Top Seal
6’ Top Sand Pack
8’ Top Screen
18’ Bottom Screen
20’ Total Depth of Boring

ATTACHMENT 4

CHEMICAL DATA TABLES

Table 2
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
TCL Volatile Organic Compounds

Sample ID	SB-01(13-15)	SB-01(23-25)	SB-02(13-15)	SB-02(23-25)	SB-03(12-14)	NYCRR 6 Part 375 Restricted-Residential Use Soil Cleanup Objectives (SCO)	NYCRR 6 Part 375 Industrial Use Soil Cleanup Objectives (SCO)
Sampling Date	3/16/2016	3/16/2016	3/17/2016	3/17/2016	3/17/2016		
Start Depth (in Feet)	13	23	13	23	12		
End Depth (in Feet)	15	25	15	25	14		
Units	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/kg	ug/kg
VOLATILE COMPOUNDS							
1,1,1-Trichloroethane	8.6 U	4.2 U	10.7 U	4.5 U	5.7 U	100000	1000000
1,1,2,2-Tetrachloroethane	8.6 UJ	4.2 U	10.7 U	4.5 U	5.7 U	--	--
1,1,2-Trichloroethane	8.6 U	4.2 U	10.7 U	4.5 U	5.7 U	--	--
1,1,2-Trichlorotrifluoroethane	8.6 U	4.2 U	10.7 U	4.5 U	5.7 U	--	--
1,1-Dichloroethane	8.6 U	4.2 U	10.7 U	4.5 U	5.7 U	26000	480000
1,1-Dichloroethene	8.6 U	4.2 U	10.7 U	4.5 U	5.7 U	100000	1000000
1,2,3-Trichlorobenzene	8.6 UJ	4.2 U	10.7 U	4.5 U	5.7 U	--	--
1,2,4-Trichlorobenzene	8.6 UJ	4.2 U	10.7 U	4.5 U	5.7 U	--	--
1,2-Dibromo-3-Chloropropane	8.6 UJ	4.2 U	10.7 U	4.5 U	5.7 U	--	--
1,2-Dibromoethane	8.6 U	4.2 U	10.7 U	4.5 U	5.7 U	--	--
1,2-Dichlorobenzene	8.6 UJ	4.2 U	10.7 U	4.5 U	5.7 U	100000	1000000
1,2-Dichloroethane	8.6 U	4.2 U	10.7 U	4.5 U	5.7 U	3100	60000
1,2-Dichloropropane	8.6 U	4.2 U	10.7 U	4.5 U	5.7 U	--	--
1,3-Dichlorobenzene	8.6 UJ	4.2 U	10.7 U	4.5 U	5.7 U	49000	560000
1,4-Dichlorobenzene	8.6 UJ	4.2 U	10.7 U	4.5 U	5.7 U	13000	250000
2-Butanone	42.9 U	21.2 U	9.6 J	22.7 U	5.5 J	100000	1000000
2-Hexanone	42.9 U	21.2 U	53.3 U	22.7 U	28.7 U	--	--
4-Methyl-2-Pentanone	42.9 U	21.2 U	53.3 U	22.7 U	28.7 U	--	--
Acetone	15.4 J	9.1 J	37.4 J	22.7 U	40.3	100000	1000000
Benzene	8.6 U	4.2 U	10.7 U	4.5 U	5.7 U	4800	89000
Bromochloromethane	8.6 U	4.2 U	10.7 U	4.5 U	5.7 U	--	--
Bromodichloromethane	8.6 U	4.2 U	10.7 U	4.5 U	5.7 U	--	--
Bromoform	8.6 U	4.2 U	10.7 U	4.5 U	5.7 U	--	--
Bromomethane	8.6 U	4.2 U	10.7 U	4.5 U	5.7 U	--	--
Carbon Disulfide	8.9 J	4.2 U	11.3 J	4.5 U	5.7 U	--	--
Carbon Tetrachloride	8.6 U	4.2 U	10.7 U	4.5 U	5.7 U	2400	44000
Chlorobenzene	8.6 U	4.2 U	10.7 U	4.5 U	5.7 U	100000	1000000
Chloroethane	8.6 U	4.2 U	10.7 U	4.5 U	5.7 U	--	--
Chloroform	8.6 U	4.2 U	10.7 U	4.5 U	5.7 U	49000	700000
Chloromethane	8.6 U	4.2 U	10.7 U	4.5 U	5.7 U	--	--
cis-1,2-Dichloroethene	5 J	1.3 J	7.3 J	1.1 J	5.7 U	100000	1000000
cis-1,3-Dichloropropene	8.6 U	4.2 U	10.7 U	4.5 U	5.7 U	--	--
Cyclohexane	8.6 U	4.2 U	10.7 U	4.5 U	5.7 U	--	--
Dibromochloromethane	8.6 U	4.2 U	10.7 U	4.5 U	5.7 U	--	--
Dichlorodifluoromethane	8.6 U	4.2 U	10.7 U	4.5 U	5.7 U	--	--
Ethyl Benzene	8.6 U	4.2 U	10.7 U	4.5 U	5.7 U	41000	780000
Isopropylbenzene	8.6 UJ	4.2 U	10.7 U	4.5 U	5.7 U	--	--
m/p-Xylenes	17.4 U	8.5 U	21.3 U	9.1 U	11.5 U	100000	1000000
Methyl Acetate	8.6 U	4.2 U	10.7 U	4.5 U	5.7 U	--	--
Methyl tert-butyl Ether	2.5 J	4.2 U	51.3	4.5 U	5.7 U	100000	1000000
Methylcyclohexane	8.6 U	4.2 U	10.7 U	4.5 U	5.7 U	--	--
Methylene Chloride	7.9 UB	4.2 U	10.7 U	4.5 U	5.7 U	100000	1000000
o-Xylene	8.6 U	4.2 U	10.7 U	4.5 U	5.7 U	100000	1000000
Styrene	8.6 U	4.2 U	10.7 U	4.5 U	5.7 U	--	--
t-1,3-Dichloropropene	8.6 U	4.2 U	10.7 U	4.5 U	5.7 U	--	--
Tetrachloroethene	8.6 U	4.2 U	10.7 U	3 J	5.7 U	19000	300000
Toluene	8.6 U	4.2 U	10.7 U	4.5 U	5.7 U	100000	1000000
trans-1,2-Dichloroethene	8.6 U	4.2 U	10.7 U	4.5 U	5.7 U	100000	1000000
Trichloroethene	8.6 U	4.2 U	10.7 U	4.5 U	5.7 U	21000	400000
Trichlorofluoromethane	8.6 U	4.2 U	10.7 U	4.5 U	5.7 U	--	--
Vinyl Chloride	8.6 U	1.5 J	7.7 J	4.5 U	5.7 U	900	27000
Total Volatile Organic Compounds	39.7	12	125	4	46	--	--

Footnotes/Qualifiers:

ug/kg: Micrograms per kilogram

BD: Blind duplicate

U: Analyzed for but not detected

UB: Not detected based on blank results

D: Reported from secondary dilution

E: Exceeded calibration range estimated value

J: Estimated value or detection limits

--: No standard

Exceeded the Restricted-Residential Use SCO

Table 2
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
TCL Volatile Organic Compounds

Sample ID	SB-03(18-20)	SB-04(3-5)	SB-04(10-12)	SB-04(27-29)	NYCRR 6 Part 375 Restricted-Residential Use Soil Cleanup Objectives (SCO)	NYCRR 6 Part 375 Industrial Use Soil Cleanup Objectives (SCO)
Sampling Date	3/17/2016	3/16/2016	3/16/2016	3/16/2016		
Start Depth (in Feet)	18	3	10	27		
End Depth (in Feet)	20	5	12	29		
Units	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/kg	ug/kg
VOLATILE COMPOUNDS						
1,1,1-Trichloroethane	4.8 U	5.5 U	10.1 U	5.1 U	100000	1000000
1,1,2,2-Tetrachloroethane	4.8 U	4.6 J+	10.1 U	5.1 U	--	--
1,1,2-Trichloroethane	4.8 U	5.5 U	10.1 U	5.1 U	--	--
1,1,2-Trichlorotrifluoroethane	4.8 U	5.5 U	10.1 U	5.1 U	--	--
1,1-Dichloroethane	4.8 U	5.5 U	10.1 U	5.1 U	26000	480000
1,1-Dichloroethene	4.8 U	5.5 U	10.1 U	5.1 U	100000	1000000
1,2,3-Trichlorobenzene	4.8 U	5.5 UJ	10.1 U	5.1 U	--	--
1,2,4-Trichlorobenzene	4.8 U	5.5 UJ	10.1 U	5.1 U	--	--
1,2-Dibromo-3-Chloropropane	4.8 U	5.5 UJ	10.1 U	5.1 U	--	--
1,2-Dibromoethane	4.8 U	5.5 U	10.1 U	5.1 U	--	--
1,2-Dichlorobenzene	4.8 U	5.5 UJ	10.1 U	5.1 U	100000	1000000
1,2-Dichloroethane	4.8 U	5.5 U	10.1 U	5.1 U	3100	60000
1,2-Dichloropropane	4.8 U	5.5 U	10.1 U	5.1 U	--	--
1,3-Dichlorobenzene	4.8 U	5.5 UJ	10.1 U	5.1 U	49000	560000
1,4-Dichlorobenzene	4.8 U	5.5 UJ	10.1 U	5.1 U	13000	250000
2-Butanone	23.8 U	8.9 J	9.9 J	25.6 U	100000	1000000
2-Hexanone	23.8 U	27.7 U	50.4 U	25.6 U	--	--
4-Methyl-2-Pentanone	23.8 U	27.7 U	50.4 U	25.6 U	--	--
Acetone	12.6 J	57	68.7	25.6 U	100000	1000000
Benzene	4.8 U	1.4 J	10.1 U	5.1 U	4800	89000
Bromochloromethane	4.8 U	5.5 U	10.1 U	5.1 U	--	--
Bromodichloromethane	4.8 U	5.5 U	10.1 U	5.1 U	--	--
Bromoform	4.8 U	5.5 U	10.1 U	5.1 U	--	--
Bromomethane	4.8 U	5.5 U	10.1 U	5.1 U	--	--
Carbon Disulfide	2.6 J	5.5 U	10.1 U	5.1 U	--	--
Carbon Tetrachloride	4.8 U	5.5 U	10.1 U	5.1 U	2400	44000
Chlorobenzene	4.8 U	5.5 U	10.1 U	5.1 U	100000	1000000
Chloroethane	4.8 U	5.5 U	10.1 U	5.1 U	--	--
Chloroform	4.8 U	5.5 U	10.1 U	5.1 U	49000	700000
Chloromethane	4.8 U	5.5 U	10.1 U	5.1 U	--	--
cis-1,2-Dichloroethene	4.8 U	12.5	43.4	5.1 U	100000	1000000
cis-1,3-Dichloropropene	4.8 U	5.5 U	10.1 U	5.1 U	--	--
Cyclohexane	4.8 U	5.5 U	10.1 U	5.1 U	--	--
Dibromochloromethane	4.8 U	5.5 U	10.1 U	5.1 U	--	--
Dichlorodifluoromethane	4.8 U	5.5 U	10.1 U	5.1 U	--	--
Ethyl Benzene	4.8 U	5.5 U	10.1 U	5.1 U	41000	780000
Isopropylbenzene	4.8 U	4.8 J+	10.1 U	5.1 U	--	--
m/p-Xylenes	9.5 U	11.1 U	20.2 U	10.2 U	100000	1000000
Methyl Acetate	4.8 U	5.5 U	10.1 U	5.1 U	--	--
Methyl tert-butyl Ether	4.8 U	5.5 U	35.5	1.1 J	100000	1000000
Methylcyclohexane	4.8 U	5.5 U	10.1 U	5.1 U	--	--
Methylene Chloride	4.8 U	5.5 U	10.1 U	5.1 U	100000	1000000
o-Xylene	4.8 U	1.4 J	10.1 U	5.1 U	100000	1000000
Styrene	4.8 U	5.5 U	10.1 U	5.1 U	--	--
t-1,3-Dichloropropene	4.8 U	5.5 U	10.1 U	5.1 U	--	--
Tetrachloroethene	4.8 U	19.6	10.5	1.1 J	19000	300000
Toluene	4.8 U	5.5 U	10.1 U	5.1 U	100000	1000000
trans-1,2-Dichloroethene	4.8 U	5.5 U	10.1 U	5.1 U	100000	1000000
Trichloroethene	4.8 U	2.9 J	10.1 U	5.1 U	21000	400000
Trichlorofluoromethane	4.8 U	5.5 U	10.1 U	5.1 U	--	--
Vinyl Chloride	4.8 U	6	6.2 J	5.1 U	900	27000
Total Volatile Organic Compounds	15	119.1	174.2	2.2	--	--

Footnotes/Qualifiers:

ug/kg:	Micrograms per kilogram	D:	Reported from secondary dilution
BD:	Blind duplicate	E:	Exceeded calibration range estimated value
U:	Analyzed for but not detected	J:	Estimated value or detection limits
UB:	Not detected based on blank results	--:	No standard
			Exceeded the Restricted-Residential Use SCO

D&B ENGINEERS AND ARCHITECTS, P.C.

Table 2
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
TCL Volatile Organic Compounds

Sample ID	SB-05(10-11)	SB-05(10-11)BD	SB-05(11-13)	SB-06(8-10)	NYCRR 6 Part 375 Restricted-Residential Use Soil Cleanup Objectives (SCO)	NYCRR 6 Part 375 Industrial Use Soil Cleanup Objectives (SCO)
Sampling Date	3/16/2016	3/16/2016	3/16/2016	3/17/2016		
Start Depth (in Feet)	10	10	11	8		
End Depth (in Feet)	11	11	13	10		
Units	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/kg	ug/kg
VOLATILE COMPOUNDS						
1,1,1-Trichloroethane	5.3 U	5 U	7.6 U	6.2 U	100000	1000000
1,1,2,2-Tetrachloroethane	5.3 U	5 U	7.6 UJ	6.2 U	--	--
1,1,2-Trichloroethane	5.3 U	5 U	7.6 U	6.2 U	--	--
1,1,2-Trichlorotrifluoroethane	5.3 U	5 U	7.6 U	6.2 U	--	--
1,1-Dichloroethane	5.3 U	5 U	7.6 U	6.2 U	26000	480000
1,1-Dichloroethene	5.3 U	5 U	8.7	6.2 U	100000	1000000
1,2,3-Trichlorobenzene	5.3 U	5 U	7.6 UJ	6.2 U	--	--
1,2,4-Trichlorobenzene	5.3 U	5 U	7.6 UJ	6.2 U	--	--
1,2-Dibromo-3-Chloropropane	5.3 U	5 U	7.6 UJ	6.2 U	--	--
1,2-Dibromoethane	5.3 U	5 U	7.6 U	6.2 U	--	--
1,2-Dichlorobenzene	5.3 U	5 U	7.6 UJ	6.2 U	100000	1000000
1,2-Dichloroethane	5.3 U	5 U	7.6 U	6.2 U	3100	60000
1,2-Dichloropropane	5.3 U	5 U	7.6 U	6.2 U	--	--
1,3-Dichlorobenzene	5.3 U	5 U	7.6 UJ	6.2 U	49000	560000
1,4-Dichlorobenzene	5.3 U	5 U	7.6 UJ	6.2 U	13000	250000
2-Butanone	3.8 J	5.9 J	15.1 J	4.4 J	100000	1000000
2-Hexanone	26.6 U	25.1 U	37.8 U	4 J	--	--
4-Methyl-2-Pentanone	26.6 U	25.1 U	37.8 U	3.1 J	--	--
Acetone	15.8 J	27.4	75	16.6 J	100000	1000000
Benzene	5.3 U	5 U	2.4 J	6.2 U	4800	89000
Bromochloromethane	5.3 U	5 U	7.6 U	6.2 U	--	--
Bromodichloromethane	5.3 U	5 U	7.6 U	6.2 U	--	--
Bromoform	5.3 U	5 U	7.6 U	6.2 U	--	--
Bromomethane	5.3 U	5 U	7.6 U	6.2 U	--	--
Carbon Disulfide	5.3 U	6.2 J	37.9 J	2.3 J	--	--
Carbon Tetrachloride	5.3 U	5 U	7.6 U	6.2 U	2400	44000
Chlorobenzene	5.3 U	5 U	7.6 U	6.2 U	100000	1000000
Chloroethane	5.3 U	5 U	7.6 U	6.2 U	--	--
Chloroform	5.3 U	5 U	7.6 U	6.2 U	49000	700000
Chloromethane	5.3 U	5 U	7.6 U	6.2 U	--	--
cis-1,2-Dichloroethene	880 JD	180 JD	3400 JD	1600 D	100000	1000000
cis-1,3-Dichloropropene	5.3 U	5 U	7.6 U	6.2 U	--	--
Cyclohexane	5.3 U	5 U	7.6 U	6.2 U	--	--
Dibromochloromethane	5.3 U	5 U	7.6 U	6.2 U	--	--
Dichlorodifluoromethane	5.3 U	5 U	7.6 U	6.2 U	--	--
Ethyl Benzene	5.3 U	5 U	7.6 U	6.2 U	41000	780000
Isopropylbenzene	5.3 U	5 U	7.6 UJ	6.2 U	--	--
m/p-Xylenes	10.6 U	10.1 U	15.1 U	12.5 U	100000	1000000
Methyl Acetate	5.3 U	5 U	7.6 U	6.2 U	--	--
Methyl tert-butyl Ether	2.8 J	1.3 J	26.7	6.2 U	100000	1000000
Methylcyclohexane	5.3 U	5 U	7.6 U	6.2 U	--	--
Methylene Chloride	5.3 U	5 U	7.6 U	6.2 U	100000	1000000
o-Xylene	5.3 U	5 U	7.6 U	6.2 U	100000	1000000
Styrene	5.3 U	5 U	7.6 U	6.2 U	--	--
t-1,3-Dichloropropene	5.3 U	5 U	7.6 U	6.2 U	--	--
Tetrachloroethene	***20900 JD***	7000 JD	***31300 D***	1300 D	19000	300000
Toluene	5.3 U	5 U	2.7 J	6.2 U	100000	1000000
trans-1,2-Dichloroethene	100 J	75.3 J	190 EJ	15.2 J	100000	1000000
Trichloroethene	400 JD	81 JD	2600 JD	22.2 J	21000	400000
Trichlorofluoromethane	5.3 U	5 U	7.6 U	6.2 U	--	--
Vinyl Chloride	560 JD	120 JD	***2200 JD***	410 JD	900	27000
Total Volatile Organic Compounds	22862	7497	39669	3378	--	--

Footnotes/Qualifiers:
ug/kg: Micrograms per kilogram
BD: Blind duplicate
U: Analyzed for but not detected
UB: Not detected based on blank results

D: Reported from secondary dilution
E: Exceeded calibration range estimated value
J: Estimated value or detection limits
--: No standard
🟩 ***Exceeded the Restricted-Residential Use SCO***

D&B ENGINEERS AND ARCHITECTS, P.C.

Table 2
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
TCL Volatile Organic Compounds

Sample ID	SB-06(11-13)	SB-07(12-14)	SB-07(23-25)	SB-08(4-6)	SB-08(6-8)	NYCRR 6 Part 375	NYCRR 6 Part 375
Sampling Date	3/17/2016	3/18/2016	3/18/2016	3/17/2016	3/17/2016	Restricted-	Industrial
Start Depth (in Feet)	11	12	23	4	6	Residential	Use Soil
End Depth (in Feet)	13	14	25	6	8	Use Soil Cleanup	Cleanup
						Objectives (SCO)	Objectives (SCO)
Units	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/kg	ug/kg
VOLATILE COMPOUNDS							
1,1,1-Trichloroethane	6.2 U	5.7 U	4.3 U	10.3 U	5 U	100000	1000000
1,1,2,2-Tetrachloroethane	6.2 U	5.7 U	4.3 U	10.3 UJ	5 UJ	--	--
1,1,2-Trichloroethane	6.2 U	5.7 U	4.3 U	10.3 U	5 U	--	--
1,1,2-Trichlorotrifluoroethane	6.2 U	5.7 U	4.3 U	10.3 U	5 U	--	--
1,1-Dichloroethane	6.2 U	5.7 U	4.3 U	10.3 U	5 U	26000	480000
1,1-Dichloroethene	6.2 U	5.7 U	4.3 U	10.3 U	5 U	100000	1000000
1,2,3-Trichlorobenzene	6.2 U	5.7 U	4.3 U	10.3 UJ	5 UJ	--	--
1,2,4-Trichlorobenzene	6.2 U	5.7 U	4.3 U	10.3 UJ	5 UJ	--	--
1,2-Dibromo-3-Chloropropane	6.2 U	5.7 U	4.3 U	10.3 UJ	5 UJ	--	--
1,2-Dibromoethane	6.2 U	5.7 U	4.3 U	10.3 U	5 U	--	--
1,2-Dichlorobenzene	6.2 U	5.7 U	4.3 U	10.3 UJ	5 UJ	100000	1000000
1,2-Dichloroethane	6.2 U	5.7 U	4.3 U	10.3 U	5 U	3100	60000
1,2-Dichloropropane	6.2 U	5.7 U	4.3 U	10.3 U	5 U	--	--
1,3-Dichlorobenzene	6.2 U	5.7 U	4.3 U	10.3 UJ	5 UJ	49000	560000
1,4-Dichlorobenzene	6.2 U	5.7 U	4.3 U	10.3 UJ	5 UJ	13000	250000
2-Butanone	5.2 J	28.7 U	21.7 U	51.5 U	24.9 U	100000	1000000
2-Hexanone	31 U	28.7 U	21.7 U	51.5 U	24.9 U	--	--
4-Methyl-2-Pentanone	31 U	28.7 U	21.7 U	51.5 U	24.9 U	--	--
Acetone	33.4	17.1 J	13.9 J	140	29.7	100000	1000000
Benzene	6.2 U	5.7 U	4.3 U	10.3 U	5 U	4800	89000
Bromochloromethane	6.2 U	5.7 U	4.3 U	10.3 U	5 U	--	--
Bromodichloromethane	6.2 U	5.7 U	4.3 U	10.3 U	5 U	--	--
Bromoform	6.2 U	5.7 U	4.3 U	10.3 U	5 U	--	--
Bromomethane	6.2 U	5.7 U	4.3 U	10.3 U	5 U	--	--
Carbon Disulfide	6.2 U	5.7 U	4.3 U	4.6 J	1.3 J	--	--
Carbon Tetrachloride	6.2 U	5.7 U	4.3 U	10.3 U	5 U	2400	44000
Chlorobenzene	6.2 U	5.7 U	4.3 U	10.3 U	5 U	100000	1000000
Chloroethane	6.2 U	5.7 U	4.3 U	10.3 U	5 U	--	--
Chloroform	6.2 U	5.7 U	4.3 U	10.3 U	5 U	49000	700000
Chloromethane	6.2 U	5.7 U	4.3 U	10.3 U	5 U	--	--
cis-1,2-Dichloroethene	6.1 J	1.6 J	1.4 J	5.8 J	4.6 J	100000	1000000
cis-1,3-Dichloropropene	6.2 U	5.7 U	4.3 U	10.3 U	5 U	--	--
Cyclohexane	6.2 U	5.7 U	4.3 U	10.3 U	5 U	--	--
Dibromochloromethane	6.2 U	5.7 U	4.3 U	10.3 U	5 U	--	--
Dichlorodifluoromethane	6.2 U	5.7 U	4.3 U	10.3 U	5 U	--	--
Ethyl Benzene	6.2 U	5.7 U	4.3 U	10.3 U	5 U	41000	780000
Isopropylbenzene	1.4 J	5.7 U	4.3 U	10.3 UJ	5 UJ	--	--
m/p-Xylenes	12.4 U	11.5 U	8.7 U	17.4 U	10 U	100000	1000000
Methyl Acetate	6.2 U	5.7 U	4.3 U	10.3 U	5 U	--	--
Methyl tert-butyl Ether	6.2 U	4.2 J	4.3 U	10.3 U	5 U	100000	1000000
Methylcyclohexane	6.2 U	5.7 U	4.3 U	10.3 U	5 U	--	--
Methylene Chloride	6.2 U	5.7 UB	5.1 UB	35.2	5 U	100000	1000000
o-Xylene	6.2 U	5.7 U	4.3 U	10.3 U	5 U	100000	1000000
Styrene	6.2 U	5.7 U	4.3 U	10.3 U	5 U	--	--
t-1,3-Dichloropropene	6.2 U	5.7 U	4.3 U	10.3 U	5 U	--	--
Tetrachloroethene	2 J	2.8 J	2.1 J	10.3 U	3.6 J	19000	300000
Toluene	6.2 U	5.7 U	4.3 U	10.3 U	5 U	100000	1000000
trans-1,2-Dichloroethene	6.2 U	2.8 J	1.4 J	10.3 U	5 U	100000	1000000
Trichloroethene	6.2 U	1.9 J	4.3 U	10.3 U	5 U	21000	400000
Trichlorofluoromethane	6.2 U	5.7 U	4.3 U	10.3 U	5 U	--	--
Vinyl Chloride	2.2 J	5.7 U	4.3 U	10.3 U	4.8 J	900	27000
Total Volatile Organic Compounds	50.3	33.1	23.9	185.6	44	--	--

Footnotes/Qualifiers:
ug/kg: Micrograms per kilogram
BD: Blind duplicate
U: Analyzed for but not detected
UB: Not detected based on blank results
D: Reported from secondary dilution
E: Exceeded calibration range estimated value
J: Estimated value or detection limits
--: No standard
Exceeded the Restricted-Residential Use SCO

D&B ENGINEERS AND ARCHITECTS, P.C.

Table 2
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
TCL Volatile Organic Compounds

Sample ID	SB-08(13-15)	GW-01(4-5)	GW-01(13-15)	GW-01(18-20)	GW-03(3-4)	NYCRR 6 Part 375 Restricted-Residential Use Soil Cleanup Objectives (SCO)	NYCRR 6 Part 375 Industrial Use Soil Cleanup Objectives (SCO)
Sampling Date	3/17/2016	3/21/2016	3/21/2016	3/21/2016	3/21/2016		
Start Depth (in Feet)	13	4	13	18	3		
End Depth (in Feet)	15	5	15	20	4		
Units	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/kg	ug/kg
VOLATILE COMPOUNDS							
1,1,1-Trichloroethane	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	100000	1000000
1,1,2,2-Tetrachloroethane	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 UJ	--	--
1,1,2-Trichloroethane	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	--	--
1,1,2-Trichlorotrifluoroethane	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	--	--
1,1-Dichloroethane	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	26000	480000
1,1-Dichloroethene	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	100000	1000000
1,2,3-Trichlorobenzene	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 UJ	--	--
1,2,4-Trichlorobenzene	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 UJ	--	--
1,2-Dibromo-3-Chloropropane	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 UJ	--	--
1,2-Dibromoethane	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	--	--
1,2-Dichlorobenzene	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 UJ	100000	1000000
1,2-Dichloroethane	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	3100	60000
1,2-Dichloropropane	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	--	--
1,3-Dichlorobenzene	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 UJ	49000	560000
1,4-Dichlorobenzene	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 UJ	13000	250000
2-Butanone	24.3 U	28.9 UJ	4.3 J	21.5 U	22.3 U	100000	1000000
2-Hexanone	24.3 U	28.9 UJ	24.7 U	21.5 U	22.3 U	--	--
4-Methyl-2-Pentanone	24.3 U	10.9 J+	24.7 U	21.5 U	22.3 U	--	--
Acetone	14.2 J	30.8 J+	22 J	12.4 J	20.0 J	100000	1000000
Benzene	4.9 U	5.8 UJ	4.9 U	4.3 U	1.6 J	4800	89000
Bromochloromethane	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	--	--
Bromodichloromethane	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	--	--
Bromoform	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 UJ	--	--
Bromomethane	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	--	--
Carbon Disulfide	1.2 J	5.8 UJ	4.9 U	4.3 U	4.5 U	--	--
Carbon Tetrachloride	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	2400	44000
Chlorobenzene	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 UJ	100000	1000000
Chloroethane	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	--	--
Chloroform	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	49000	700000
Chloromethane	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	--	--
cis-1,2-Dichloroethene	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	100000	1000000
cis-1,3-Dichloropropene	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	--	--
Cyclohexane	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	--	--
Dibromochloromethane	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	--	--
Dichlorodifluoromethane	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	--	--
Ethyl Benzene	4.9 U	5.8 UJ	4.9 U	4.3 U	0.97 J+	41000	780000
Isopropylbenzene	4.9 U	5.8 UJ	4.9 U	4.3 U	1.4 J+	--	--
m/p-Xylenes	9.7 U	11.8 UJ	9.9 U	8.6 U	3.1 J+	100000	1000000
Methyl Acetate	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	--	--
Methyl tert-butyl Ether	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	100000	1000000
Methylcyclohexane	4.9 U	5.8 UJ	4.9 U	4.3 U	8	--	--
Methylene Chloride	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	100000	1000000
o-Xylene	4.9 U	5.8 UJ	4.9 U	4.3 U	2.9 J+	100000	1000000
Styrene	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 UJ	--	--
t-1,3-Dichloropropene	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	--	--
Tetrachloroethene	4.9 U	5.8 UJ	4.9 U	4.3 U	3.0 J+	19000	300000
Toluene	4.9 U	5.8 UJ	4.9 U	4.3 U	2.4 J	100000	1000000
trans-1,2-Dichloroethene	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	100000	1000000
Trichloroethene	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	21000	400000
Trichlorofluoromethane	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	--	--
Vinyl Chloride	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	900	27000
Total Volatile Organic Compounds	15.4	41.7	26.3	12.4	43.37	--	--

Footnotes/Qualifiers:

ug/kg: Micrograms per kilogram

BD: Blind duplicate

U: Analyzed for but not detected

UB: Not detected based on blank results

D: Reported from secondary dilution

E: Exceeded calibration range estimated value

J: Estimated value or detection limits

--: No standard

🟩 ***Exceeded the Restricted-Residential Use SCO***

Table 2
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
TCL Volatile Organic Compounds

Sample ID Sampling Date Start Depth (in Feet) End Depth (in Feet) Units	GW-03(12-14) 3/21/2016 12 14 ug/Kg	GW-03(18-20) 3/21/2016 18 20 ug/Kg	GW-04(2-3) 3/23/2016 2 3 ug/Kg	GW-04(12-14) 3/23/2016 12 14 ug/Kg	NYCRR 6 Part 375 Restricted-Residential Use Soil Cleanup Objectives (SCO) ug/kg	NYCRR 6 Part 375 Industrial Use Soil Cleanup Objectives (SCO) ug/kg
VOLATILE COMPOUNDS						
1,1,1-Trichloroethane	9.2 U	5.1 U	4.9 U	6.5 U	100000	1000000
1,1,2,2-Tetrachloroethane	9.2 U	5.1 U	4.9 UJ	6.5 U	--	--
1,1,2-Trichloroethane	9.2 U	5.1 U	4.9 U	6.5 U	--	--
1,1,2-Trichlorotrifluoroethane	9.2 U	5.1 U	4.9 U	6.5 U	--	--
1,1-Dichloroethane	9.2 U	5.1 U	4.9 U	6.5 U	26000	480000
1,1-Dichloroethene	9.2 U	5.1 U	4.9 U	6.5 U	100000	1000000
1,2,3-Trichlorobenzene	9.2 U	5.1 U	4.9 UJ	6.5 U	--	--
1,2,4-Trichlorobenzene	9.2 U	5.1 U	4.9 UJ	6.5 U	--	--
1,2-Dibromo-3-Chloropropane	9.2 U	5.1 U	4.9 UJ	6.5 U	--	--
1,2-Dibromoethane	9.2 U	5.1 U	4.9 U	6.5 U	--	--
1,2-Dichlorobenzene	9.2 U	5.1 U	4.9 UJ	6.5 U	100000	1000000
1,2-Dichloroethane	9.2 U	5.1 U	4.9 U	6.5 U	3100	60000
1,2-Dichloropropane	9.2 U	5.1 U	4.9 U	6.5 U	--	--
1,3-Dichlorobenzene	9.2 U	5.1 U	4.9 UJ	6.5 U	49000	560000
1,4-Dichlorobenzene	9.2 U	5.1 U	4.9 UJ	6.5 U	13000	250000
2-Butanone	46.1 U	25.4 U	24.3 U	32.5 U	100000	1000000
2-Hexanone	46.1 U	25.4 U	24.3 U	32.5 U	--	--
4-Methyl-2-Pentanone	46.1 U	25.4 U	24.3 U	32.5 U	--	--
Acetone	60.7 J	28.5 J	22.7 J	14.1 J	100000	1000000
Benzene	9.2 U	5.1 U	4.9 U	6.5 U	4800	89000
Bromochloromethane	9.2 U	5.1 U	4.9 U	6.5 U	--	--
Bromodichloromethane	9.2 U	5.1 U	4.9 U	6.5 U	--	--
Bromoform	9.2 U	5.1 U	4.9 UJ	6.5 U	--	--
Bromomethane	9.2 U	5.1 U	4.9 U	6.5 U	--	--
Carbon Disulfide	43.5	5.1 U	4.9 U	3.2 J	--	--
Carbon Tetrachloride	9.2 U	5.1 U	4.9 U	6.5 U	2400	44000
Chlorobenzene	9.2 U	5.1 U	4.9 UJ	6.5 U	100000	1000000
Chloroethane	9.2 U	5.1 U	4.9 U	6.5 U	--	--
Chloroform	9.2 U	5.1 U	4.9 U	6.5 U	49000	700000
Chloromethane	9.2 U	5.1 U	4.9 U	6.5 U	--	--
cis-1,2-Dichloroethene	9.2 U	5.1 U	4.9 U	6.5 U	100000	1000000
cis-1,3-Dichloropropene	9.2 U	5.1 U	4.9 U	6.5 U	--	--
Cyclohexane	9.2 U	5.1 U	4.9 U	6.5 U	--	--
Dibromochloromethane	9.2 U	5.1 U	4.9 U	6.5 U	--	--
Dichlorodifluoromethane	9.2 U	5.1 U	4.9 U	6.5 U	--	--
Ethyl Benzene	9.2 U	5.1 U	4.9 U	6.5 U	41000	780000
Isopropylbenzene	9.2 U	5.1 U	4.9 U	6.5 U	--	--
m/p-Xylenes	18.4 U	10.2 U	9.7 U	13 U	100000	1000000
Methyl Acetate	9.2 U	5.1 U	4.9 U	6.5 U	--	--
Methyl tert-butyl Ether	9.2 U	5.1 U	4.9 U	6.5 U	100000	1000000
Methylcyclohexane	9.2 U	5.1 U	4.9 U	6.5 U	--	--
Methylene Chloride	9.2 U	5.1 U	3.3 J	7.5	100000	1000000
o-Xylene	9.2 U	5.1 U	4.9 U	6.5 U	100000	1000000
Styrene	9.2 U	5.1 U	4.9 UJ	6.5 U	--	--
t-1,3-Dichloropropene	9.2 U	5.1 U	4.9 U	6.5 U	--	--
Tetrachloroethene	9.2 U	5.1 U	4.9 U	6.5 U	19000	300000
Toluene	9.2 U	5.1 U	4.9 U	6.5 U	100000	1000000
trans-1,2-Dichloroethene	9.2 U	5.1 U	4.9 U	6.5 U	100000	1000000
Trichloroethene	9.2 U	5.1 U	4.9 U	6.5 U	21000	400000
Trichlorofluoromethane	9.2 U	5.1 U	4.9 U	6.5 U	--	--
Vinyl Chloride	9.2 U	5.1 U	4.9 U	6.5 U	900	27000
Total Volatile Organic Compounds	104.2	28.5	26	24.8	--	--

Footnotes/Qualifiers:

ug/kg: Micrograms per kilogram

BD: Blind duplicate

U: Analyzed for but not detected

UB: Not detected based on blank results

D: Reported from secondary dilution

E: Exceeded calibration range estimated value

J: Estimated value or detection limits

--: No standard

Exceeded the Restricted-Residential Use SCO

Table 2
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
TCL Volatile Organic Compounds

Sample ID Sampling Date Start Depth (in Feet) End Depth (in Feet) Units	GW-04(12-14)BD 3/23/2016 12 14 ug/Kg	GW-04(16-18) 3/23/2016 16 18 ug/Kg	NYCRR 6 Part 375 Restricted-Residential Use Soil Cleanup Objectives (SCO) ug/kg	NYCRR 6 Part 375 Industrial Use Soil Cleanup Objectives (SCO) ug/kg
VOLATILE COMPOUNDS				
1,1,1-Trichloroethane	7 U	4.5 U	100000	1000000
1,1,2,2-Tetrachloroethane	7 U	4.5 U	--	--
1,1,2-Trichloroethane	7 U	4.5 U	--	--
1,1,2-Trichlorotrifluoroethane	7 U	4.5 U	--	--
1,1-Dichloroethane	7 U	4.5 U	26000	480000
1,1-Dichloroethene	7 U	4.5 U	100000	1000000
1,2,3-Trichlorobenzene	7 U	4.5 U	--	--
1,2,4-Trichlorobenzene	7 U	4.5 U	--	--
1,2-Dibromo-3-Chloropropane	7 U	4.5 U	--	--
1,2-Dibromoethane	7 U	4.5 U	--	--
1,2-Dichlorobenzene	7 U	4.5 U	100000	1000000
1,2-Dichloroethane	7 U	4.5 U	3100	60000
1,2-Dichloropropane	7 U	4.5 U	--	--
1,3-Dichlorobenzene	7 U	4.5 U	49000	560000
1,4-Dichlorobenzene	7 U	4.5 U	13000	250000
2-Butanone	35.2 U	22.4 U	100000	1000000
2-Hexanone	35.2 U	22.4 U	--	--
4-Methyl-2-Pentanone	35.2 U	22.4 U	--	--
Acetone	18.7 J	9.7 J	100000	1000000
Benzene	7 U	4.5 U	4800	89000
Bromochloromethane	7 U	4.5 U	--	--
Bromodichloromethane	7 U	4.5 U	--	--
Bromoform	7 U	4.5 U	--	--
Bromomethane	7 U	4.5 U	--	--
Carbon Disulfide	10.2 J	2.7 J	--	--
Carbon Tetrachloride	7 U	4.5 U	2400	44000
Chlorobenzene	7 U	4.5 U	100000	1000000
Chloroethane	7 U	4.5 U	--	--
Chloroform	7 U	4.5 U	49000	700000
Chloromethane	7 U	4.5 U	--	--
cis-1,2-Dichloroethene	7 U	4.5 U	100000	1000000
cis-1,3-Dichloropropene	7 U	4.5 U	--	--
Cyclohexane	7 U	4.5 U	--	--
Dibromochloromethane	7 U	4.5 U	--	--
Dichlorodifluoromethane	7 U	4.5 U	--	--
Ethyl Benzene	7 U	4.5 U	41000	780000
Isopropylbenzene	7 U	4.5 U	--	--
m/p-Xylenes	14.1 U	9 U	100000	1000000
Methyl Acetate	7 U	4.5 U	--	--
Methyl tert-butyl Ether	7 U	4.5 U	100000	1000000
Methylcyclohexane	7 U	4.5 U	--	--
Methylene Chloride	7 U	5.1	100000	1000000
o-Xylene	7 U	4.5 U	100000	1000000
Styrene	7 U	4.5 U	--	--
t-1,3-Dichloropropene	7 U	4.5 U	--	--
Tetrachloroethene	7 U	4.5 U	19000	300000
Toluene	7 U	4.5 U	100000	1000000
trans-1,2-Dichloroethene	7 U	4.5 U	100000	1000000
Trichloroethene	7 U	4.5 U	21000	400000
Trichlorofluoromethane	7 U	4.5 U	--	--
Vinyl Chloride	7 U	4.5 U	900	27000
Total Volatile Organic Compounds	28.9	17.5	--	--

Footnotes/Qualifiers:

ug/kg: Micrograms per kilogram
BD: Blind duplicate
U: Analyzed for but not detected
UB: Not detected based on blank results

D: Reported from secondary dilution
E: Exceeded calibration range estimated value
J: Estimated value or detection limits
--: No standard

Exceeded the Restricted-Residential Use SCO

D&B ENGINEERS AND ARCHITECTS, P.C.

Table 3
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
TCL Semivolatile Organic Compounds

Sample ID			SB-01(13-15)	SB-01(23-25)	SB-02(13-15)	SB-02(23-25)	SB-03(12-14)	SB-03(18-20)	SB-04(3-5)
Sampling Date			3/16/2016	3/16/2016	3/17/2016	3/17/2016	3/17/2016	3/17/2016	3/16/2016
Start Depth (in Feet)			13	23	13	23	12	18	3
End Depth (in Feet)			15	25	15	25	14	20	5
Units			ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
	NYCRR 6 Part 375 Restricted-Residential Use Soil Cleanup Objectives (SCO) ug/kg	NYCRR 6 Part 375 Industrial Use Soil Cleanup Objectives (SCO) ug/kg							
SEMIVOLATILE COMPOUNDS									
1,1-Biphenyl	--	--	550 U	370 U	580 U	380 U	410 U	380 U	300 J
1,2,4,5-Tetrachlorobenzene	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
1,4-Dioxane	13000	250000	550 U	370 U	580 U	380 U	410 U	380 U	400 U
2,2-oxybis(1-Chloropropane)	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
2,3,4,6-Tetrachlorophenol	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
2,4,5-Trichlorophenol	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
2,4,6-Trichlorophenol	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
2,4-Dichlorophenol	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
2,4-Dimethylphenol	--	--	550 U	370 U	580 U	380 U	410 U	380 U	100 J
2,4-Dinitrophenol	--	--	550 UJ	370 UJ	580 UJ	380 UJ	410 UJ	380 UJ	400 UJ
2,4-Dinitrotoluene	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
2,6-Dinitrotoluene	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
2-Chloronaphthalene	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
2-Chlorophenol	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
2-Methylnaphthalene	--	--	550 U	370 U	580 U	380 U	410 U	380 U	990
2-Methylphenol	100000	1000000	550 U	370 U	580 U	380 U	410 U	380 U	400 U
2-Nitroaniline	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
2-Nitrophenol	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
3,3-Dichlorobenzidine	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
3+4-Methylphenols	100000	1000000	550 U	370 U	580 U	380 U	410 U	380 U	400 U
3-Nitroaniline	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
4,6-Dinitro-2-methylphenol	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
4-Bromophenyl-phenylether	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
4-Chloro-3-methylphenol	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
4-Chloroaniline	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
4-Chlorophenyl-phenylether	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
4-Nitroaniline	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
4-Nitrophenol	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
Acenaphthene	100000	1000000	550 U	370 U	580 U	380 U	410 U	380 U	2300
Acenaphthylene	100000	1000000	550 U	370 U	580 U	380 U	410 U	380 U	400 U
Acetophenone	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
Anthracene	100000	1000000	550 U	370 U	580 U	380 U	410 U	380 U	5600 D
Atrazine	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
Benzaldehyde	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
Benzo(a)anthracene	1000	11000	550 U	370 U	580 U	380 U	410 U	380 U	***5300 D***
Benzo(a)pyrene	1000	1100	550 U	370 U	580 U	380 U	410 U	380 U	***2900***
Benzo(b)fluoranthene	1000	11000	550 U	370 U	580 U	380 U	410 U	380 U	***4000 D***
Benzo(g,h,i)perylene	100000	1000000	550 U	370 U	580 U	380 U	410 U	380 U	1500

See next page for Footnotes/Qualifiers

D&B ENGINEERS AND ARCHITECTS, P.C.

Table 3
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
TCL Semivolatile Organic Compounds

		Sample ID	SB-01(13-15)	SB-01(23-25)	SB-02(13-15)	SB-02(23-25)	SB-03(12-14)	SB-03(18-20)	SB-04(3-5)
		Sampling Date	3/16/2016	3/16/2016	3/17/2016	3/17/2016	3/17/2016	3/17/2016	3/16/2016
		Start Depth (in Feet)	13	23	13	23	12	18	3
		End Depth (in Feet)	15	25	15	25	14	20	5
		Units	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
	NYCRR 6 Part 375 Restricted-Residential Use Soil Cleanup Objectives (SCO) ug/kg	NYCRR 6 Part 375 Industrial Use Soil Cleanup Objectives (SCO) ug/kg							
COMPOUNDS CONTINUED									
Benzo(k)fluoranthene	3900	110000	550 U	370 U	580 U	380 U	410 U	380 U	1100
bis(2-Chloroethoxy)methane	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
bis(2-Chloroethyl)ether	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
Bis(2-ethylhexyl)phthalate	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
Butylbenzylphthalate	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
Caprolactam	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
Carbazole	--	--	550 U	370 U	580 U	380 U	410 U	380 U	1600
Chrysene	3900	110000	550 U	370 U	580 U	380 U	410 U	380 U	3800 JD
Dibenzo(a,h)anthracene	330	1100	550 U	370 U	580 U	380 U	410 U	380 U	***430***
Dibenzofuran	59000	1000000	550 U	370 U	580 U	380 U	410 U	380 U	1900
Diethylphthalate	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
Dimethylphthalate	--	--	1000	550	1000	620	660	620	520
Di-n-butylphthalate	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
Di-n-octyl phthalate	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
Fluoranthene	100000	1000000	550 U	370 U	580 U	380 U	410 U	380 U	10000 D
Fluorene	100000	1000000	550 U	370 U	580 U	380 U	410 U	380 U	2700
Hexachlorobenzene	1200	12000	550 U	370 U	580 U	380 U	410 U	380 U	400 U
Hexachlorobutadiene	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
Hexachlorocyclopentadiene	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
Hexachloroethane	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
Indeno(1,2,3-cd)pyrene	500	11000	550 U	370 U	580 U	380 U	410 U	380 U	***1900***
Isophorone	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
Naphthalene	100000	1000000	550 U	370 U	580 U	380 U	410 U	380 U	1400
Nitrobenzene	15000	140000	550 U	370 U	580 U	380 U	410 U	380 U	400 U
n-Nitroso-di-n-propylamine	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
n-Nitrosodiphenylamine	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
Pentachlorophenol	6700	55000	550 U	370 U	580 U	380 U	410 U	380 U	400 U
Phenanthrene	100000	1000000	550 U	370 U	580 U	380 U	410 U	380 U	17100 D
Phenol	100000	1000000	550 U	370 U	580 U	380 U	410 U	380 U	400 U
Pyrene	100000	1000000	550 U	370 U	580 U	380 U	410 U	380 U	7500 D
Total Semivolatile Compounds	--	--	1000	550	1000	620	660	620	72940

Footnotes/Qualifiers:

ug/kg:	Micrograms per kilogram	--:	No standard
BD:	Blind duplicate		Exceeded the Industrial Use SCO
U:	Analyzed for but not detected		
D:	Reported from secondary dilution		
J:	Estimated value or detection limits		

Exceeded the Restricted-Residential Use SCO

D&B ENGINEERS
AND
ARCHITECTS, P.C.

Table 3
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
TCL Semivolatile Organic Compounds

Sample ID			SB-04(10-12)	SB-04(27-29)	SB-05(10-11)	SB-05(10-11) BD	SB-05(11-13)	SB-06(8-10)	SB-06(11-13)
Sampling Date			3/16/2016	3/16/2016	3/16/2016	3/16/2016	3/16/2016	3/17/2016	3/17/2016
Start Depth (in Feet)			10	27	10	10	11	8	11
End Depth (in Feet)			12	29	11	11	13	10	13
Units			ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
	NYCRR 6 Part 375 Restricted-Residential Use Soil Cleanup Objectives (SCO) ug/kg	NYCRR 6 Part 375 Industrial Use Soil Cleanup Objectives (SCO) ug/kg							
SEMIVOLATILE COMPOUNDS									
1,1-Biphenyl	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
1,2,4,5-Tetrachlorobenzene	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
1,4-Dioxane	13000	250000	570 U	370 U	400 U	390 U	490 U	430 U	380 U
2,2-oxybis(1-Chloropropane)	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
2,3,4,6-Tetrachlorophenol	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
2,4,5-Trichlorophenol	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
2,4,6-Trichlorophenol	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
2,4-Dichlorophenol	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
2,4-Dimethylphenol	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
2,4-Dinitrophenol	--	--	570 UJ	370 UJ	400 UJ	390 UJ	490 UJ	430 UJ	380 UJ
2,4-Dinitrotoluene	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
2,6-Dinitrotoluene	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
2-Chloronaphthalene	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
2-Chlorophenol	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
2-Methylnaphthalene	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
2-Methylphenol	100000	1000000	570 U	370 U	400 U	390 U	490 U	430 U	380 U
2-Nitroaniline	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
2-Nitrophenol	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
3,3-Dichlorobenzidine	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
3+4-Methylphenols	100000	1000000	570 U	370 U	400 U	390 U	490 U	430 U	380 U
3-Nitroaniline	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
4,6-Dinitro-2-methylphenol	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
4-Bromophenyl-phenylether	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
4-Chloro-3-methylphenol	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
4-Chloroaniline	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
4-Chlorophenyl-phenylether	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
4-Nitroaniline	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
4-Nitrophenol	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Acenaphthene	100000	1000000	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Acenaphthylene	100000	1000000	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Acetophenone	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Anthracene	100000	1000000	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Atrazine	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Benzaldehyde	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Benzo(a)anthracene	1000	11000	570 U	370 U	400 U	390 U	490 U	92.3 J	380 U
Benzo(a)pyrene	1000	1100	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Benzo(b)fluoranthene	1000	11000	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Benzo(g,h,i)perylene	100000	1000000	570 U	370 U	400 U	390 U	490 U	430 U	380 U

See next page for Footnotes/Qualifiers

Table 3
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
TCL Semivolatile Organic Compounds

Sample ID			SB-04(10-12)	SB-04(27-29)	SB-05(10-11)	SB-05(10-11) BD	SB-05(11-13)	SB-06(8-10)	SB-06(11-13)
Sampling Date			3/16/2016	3/16/2016	3/16/2016	3/16/2016	3/16/2016	3/17/2016	3/17/2016
Start Depth (in Feet)			10	27	10	10	11	8	11
End Depth (in Feet)			12	29	11	11	13	10	13
Units			ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
	NYCRR 6 Part 375 Restricted-Residential Use Soil Cleanup Objectives (SCO) ug/kg	NYCRR 6 Part 375 Industrial Use Soil Cleanup Objectives (SCO) ug/kg							
COMPOUNDS CONTINUED									
Benzo(k)fluoranthene	3900	110000	570 U	370 U	400 U	390 U	490 U	430 U	380 U
bis(2-Chloroethoxy)methane	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
bis(2-Chloroethyl)ether	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Bis(2-ethylhexyl)phthalate	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Butylbenzylphthalate	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Caprolactam	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Carbazole	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Chrysene	3900	110000	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Dibenzo(a,h)anthracene	330	1100	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Dibenzofuran	59000	1000000	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Diethylphthalate	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Dimethylphthalate	--	--	890	580	660	680	860	550	610
Di-n-butylphthalate	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Di-n-octyl phthalate	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Fluoranthene	100000	1000000	570 U	370 U	84.3 J	390 U	490 U	170 J	380 U
Fluorene	100000	1000000	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Hexachlorobenzene	1200	12000	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Hexachlorobutadiene	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Hexachlorocyclopentadiene	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Hexachloroethane	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Indeno(1,2,3-cd)pyrene	500	11000	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Isophorone	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Naphthalene	100000	1000000	570 U	370 U	400 U	390 U	490 U	160 J	380 U
Nitrobenzene	15000	140000	570 U	370 U	400 U	390 U	490 U	430 U	380 U
n-Nitroso-di-n-propylamine	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
n-Nitrosodiphenylamine	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Pentachlorophenol	6700	55000	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Phenanthrene	100000	1000000	570 U	370 U	400 U	390 U	490 U	180 J	380 U
Phenol	100000	1000000	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Pyrene	100000	1000000	570 U	370 U	91.6 J	390 U	490 U	190 J	380 U
Total Semivolatile Compounds	--	--	890	580	835.9	680	860	1342.3	610

Footnotes/Qualifiers:

ug/kg:	Micrograms per kilogram	--:	No standard
BD:	Blind duplicate	Exceeded the Industrial Use SCO	
U:	Analyzed for but not detected		
D:	Reported from secondary dilution		
J:	Estimated value or detection limits		

Exceeded the Restricted-Residential Use SCO

D&B ENGINEERS AND ARCHITECTS, P.C.

Table 3
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
TCL Semivolatile Organic Compounds

Sample ID			SB-07(12-14)	SB-07(23-25)	SB-08(4-6)	SB-08(6-8)	SB-08(13-15)	GW-01(4-5)	GW-01(13-15)
Sampling Date			3/18/2016	3/18/2016	3/17/2016	3/17/2016	3/17/2016	3/21/2016	3/21/2016
Start Depth (in Feet)			12	23	4	6	13	4	13
End Depth (in Feet)			14	25	6	8	15	5	15
Units			ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
	NYCRR 6 Part 375 Restricted-Residential Use Soil Cleanup Objectives (SCO) ug/kg	NYCRR 6 Part 375 Industrial Use Soil Cleanup Objectives (SCO) ug/kg							
SEMIVOLATILE COMPOUNDS									
1,1-Biphenyl	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
1,2,4,5-Tetrachlorobenzene	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
1,4-Dioxane	13000	250000	450 U	360 U	660 U	380 U	380 U	400 U	390 U
2,2-oxybis(1-Chloropropane)	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
2,3,4,6-Tetrachlorophenol	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
2,4,5-Trichlorophenol	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
2,4,6-Trichlorophenol	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
2,4-Dichlorophenol	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
2,4-Dimethylphenol	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
2,4-Dinitrophenol	--	--	450 U	360 U	660 UJ	380 UJ	380 U	400 U	390 U
2,4-Dinitrotoluene	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
2,6-Dinitrotoluene	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
2-Chloronaphthalene	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
2-Chlorophenol	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
2-Methylnaphthalene	--	--	450 U	360 U	290 J	380 U	380 U	400 U	390 U
2-Methylphenol	100000	1000000	450 U	360 U	660 U	380 U	380 U	400 U	390 U
2-Nitroaniline	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
2-Nitrophenol	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
3,3-Dichlorobenzidine	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
3+4-Methylphenols	100000	1000000	450 U	360 U	660 U	380 U	380 U	400 U	390 U
3-Nitroaniline	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
4,6-Dinitro-2-methylphenol	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
4-Bromophenyl-phenylether	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
4-Chloro-3-methylphenol	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
4-Chloroaniline	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
4-Chlorophenyl-phenylether	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
4-Nitroaniline	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
4-Nitrophenol	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
Acenaphthene	100000	1000000	450 U	360 U	660 U	380 U	380 U	400 U	390 U
Acenaphthylene	100000	1000000	450 U	360 U	660 U	380 U	380 U	400 U	390 U
Acetophenone	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
Anthracene	100000	1000000	450 U	360 U	230 J	100 J	380 U	90.4 J	390 U
Atrazine	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
Benzaldehyde	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
Benzo(a)anthracene	1000	11000	450 U	360 U	590 J	220 J	380 U	330 J	390 U
Benzo(a)pyrene	1000	1100	450 U	360 U	520 J	190 J	380 U	250 J	390 U
Benzo(b)fluoranthene	1000	11000	450 U	360 U	680	260 J	380 U	340 J	390 U
Benzo(g,h,i)perylene	100000	1000000	450 U	360 U	320 J	120 J	380 U	140 J	390 U

See next page for Footnotes/Qualifiers

Table 3
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
TCL Semivolatile Organic Compounds

Sample ID			SB-07(12-14)	SB-07(23-25)	SB-08(4-6)	SB-08(6-8)	SB-08(13-15)	GW-01(4-5)	GW-01(13-15)
Sampling Date			3/18/2016	3/18/2016	3/17/2016	3/17/2016	3/17/2016	3/21/2016	3/21/2016
Start Depth (in Feet)			12	23	4	6	13	4	13
End Depth (in Feet)			14	25	6	8	15	5	15
Units			ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
	NYCRR 6 Part 375 Restricted-Residential Use Soil Cleanup Objectives (SCO) ug/kg	NYCRR 6 Part 375 Industrial Use Soil Cleanup Objectives (SCO) ug/kg							
COMPOUNDS CONTINUED									
Benzo(k)fluoranthene	3900	110000	450 U	360 U	300 J	100 J	380 U	180 J	390 U
bis(2-Chloroethoxy)methane	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
bis(2-Chloroethyl)ether	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
Bis(2-ethylhexyl)phthalate	--	--	450 U	360 U	290 J	140 J	380 U	130 J	390 U
Butylbenzylphthalate	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
Caprolactam	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
Carbazole	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
Chrysene	3900	110000	450 U	360 U	630 J	220 J	380 U	280 J	390 U
Dibenzo(a,h)anthracene	330	1100	450 U	360 U	660 U	380 U	380 U	400 U	390 U
Dibenzofuran	59000	1000000	450 U	360 U	660 U	380 U	380 U	400 U	390 U
Diethylphthalate	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
Dimethylphthalate	--	--	800	600	970	450	750	590 J	660 J
Di-n-butylphthalate	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
Di-n-octyl phthalate	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
Fluoranthene	100000	1000000	450 U	360 U	1100	410	380 U	430 J	390 U
Fluorene	100000	1000000	450 U	360 U	660 U	380 U	380 U	400 U	390 U
Hexachlorobenzene	1200	12000	450 U	360 U	660 U	380 U	380 U	400 U	390 U
Hexachlorobutadiene	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
Hexachlorocyclopentadiene	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
Hexachloroethane	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
Indeno(1,2,3-cd)pyrene	500	11000	450 U	360 U	240 J	91.5 J	380 U	170 J	390 U
Isophorone	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
Naphthalene	100000	1000000	450 U	360 U	300 J	88.9 J	380 U	400 U	390 U
Nitrobenzene	15000	140000	450 U	360 U	660 U	380 U	380 U	400 U	390 U
n-Nitroso-di-n-propylamine	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
n-Nitrosodiphenylamine	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
Pentachlorophenol	6700	55000	450 U	360 U	660 U	380 U	380 U	400 U	390 U
Phenanthrene	100000	1000000	450 U	360 U	820	340 J	380 U	300 J	390 U
Phenol	100000	1000000	450 U	360 U	660 U	380 U	380 U	400 U	390 U
Pyrene	100000	1000000	450 U	360 U	950	400	380 U	370 J	390 U
Total Semivolatile Compounds	--	--	800	600	8230	3130.4	750	3600.4	660

Footnotes/Qualifiers:

ug/kg: Micrograms per kilogram --: No standard

BD: Blind duplicate

Exceeded the Industrial Use SCO

U: Analyzed for but not detected

D: Reported from secondary dilution

J: Estimated value or detection limits

Exceeded the Restricted-Residential Use SCO

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Table 3
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
TCL Semivolatile Organic Compounds

		Sample ID	**GW-01(18-20)**	**GW-03(3-4)**	**GW-03(12-14)**	**GW-03(18-20)**	**GW-04(2-3)**	**GW-04(12-14)**	**GW-04(12-14)BD**	**GW-04(16-18)**
		Sampling Date	**3/21/2016**	**3/21/2016**	**3/21/2016**	**3/21/2016**	**3/23/2016**	**3/23/2016**	**3/23/2016**	**3/23/2016**
		Start Depth (in Feet)	**18**	**3**	**12**	**18**	**2**	**12**	**12**	**16**
		End Depth (in Feet)	**20**	**4**	**14**	**20**	**3**	**14**	**14**	**18**
		Units	**ug/Kg**	**ug/Kg**	**ug/Kg**	**ug/Kg**	**ug/Kg**	**ug/Kg**	**ug/Kg**	**ug/Kg**
	NYCRR 6 Part 375 **Restricted-Residential Use Soil Cleanup Objectives (SCO) ug/kg**	**NYCRR 6 Part 375** **Industrial Use Soil Cleanup Objectives (SCO) ug/kg**								
SEMIVOLATILE COMPOUNDS										
1,1-Biphenyl	--	--	370 U	77.7 J	540 U	390 U	370 U	520 U	550 U	370 U
1,2,4,5-Tetrachlorobenzene	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
1,4-Dioxane	13000	250000	370 U	360 U	540 U	390 U	370 UJ	520 UJ	550 UJ	370 UJ
2,2-oxybis(1-Chloropropane)	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
2,3,4,6-Tetrachlorophenol	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
2,4,5-Trichlorophenol	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
2,4,6-Trichlorophenol	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
2,4-Dichlorophenol	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
2,4-Dimethylphenol	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
2,4-Dinitrophenol	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
2,4-Dinitrotoluene	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
2,6-Dinitrotoluene	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
2-Chloronaphthalene	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
2-Chlorophenol	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
2-Methylnaphthalene	--	--	370 U	310 J	540 U	390 U	110 J	520 U	550 U	370 U
2-Methylphenol	100000	1000000	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
2-Nitroaniline	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
2-Nitrophenol	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
3,3-Dichlorobenzidine	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
3+4-Methylphenols	100000	1000000	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
3-Nitroaniline	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
4,6-Dinitro-2-methylphenol	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
4-Bromophenyl-phenylether	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
4-Chloro-3-methylphenol	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
4-Chloroaniline	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
4-Chlorophenyl-phenylether	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
4-Nitroaniline	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
4-Nitrophenol	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
Acenaphthene	100000	1000000	370 U	280 J	540 U	390 U	660 J	520 U	550 U	370 U
Acenaphthylene	100000	1000000	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
Acetophenone	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
Anthracene	100000	1000000	370 U	540 J	540 U	390 U	1200 J	520 U	550 U	370 U
Atrazine	--	--	370 U	540 J	540 U	390 U	370 U	520 U	550 U	370 U
Benzaldehyde	--	--	370 U	360 U	540 U	390 U	370 UJ	520 UJ	550 UJ	370 UJ
Benzo(a)anthracene	1000	11000	370 U	610 J	540 U	390 U	***1200 J***	520 U	550 U	370 U
Benzo(a)pyrene	1000	1100	370 U	370 J	540 U	390 U	810 J	520 U	550 U	370 U
Benzo(b)fluoranthene	1000	11000	370 U	580 J	540 U	390 U	950 J	520 U	550 U	370 U
Benzo(g,h,i)perylene	100000	1000000	370 U	190 J	540 U	390 U	430 J	520 U	550 U	370 U

See next page for Footnotes/Qualifiers

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Table 3
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
TCL Semivolatile Organic Compounds

Sample ID			GW-01(18-20)	GW-03(3-4)	GW-03(12-14)	GW-03(18-20)	GW-04(2-3)	GW-04(12-14)	GW-04(12-14)BD	GW-04(16-18)
Sampling Date			3/21/2016	3/21/2016	3/21/2016	3/21/2016	3/23/2016	3/23/2016	3/23/2016	3/23/2016
Start Depth (in Feet)			18	3	12	18	2	12	12	16
End Depth (in Feet)			20	4	14	20	3	14	14	18
Units			ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
	NYCRR 6 Part 375 Restricted-Residential Use Soil Cleanup Objectives (SCO) ug/kg	NYCRR 6 Part 375 Industrial Use Soil Cleanup Objectives (SCO) ug/kg								
COMPOUNDS CONTINUED										
Benzo(k)fluoranthene	3900	110000	370 U	270 J	540 U	390 U	290 J	520 U	550 U	370 U
bis(2-Chloroethoxy)methane	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
bis(2-Chloroethyl)ether	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
Bis(2-ethylhexyl)phthalate	--	--	370 U	120 J	540 U	390 U	370 U	520 U	550 U	370 U
Butylbenzylphthalate	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
Caprolactam	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
Carbazole	--	--	370 U	360 U	540 U	390 U	410 J	520 U	550 U	370 U
Chrysene	3900	110000	370 U	660 J	540 U	390 U	990 J	520 U	550 U	370 U
Dibenzo(a,h)anthracene	330	1100	370 U	360 U	540 U	390 U	120 J	520 U	550 U	370 U
Dibenzofuran	59000	1000000	370 U	340 J	540 U	390 U	430 J	520 U	550 U	370 U
Diethylphthalate	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
Dimethylphthalate	--	--	370 J	240 J	440 J	580 J	510 J	960 J	780 J	590 J
Di-n-butylphthalate	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
Di-n-octyl phthalate	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
Fluoranthene	100000	1000000	370 U	1500 J	540 U	390 U	2000 J	520 U	550 U	370 U
Fluorene	100000	1000000	370 U	230 J	540 U	390 U	690 J	520 U	550 U	370 U
Hexachlorobenzene	1200	12000	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
Hexachlorobutadiene	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
Hexachlorocyclopentadiene	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
Hexachloroethane	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
Indeno(1,2,3-cd)pyrene	500	11000	370 U	270 J	540 U	390 U	***600 J***	520 U	550 U	370 U
Isophorone	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
Naphthalene	100000	1000000	370 U	420 J	540 U	390 U	200 J	520 U	550 U	370 U
Nitrobenzene	15000	140000	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
n-Nitroso-di-n-propylamine	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
n-Nitrosodiphenylamine	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
Pentachlorophenol	6700	55000	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
Phenanthrene	100000	1000000	370 U	850 J	540 U	390 U	3000 D	520 U	550 U	370 U
Phenol	100000	1000000	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
Pyrene	100000	1000000	370 U	1000 J	540 U	390 U	2000 J	520 U	550 U	370 U
Total Semivolatile Compounds	--	--	370	9397.7	440	580	16600	960	780	590

Footnotes/Qualifiers:

ug/kg: Micrograms per kilogram --: No standard

BD: Blind duplicate

Exceeded the Industrial Use SCO

U: Analyzed for but not detected

D: Reported from secondary dilution

J: Estimated value or detection limits

Exceeded the Restricted-Residential Use SCO

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Table 4
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
Polychlorinated Biphenyls (PCBs)

Sample ID			SB-03(12-14)	SB-04(3-5)	SB-05(10-11)	SB-05(10-11) BD	SB-06(8-10)	SB-07(12-14)	SB-09(0-1)
Sampling Date			3/17/2016	3/16/2016	3/16/2016	3/16/2016	3/17/2016	3/18/2016	3/18/2016
Start Depth (in Feet)			12	3	10	10	8	12	0
End Depth (in Feet)			14	5	11	11	10	14	1
Units			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
	NYCRR 6 Part 375 Restricted-Residential Use Soil Cleanup Objectives (SCO) ug/kg	NYCRR 6 Part 375 Industrial Use Soil Cleanup Objectives (SCO) ug/kg							
PCBS									
Aroclor 1016	1000	25000	21.2 U	20.8 UJ	20.5 U	20.1 UJ	22.3 UJ	23.4 UJ	20 U
Aroclor 1221	1000	25000	21.2 U	20.8 UJ	20.5 U	20.1 UJ	22.3 UJ	23.4 UJ	20 U
Aroclor 1232	1000	25000	21.2 U	20.8 UJ	20.5 U	20.1 UJ	22.3 UJ	23.4 UJ	20 U
Aroclor 1242	1000	25000	21.2 U	20.8 UJ	20.5 U	20.1 UJ	22.3 UJ	23.4 UJ	20 U
Aroclor 1248	1000	25000	21.2 U	20.8 UJ	20.5 U	20.1 UJ	22.3 UJ	23.4 UJ	20 U
Aroclor 1254	1000	25000	21.2 U	20.8 UJ	20.5 U	20.1 UJ	22.3 UJ	23.4 UJ	20 U
Aroclor 1260	1000	25000	21.2 U	20.8 UJ	20.5 U	20.1 UJ	22.3 UJ	23.4 UJ	20 U
Aroclor-1262	1000	25000	21.2 U	20.8 UJ	20.5 U	20.1 UJ	22.3 UJ	23.4 UJ	20 U
Aroclor-1268	1000	25000	21.2 U	20.8 UJ	20.5 U	20.1 UJ	22.3 UJ	23.4 UJ	20 U
Total PCBs	1000	25000	0	0	0	0	0	0	0

Footnotes/Qualifiers:

ug/kg: Micrograms per kilogram
U: Analyzed for but not detected
BD: Blind duplicate
J: Estimated value or detection limits
--: No standard

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Table 4
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
Polychlorinated Biphenyls (PCBs)

Sample ID			SB-09(2-3)	SB-09(4-5)	SB-09(7-8)	SB-10(0-1)	SB-10(2-3)	SB-10(4-5)	SB-10(4-5) BD
Sampling Date			3/18/2016	3/18/2016	3/18/2016	3/16/2016	3/18/2016	3/18/2016	3/18/2016
Start Depth (in Feet)			2	4	7	0	2	4	4
End Depth (in Feet)			3	5	8	1	3	5	5
Units			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
	NYCRR 6 Part 375 Restricted-Residential Use Soil Cleanup Objectives (SCO) ug/kg	NYCRR 6 Part 375 Industrial Use Soil Cleanup Objectives (SCO) ug/kg							
PCBS									
Aroclor 1016	1000	25000	21.8 U	20.4 UJ	20 U	18.8 U	21.4 UJ	21 U	21.7 U
Aroclor 1221	1000	25000	21.8 U	20.4 UJ	20 U	18.8 U	21.4 UJ	21 U	21.7 U
Aroclor 1232	1000	25000	21.8 U	20.4 UJ	20 U	18.8 U	21.4 UJ	21 U	21.7 U
Aroclor 1242	1000	25000	21.8 U	20.4 UJ	20 U	18.8 U	21.4 UJ	21 U	21.7 U
Aroclor 1248	1000	25000	21.8 U	20.4 UJ	20 U	18.8 U	21.4 UJ	21 U	21.7 U
Aroclor 1254	1000	25000	21.8 U	20.4 UJ	20 U	18.8 U	21.4 UJ	21 U	21.7 U
Aroclor 1260	1000	25000	21.8 U	20.4 UJ	20 U	61.6	21.4 UJ	21 U	21.7 U
Aroclor-1262	1000	25000	21.8 U	20.4 UJ	20 U	18.8 U	21.4 UJ	21 U	21.7 U
Aroclor-1268	1000	25000	21.8 U	20.4 UJ	20 U	18.8 U	21.4 UJ	21 U	21.7 U
Total PCBs	1000	25000	0	0	0	61.6	0	0	0

Footnotes/Qualifiers:

ug/kg:	Micrograms per kilogram
U:	Analyzed for but not detected
BD:	Blind duplicate
J:	Estimated value or detection limits
--:	No standard

D&B ENGINEERS AND ARCHITECTS, P.C.

Table 4
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
Polychlorinated Biphenyls (PCBs)

Sample ID			SB-10(7-8)	SB-11(0-1)	SB-11(2-3)	SB-11(4-5)	SB-11(7-8)	SB-12(0-1)	SB-12(2-3)
Sampling Date			3/18/2016	3/18/2016	3/18/2016	3/18/2016	3/18/2016	3/21/2016	3/21/2016
Start Depth (in Feet)			7	0	2	4	7	0	2
End Depth (in Feet)			8	1	3	5	8	1	3
Units			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
	NYCRR 6 Part 375 Restricted-Residential Use Soil Cleanup Objectives (SCO) ug/kg	NYCRR 6 Part 375 Industrial Use Soil Cleanup Objectives (SCO) ug/kg							
PCBS									
Aroclor 1016	1000	25000	20.8 U	21.2 U	21.7 U	21.2 U	44.4 U	19.8 U	21.7 UJ
Aroclor 1221	1000	25000	20.8 U	21.2 U	21.7 U	21.2 U	44.4 U	19.8 U	21.7 UJ
Aroclor 1232	1000	25000	20.8 U	21.2 U	21.7 U	21.2 U	44.4 U	19.8 U	21.7 UJ
Aroclor 1242	1000	25000	20.8 U	21.2 U	21.7 U	21.2 U	44.4 U	19.8 U	21.7 UJ
Aroclor 1248	1000	25000	20.8 U	21.2 U	21.7 U	21.2 U	44.4 U	19.8 U	21.7 UJ
Aroclor 1254	1000	25000	20.8 U	21.2 U	21.7 U	21.2 U	44.4 U	19.8 U	21.7 UJ
Aroclor 1260	1000	25000	20.8 U	21.2 U	21.7 U	21.2 U	44.4 U	19.8 U	21.7 UJ
Aroclor-1262	1000	25000	20.8 U	21.2 U	21.7 U	21.2 U	44.4 U	19.8 U	21.7 UJ
Aroclor-1268	1000	25000	20.8 U	21.2 U	21.7 U	21.2 U	44.4 U	19.8 U	21.7 UJ
Total PCBs	1000	25000	0	0	0	0	0	0	0

Footnotes/Qualifiers:

ug/kg: Micrograms per kilogram
U: Analyzed for but not detected
BD: Blind duplicate
J: Estimated value or detection limits
--: No standard

D&B ENGINEERS AND ARCHITECTS, P.C.

Table 4
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
Polychlorinated Biphenyls (PCBs)

Sample ID			SB-12(5-6)	SB-13(0-1)	SB-13(2-3)	SB-13(5-6)	SB-13(5-6)BD	SB-14(0-1)	SB-14(2-3)
Sampling Date			3/21/2016	3/21/2016	3/21/2016	3/21/2016	3/21/2016	3/16/2016	3/21/2016
Start Depth (in Feet)			5	0	2	5	5	0	2
End Depth (in Feet)			6	1	3	6	6	1	3
Units			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
	NYCRR 6 Part 375 Restricted-Residential Use Soil Cleanup Objectives (SCO) ug/kg	NYCRR 6 Part 375 Industrial Use Soil Cleanup Objectives (SCO) ug/kg							
PCBS									
Aroclor 1016	1000	25000	40.6 UJ	20.2 U	23 UJ	34.5 U	31.1 UJ	18.7 U	19.2 U
Aroclor 1221	1000	25000	40.6 UJ	20.2 U	23 UJ	34.5 U	31.1 UJ	18.7 U	19.2 U
Aroclor 1232	1000	25000	40.6 UJ	20.2 U	23 UJ	34.5 U	31.1 UJ	18.7 U	19.2 U
Aroclor 1242	1000	25000	40.6 UJ	20.2 U	23 UJ	34.5 U	31.1 UJ	18.7 U	19.2 U
Aroclor 1248	1000	25000	40.6 UJ	20.2 U	23 UJ	34.5 U	31.1 UJ	18.7 U	19.2 U
Aroclor 1254	1000	25000	40.6 UJ	32	23 UJ	34.5 U	31.1 UJ	310	19.2 U
Aroclor 1260	1000	25000	40.6 UJ	20.2 U	23 UJ	34.5 U	31.1 UJ	18.7 U	19.2 U
Aroclor-1262	1000	25000	40.6 UJ	20.2 U	23 UJ	34.5 U	31.1 UJ	18.7 U	19.2 U
Aroclor-1268	1000	25000	40.6 UJ	20.2 U	23 UJ	34.5 U	31.1 UJ	18.7 U	19.2 U
Total PCBs	1000	25000	0	32	0	0	0	310	0

Footnotes/Qualifiers:

ug/kg: Micrograms per kilogram
U: Analyzed for but not detected
BD: Blind duplicate
J: Estimated value or detection limits
--: No standard

Table 4
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
Polychlorinated Biphenyls (PCBs)

Sample ID Sampling Date Start Depth (in Feet) End Depth (in Feet) Units			SB-14(5-6) 3/21/2016 5 6 ug/kg	SB-15(0-1) 3/18/2016 0 1 ug/kg	SB-15(2-3) 3/18/2016 2 3 ug/kg	SB-15(5-6) 3/18/2016 5 6 ug/kg	SB-16(0-1) 3/18/2016 0 1 ug/kg	SB-16(2-3) 3/18/2016 2 3 ug/kg	SB-16(5-6) 3/18/2016 5 6 ug/kg
	NYCRR 6 Part 375 Restricted-Residential Use Soil Cleanup Objectives (SCO) ug/kg	NYCRR 6 Part 375 Industrial Use Soil Cleanup Objectives (SCO) ug/kg							
PCBS									
Aroclor 1016	1000	25000	18.8 U	20.1 UJ	19.1 U	19.3 U	17.9 U	21 U	21.1 U
Aroclor 1221	1000	25000	18.8 U	20.1 UJ	19.1 U	19.3 U	17.9 U	21 U	21.1 U
Aroclor 1232	1000	25000	18.8 U	20.1 UJ	19.1 U	19.3 U	17.9 U	21 U	21.1 U
Aroclor 1242	1000	25000	18.8 U	20.1 UJ	19.1 U	19.3 U	17.9 U	21 U	21.1 U
Aroclor 1248	1000	25000	18.8 U	20.1 UJ	19.1 U	19.3 U	17.9 U	21 U	21.1 U
Aroclor 1254	1000	25000	18.8 U	10 J-	19.1 U	19.3 U	17.9 U	21 U	21.1 U
Aroclor 1260	1000	25000	18.8 U	20.1 UJ	19.1 U	19.3 U	17.9 U	21 U	21.1 U
Aroclor-1262	1000	25000	18.8 U	20.1 UJ	19.1 U	19.3 U	17.9 U	21 U	21.1 U
Aroclor-1268	1000	25000	18.8 U	20.1 UJ	19.1 U	19.3 U	17.9 U	21 U	21.1 U
Total PCBs	1000	25000	0	10	0	0	0	0	0

Footnotes/Qualifiers:

ug/kg: Micrograms per kilogram
U: Analyzed for but not detected
BD: Blind duplicate
J: Estimated value or detection limits
--: No standard

Table 4
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
Polychlorinated Biphenyls (PCBs)

		Sample ID	SB-17(0-1)	SB-17(2-3)	SB-17(5-6)	GW-01(13-15)	GW-03(12-14)	GW-04(12-14)	GW-04(12-14)BD
		Sampling Date	3/16/2016	3/18/2016	3/18/2016	3/21/2016	3/21/2016	3/23/2016	3/23/2016
		Start Depth (in Feet)	0	2	5	13	12	12	12
		End Depth (in Feet)	1	3	6	15	14	14	14
		Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
	NYCRR 6 Part 375 Restricted-Residential Use Soil Cleanup Objectives (SCO) ug/kg	NYCRR 6 Part 375 Industrial Use Soil Cleanup Objectives (SCO) ug/kg							
PCBS									
Aroclor 1016	1000	25000	19.5 U	21.9 UJ	19.5 U	20.2 UJ	27.9 UJ	26.9 U	28.6 U
Aroclor 1221	1000	25000	19.5 U	21.9 UJ	19.5 U	20.2 UJ	27.9 UJ	26.9 U	28.6 U
Aroclor 1232	1000	25000	19.5 U	21.9 UJ	19.5 U	20.2 UJ	27.9 UJ	26.9 U	28.6 U
Aroclor 1242	1000	25000	19.5 U	21.9 UJ	19.5 U	20.2 UJ	27.9 UJ	26.9 U	28.6 U
Aroclor 1248	1000	25000	19.5 U	21.9 UJ	19.5 U	20.2 UJ	27.9 UJ	26.9 U	28.6 U
Aroclor 1254	1000	25000	19.5 U	21.9 UJ	19.5 U	20.2 UJ	27.9 UJ	26.9 U	28.6 U
Aroclor 1260	1000	25000	44.4	21.9 UJ	19.5 U	20.2 UJ	27.9 UJ	26.9 U	28.6 U
Aroclor-1262	1000	25000	19.5 U	21.9 UJ	19.5 U	20.2 UJ	27.9 UJ	26.9 U	28.6 U
Aroclor-1268	1000	25000	19.5 U	21.9 UJ	19.5 U	20.2 UJ	27.9 UJ	26.9 U	28.6 U
Total PCBs	1000	25000	44.4	0	0	0	0	0	0

Footnotes/Qualifiers:

ug/kg: Micrograms per kilogram
U: Analyzed for but not detected
BD: Blind duplicate
J: Estimated value or detection limits
--: No standard

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Table 5
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
TCL Pesticides

		Sample ID	**SB-03(12-14)**	**SB-04(3-5)**	**SB-05(10-11)**	**SB-05(10-11) BD**	**SB-06(8-10)**	**SB-07(12-14)**	**GW-01(13-15)**
		Sampling Date	**3/17/2016**	**3/16/2016**	**3/16/2016**	**3/16/2016**	**3/17/2016**	**3/18/2016**	**3/21/2016**
		Start Depth (in Feet)	**12**	**3**	**10**	**10**	**8**	**12**	**13**
		End Depth (in Feet)	**14**	**5**	**11**	**11**	**10**	**14**	**15**
		Units	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**	**ug/kg**
	NYCRR 6 Part 375 Restricted-Residential Use Soil Cleanup Objectives (SCO) ug/kg	**NYCRR 6 Part 375** Industrial Use Soil Cleanup Objectives (SCO) ug/kg							
PESTICIDES									
4,4-DDD	13000	180000	2.1 U	2.1 U	2 U	2 U	2.2 U	2.3 U	2 U
4,4-DDE	8900	120000	2.1 U	2.1 U	2 U	2 U	2.2 U	2.3 U	2 U
4,4-DDT	7900	94000	2.1 U	2.1 U	2 U	2 U	2.2 U	2.3 U	2 U
Aldrin	97	1400	2.1 U	2.1 U	2 U	2 U	2.2 U	2.3 U	2 U
alpha-BHC	480	6800	2.1 U	2.1 U	2 U	2 U	2.2 U	2.3 U	2 U
alpha-Chlordane	4200	47000	2.1 U	2.1 U	2 U	2 U	2.2 U	2.3 U	2 U
beta-BHC	360	14000	2.1 U	2.1 U	2 U	2 U	2.2 U	2.3 U	2 U
delta-BHC	100000	1000000	2.1 U	2.1 U	2 U	2 U	2.2 U	2.3 U	2 U
Dieldrin	200	2800	2.1 U	2.1 U	2 U	2 U	2.2 U	2.3 U	2 U
Endosulfan I	24000	920000	2.1 U	2.1 U	2 U	2 U	2.2 U	2.3 U	2 U
Endosulfan II	24000	920000	2.1 U	2.1 U	2 U	2 U	2.2 U	2.3 U	2 U
Endosulfan Sulfate	24000	920000	2.1 U	2.1 U	2 U	2 U	2.2 U	2.3 U	2 U
Endrin	11000	410000	2.1 U	2.1 U	2 U	2 U	2.2 U	2.3 U	2 U
Endrin aldehyde	--	--	2.1 U	2.1 U	2 U	2 U	2.2 U	2.3 U	2 U
Endrin ketone	--	--	2.1 U	2.1 U	2 U	2 U	2.2 U	2.3 U	2 U
gamma-BHC (Lindane)	1300	23000	2.1 U	2.1 U	2 U	2 U	2.2 U	2.3 U	2 U
gamma-Chlordane	4200	47000	2.1 U	2.1 U	2 U	2 U	2.2 U	2.3 U	2 U
Heptachlor	2100	29000	2.1 U	2.1 U	2 U	2 U	2.2 U	2.3 U	2 U
Heptachlor epoxide	--	--	2.1 U	2.1 U	2 U	2 U	2.2 U	2.3 U	2 U
Methoxychlor	--	--	2.1 U	2.1 U	2 U	2 U	2.2 U	2.3 U	2 U
Toxaphene	--	--	21.2 U	20.8 U	20.5 U	20.1 U	22.3 U	23.3 U	20.2 U

Footnotes/Qualifiers:

ug/kg:	Micrograms per kilogram
U:	Analyzed for but not detected
BD:	Blind duplicate
--:	No standard

Table 5
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
TCL Pesticides

		Sample ID	GW-03(12-14)	GW-04(12-14)	GW-04(12-14)BD
		Sampling Date	3/21/2016	3/23/2016	3/23/2016
		Start Depth (in Feet)	12	12	12
		End Depth (in Feet)	14	14	14
		Units	ug/kg	ug/kg	ug/kg
	NYCRR 6 Part 375 Restricted-Residential Use Soil Cleanup Objectives (SCO) ug/kg	NYCRR 6 Part 375 Industrial Use Soil Cleanup Objectives (SCO) ug/kg			
PESTICIDES					
4,4-DDD	13000	180000	2.8 U	2.7 U	2.9 U
4,4-DDE	8900	120000	2.8 U	2.7 U	2.9 U
4,4-DDT	7900	94000	2.8 U	2.7 U	2.9 U
Aldrin	97	1400	2.8 U	2.7 U	2.9 U
alpha-BHC	480	6800	2.8 U	2.7 U	2.9 U
alpha-Chlordane	4200	47000	2.8 U	2.7 U	2.9 U
beta-BHC	360	14000	2.8 U	2.7 U	2.9 U
delta-BHC	100000	1000000	2.8 U	2.7 U	2.9 U
Dieldrin	200	2800	2.8 U	2.7 U	2.9 U
Endosulfan I	24000	920000	2.8 U	2.7 U	2.9 U
Endosulfan II	24000	920000	2.8 U	2.7 U	2.9 U
Endosulfan Sulfate	24000	920000	2.8 U	2.7 U	2.9 U
Endrin	11000	410000	2.8 U	2.7 U	2.9 U
Endrin aldehyde	--	--	2.8 U	2.7 U	2.9 U
Endrin ketone	--	--	2.8 U	2.7 U	2.9 U
gamma-BHC (Lindane)	1300	23000	2.8 U	2.7 U	2.9 U
gamma-Chlordane	4200	47000	2.8 U	2.7 U	2.9 U
Heptachlor	2100	29000	2.8 U	2.7 U	2.9 U
Heptachlor epoxide	--	--	2.8 U	2.7 U	2.9 U
Methoxychlor	--	--	2.8 U	2.7 U	2.9 U
Toxaphene	--	--	27.9 U	26.9 U	28.6 U

Footnotes/Qualifiers:
ug/kg: Micrograms per kilogram
U: Analyzed for but not detected
BD: Blind duplicate
--: No standard

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Table 6
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
TAL Metals

Sample ID			SB-01(13-15)	SB-01(23-25)	SB-03(12-14)	SB-04(3-5)	SB-05(10-11)	SB-05(10-11)BD	SB-06(8-10)
Sampling Date			3/16/2016	3/16/2016	3/17/2016	3/16/2016	3/16/2016	3/16/2016	3/17/2016
Start Depth			13	23	12	3	10	10	8
End Depth			15	25	14	5	11	11	10
Units			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
	NYCRR 6 Part 375 Restricted-Residential Use Soil Cleanup Objectives (SCO) mg/kg	NYCRR 6 Part 375 Industrial Use Soil Cleanup Objectives (SCO) mg/kg							
Metals									
Aluminum	--	--	14000	4260	9310	2220	7560	8920	3330
Antimony	--	--	3.62 UJ	2.3 UJ	2.6 UJ	1.43 J	2.55 UJ	2.53 UJ	2.79 UJ
Arsenic	16	16	9.37	1.21	2.66	8.17	5	2.43	8.7
Barium	400	10000	24.2 J	45.8 J	22.2 J	41.5 J	24.6 J	21.9 J	24.4 J
Beryllium	72	2700	0.982	0.353	0.526	0.72	0.486	0.496	0.611
Cadmium	4.3	60	0.44 U	0.28 U	0.31 U	0.31 U	0.31 U	0.3 U	0.34 U
Calcium	--	--	2130	5640	368	9980	1340 J	309 J	5700
Chromium	180	6800	26.3	11	12.5	5.91	16.1	12.6	8.35
Cobalt	--	--	12 J	7.16 J	6.09 J	4.71 J	9.18 J	5.74 J	7.27 J
Copper	270	10000	7.81 J	12.5 J	10.7 J	106 J	13.1 J	10.7 J	35.6 J
Iron	--	--	32500	14500	16600	51000 D	17400	15500	22800
Lead	400	3900	15.1	4.11	19.5	104	25.4	29.8	***483***
Magnesium	--	--	6010	4330	2480	2350	3790	2430	1420
Manganese	2000	10000	409	262	121	302	163	102	377
Mercury	0.81	5.7	0.206 J	0.033 J	0.039 J	0.135 J	0.047 J	0.161 J	0.199 J
Nickel	310	10000	26.7	11.7	13.8	12.7	14.2	13.4	14.1
Potassium	--	--	2730 J	1810 J	524 J	199 J	827 J	504 J	366 J
Selenium	180	6800	1.45 U	0.92 U	1.04 U	1.03 U	1.02 U	1.01 U	1.12 U
Silver	180	6800	0.73 U	0.46 U	0.52 U	0.52 U	0.51 U	0.51 U	0.56 U
Sodium	--	--	19000 J	2200 J	1390 J	208 J	2400 J	1290 J	428 J
Thallium	--	--	2.9 U	1.84 U	2.08 U	2.06 U	2.04 U	2.02 U	2.23 U
Vanadium	--	--	32.5	18.5	16.2	12.9	22.8	15.1	11.8
Zinc	10000	10000	77.1 J	31 J	42.1 J	135 J	42.5 J	40.4 J	36.5 J

Footnotes/Qualifiers:

mg/kg: Milligrams per kilogram
U: Analyzed for but not detected
D: Detected in the secondary dilution
J: Estimated value or detection limits
--: No standard or not analyzed
🟩 ***Exceeded the Restricted-Residential Use SCO***

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Table 6
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
TAL Metals

Sample ID			SB-07(12-14)	GW-01(13-15)	GW-03(12-14)	GW-04(12-14)	GW-04(12-14)BD
Sampling Date			3/18/2016	3/21/2016	3/21/2016	3/23/2016	3/23/2016
Start Depth			12	13	12	12	12
End Depth			14	15	14	14	14
Units			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
	NYCRR 6 Part 375 Restricted-Residential Use Soil Cleanup Objectives (SCO) mg/kg	NYCRR 6 Part 375 Industrial Use Soil Cleanup Objectives (SCO) mg/kg					
Metals							
Aluminum	--	--	11000	6940	13900	11800	12000
Antimony	--	--	2.93 UJ	2.51 UJ	3.48 UJ	3.26 UJ	3.46 UJ
Arsenic	16	16	5.87	2.79	9.47	4.86	5.73
Barium	400	10000	32.3 J	22 J	24.4 J	136 J	119 J
Beryllium	72	2700	0.573	0.453	0.983	0.708	0.704
Cadmium	4.3	60	0.751	0.3 U	0.141 J	0.795	1.02
Calcium	--	--	2040 J	821	2880	696	733
Chromium	180	6800	18.8 J	10.3	24.9	23.5 J	26.1 J
Cobalt	--	--	9.91	6.67	12.5	9.7	15.5
Copper	270	10000	17.9 J	8.72	5.27	8.05 J	10.3 J
Iron	--	--	22600	15800	35700	27300	23900
Lead	400	3900	37.8	13	14.5	11.9	12
Magnesium	--	--	3400 J	2220	5610	3070 J	3290 J
Manganese	2000	10000	262 J	211 J	433 J	293 J	290 J
Mercury	0.81	5.7	***0.949 DJ***	0.052	0.159	0.015 J	0.03
Nickel	310	10000	19.2	12.1	27.8	17	19.5
Potassium	--	--	1440	511	2530	1900	2010
Selenium	180	6800	1.17 U	1 U	1.39 U	1.3 U	1.39 U
Silver	180	6800	2.61	0.5 UJ	0.7 UJ	3.11	2.72
Sodium	--	--	6990	1700	13600	3930	4170
Thallium	--	--	2.34 U	2.01 U	2.78 U	2.61 U	2.77 U
Vanadium	--	--	24	14.9	32	27.8	28.5
Zinc	10000	10000	62.7	35.5	76.5	54.2	59.7

Footnotes/Qualifiers:

mg/kg: Milligrams per kilogram
U: Analyzed for but not detected
D: Detected in the secondary dilution
J: Estimated value or detection limits
--: No standard or not analyzed
Exceeded the Restricted-Residential Use SCO

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Table 7
Long Island Rail Road
Arch Street Yard RI
Groundwater Samples
TCL Volatile Organic Compounds

Sample ID Sampling Date Units	GW-01S 4/7/2016 ug/l	GW-02S 4/7/2016 ug/l	GW-02D 4/7/2016 ug/l	GW-03 4/7/2016 ug/l	NYSDEC Class GA Standard or Guidance Value ug/l
VOLATILE COMPOUNDS					
1,1,1-Trichloroethane	1 U	1 U	1 U	1 U	5
1,1,2,2-Tetrachloroethane	1 U	1 U	1 U	1 U	5
1,1,2-Trichloroethane	1 U	1 U	1 U	1 U	1
1,1,2-Trichlorotrifluoroethane	1 U	1 U	1 U	1 U	5
1,1-Dichloroethane	1 U	1 U	1 U	1 U	5
1,1-Dichloroethene	1 U	3.9	***23.6***	1 U	5
1,2,3-Trichlorobenzene	1 U	1 U	1 U	1 U	5
1,2,4-Trichlorobenzene	1 U	1 U	1 U	1 U	5
1,2-Dibromo-3-Chloropropane	1 U	1 U	1 U	1 U	0.04
1,2-Dibromoethane	1 U	1 U	1 U	1 U	0.0006
1,2-Dichlorobenzene	1 U	1 U	1 U	1 U	3
1,2-Dichloroethane	1 U	1 U	1 U	1 U	0.6
1,2-Dichloropropane	1 U	1 U	1 U	1 U	1
1,3-Dichlorobenzene	1 U	1 U	1 U	1 U	3
1,4-Dichlorobenzene	1 U	1 U	1 U	1 U	3
2-Hexanone	5 U	5 U	5 U	5 U	50
Acetone	5 U	2.9 J	4.8 J	5 U	50
Benzene	1 U	1 U	0.38 J	1 U	1
Bromochloromethane	1 U	1 U	1 U	1 U	5
Bromodichloromethane	1 U	1 U	1 U	1 U	50
Bromoform	1 U	1 U	1 U	1 U	50
Bromomethane	1 U	1 U	1 U	1 U	5
Carbon Disulfide	1 U	1 U	1 U	1 U	60
Carbon Tetrachloride	1 U	1 U	1 U	1 U	5
Chlorobenzene	1 U	1 U	1 U	1 U	5
Chloroethane	1 U	1 U	1 U	1 U	5
Chloroform	1 U	1 U	1 U	1 U	7
Chloromethane	1 U	1 U	1 U	1 U	5
Cis-1,2-Dichloroethylene	1 U	***1700 D***	***8100 D***	1 U	5
Cis-1,3-Dichloropropene	1 U	1 U	1 U	1 U	0.4
Cyclohexane	1 U	1 U	1 U	1 U	--
Dibromochloromethane	1 U	1 U	1 U	1 U	50
Dichlorodifluoromethane	1 U	1 U	1 U	1 U	5
Ethylbenzene	1 U	1 U	1 U	1 U	5
Isopropylbenzene	1 U	1 U	1 U	1 U	5
m,p-Xylene	2 U	2 U	2 U	2 U	5
Methyl Ethyl Ketone	5 U	5 U	5 U	5 U	50
Methyl Isobutyl Ketone	5 U	5 U	5 U	5 U	--
Methylene Chloride	1 U	1 U	1 U	1 U	5
Methyl Acetate	1 U	1 U	1 U	1 U	--
Methylcyclohexane	1 U	1 U	1 U	1 U	--
O-Xylene	1 U	1 U	1 U	1 U	5
Styrene	1 U	1 U	1 U	1 U	5
Tert-Butyl Methyl Ether	2.2	1 U	1 U	0.36 J	10
Tetrachloroethylene	1 U	***69.4 J***	***5900 DJ***	1 U	5
Toluene	1 U	1 U	0.38 J	1 U	5
Trans-1,2-Dichloroethene	1 U	***27.5***	***68.7***	1 U	5
Trans-1,3-Dichloropropene	1 U	1 U	1 U	1 U	0.4
Trichloroethylene	1 U	***25.3***	***1400 D***	1 U	5
Trichlorofluoromethane	1 U	1 U	1 U	1 U	5
Vinyl Chloride	1 U	***1500 D***	***5300 D***	1 U	2
Total Volatile Compounds	2.2	3329	20798	0.36	--

Footnotes/Qualifiers:

ug/l: Micrograms per liter

--: No standard

U: Analyzed for but not detected

D: Detected in the secondary dilution

J: Estimated value

BD: Blind duplicate

Exceeded Class GA value

D&B ENGINEERS AND ARCHITECTS, P.C.

Table 7
Long Island Rail Road
Arch Street Yard RI
Groundwater Samples
TCL Volatile Organic Compounds

Sample ID	GW-04S	GW-04D	MW-1	MW-1 BD	NYSDEC Class GA
Sampling Date	4/7/2016	4/7/2016	4/7/2016	4/7/2016	Standard or Guidance Value
Units	ug/l	ug/l	ug/l	ug/l	ug/l
VOLATILE COMPOUNDS					
1,1,1-Trichloroethane	1 U	1 U	1 U	1 U	5
1,1,2,2-Tetrachloroethane	1 U	1 U	1 U	1 U	5
1,1,2-Trichloroethane	1 U	1 U	1 U	1 U	1
1,1,2-Trichlorotrifluoroethane	1 U	1 U	1 U	1 U	5
1,1-Dichloroethane	1 U	1 U	1 U	1 U	5
1,1-Dichloroethene	1 U	1 U	1 U	1 U	5
1,2,3-Trichlorobenzene	1 U	1 U	1 U	1 U	5
1,2,4-Trichlorobenzene	1 U	1 U	1 U	1 U	5
1,2-Dibromo-3-Chloropropane	1 U	1 U	1 U	1 U	0.04
1,2-Dibromoethane	1 U	1 U	1 U	1 U	0.0006
1,2-Dichlorobenzene	1 U	1 U	1 U	1 U	3
1,2-Dichloroethane	1 U	1 U	1 U	1 U	0.6
1,2-Dichloropropane	1 U	1 U	1 U	1 U	1
1,3-Dichlorobenzene	1 U	1 U	1 U	1 U	3
1,4-Dichlorobenzene	1 U	1 U	1 U	1 U	3
2-Hexanone	5 U	5 U	5 U	5 U	50
Acetone	5 U	5 U	5 U	5 U	50
Benzene	1 U	1 U	1 U	1 U	1
Bromochloromethane	1 U	1 U	1 U	1 U	5
Bromodichloromethane	1 U	1 U	1 U	1 U	50
Bromoform	1 U	1 U	1 U	1 U	50
Bromomethane	1 U	1 U	1 U	1 U	5
Carbon Disulfide	1 U	1 U	1 U	1 U	60
Carbon Tetrachloride	1 U	1 U	1 U	1 U	5
Chlorobenzene	1 U	1 U	1 U	1 U	5
Chloroethane	1 U	1 U	1 U	1 U	5
Chloroform	1 U	1 U	1 U	1 U	7
Chloromethane	1 U	1 U	1 U	1 U	5
Cis-1,2-Dichloroethylene	1 U	1 U	1 U	1 U	5
Cis-1,3-Dichloropropene	1 U	1 U	1 U	1 U	0.4
Cyclohexane	1 U	1 U	1 U	1 U	--
Dibromochloromethane	1 U	1 U	1 U	1 U	50
Dichlorodifluoromethane	1 U	1 U	1 U	1 U	5
Ethylbenzene	1 U	1 U	1 U	1 U	5
Isopropylbenzene	1 U	1 U	1 U	1 U	5
m,p-Xylene	2 U	2 U	2 U	2 U	5
Methyl Ethyl Ketone	5 U	5 U	5 U	5 U	50
Methyl Isobutyl Ketone	5 U	5 U	5 U	5 U	--
Methylene Chloride	1 U	1 U	1 U	1 U	5
Methyl Acetate	1 U	1 U	1 U	1 U	--
Methylcyclohexane	1 U	1 U	1 U	1 U	--
O-Xylene	1 U	1 U	1 U	1 U	5
Styrene	1 U	1 U	1 U	1 U	5
Tert-Butyl Methyl Ether	1.7	4	***26.2***	***29.5***	10
Tetrachloroethylene	1 U	1 U	1 U	1 U	5
Toluene	1 U	0.24 J	1 U	1 U	5
Trans-1,2-Dichloroethene	1 U	1 U	1 U	1 U	5
Trans-1,3-Dichloropropene	1 U	1 U	1 U	1 U	0.4
Trichloroethylene	1 U	1 U	1 U	1 U	5
Trichlorofluoromethane	1 U	1 U	1 U	1 U	5
Vinyl Chloride	0.37 J	1 U	1 U	1 U	2
Total Volatile Compounds	2.07	4.24	26.2	29.5	--

Footnotes/Qualifiers:

ug/l: Micrograms per liter

--: No standard

U: Analyzed for but not detected

D: Detected in the secondary dilution

J: Estimated value

BD: Blind duplicate

Exceeded Class GA value

D&B ENGINEERS AND ARCHITECTS, P.C.

Table 7
Long Island Rail Road
Arch Street Yard RI
Groundwater Samples
TCL Volatile Organic Compounds

Sample ID	MW-2	MW-3	TRIP BLANK	TRIP BLANK	NYSDEC Class GA
Sampling Date	4/7/2016	4/7/2016	3/18/2016	3/23/2016	Standard or Guidance Value
Units	ug/l	ug/l	ug/l	ug/l	ug/l
VOLATILE COMPOUNDS					
1,1,1-Trichloroethane	1 U	1 U	1 U	1 U	5
1,1,2,2-Tetrachloroethane	1 U	1 U	1 U	1 U	5
1,1,2-Trichloroethane	1 U	1 U	1 U	1 U	1
1,1,2-Trichlorotrifluoroethane	1 U	1 U	1 U	1 U	5
1,1-Dichloroethane	1 U	1 U	1 U	1 U	5
1,1-Dichloroethene	1 U	3.2	1 U	1 U	5
1,2,3-Trichlorobenzene	1 U	1 U	1 U	1 U	5
1,2,4-Trichlorobenzene	1 U	1 U	1 U	1 U	5
1,2-Dibromo-3-Chloropropane	1 U	1 U	1 U	1 U	0.04
1,2-Dibromoethane	1 U	1 U	1 U	1 U	0.0006
1,2-Dichlorobenzene	1 U	1 U	1 U	1 U	3
1,2-Dichloroethane	1 U	1 U	1 U	1 U	0.6
1,2-Dichloropropane	1 U	1 U	1 U	1 U	1
1,3-Dichlorobenzene	1 U	1 U	1 U	1 U	3
1,4-Dichlorobenzene	1 U	1 U	1 U	1 U	3
2-Hexanone	5 U	5 U	5 U	5 U	50
Acetone	4.1 J	1.9 J	5 U	5 U	50
Benzene	1 U	1 U	1 U	1 U	1
Bromochloromethane	1 U	1 U	1 U	1 U	5
Bromodichloromethane	1 U	1 U	1 U	1 U	50
Bromoform	1 U	1 U	1 U	1 U	50
Bromomethane	1 U	1 U	1 U	1 U	5
Carbon Disulfide	1.6	1 U	1 U	1 U	60
Carbon Tetrachloride	1 U	1 U	1 U	1 U	5
Chlorobenzene	1 U	1 U	1 U	1 U	5
Chloroethane	1 U	1 U	1 U	1 U	5
Chloroform	1 U	1 U	1 U	1 U	7
Chloromethane	1 U	1 U	1 U	1 U	5
Cis-1,2-Dichloroethylene	1 U	***510 D***	1 U	1 U	5
Cis-1,3-Dichloropropene	1 U	1 U	1 U	1 U	0.4
Cyclohexane	1 U	1 U	1 U	1 U	--
Dibromochloromethane	1 U	1 U	1 U	1 U	50
Dichlorodifluoromethane	1 U	1 U	1 U	1 U	5
Ethylbenzene	1 U	1 U	1 U	1 U	5
Isopropylbenzene	1 U	1 U	1 U	1 U	5
m,p-Xylene	2 U	2 U	2 U	2 U	5
Methyl Ethyl Ketone	5 U	5 U	5 U	5 U	50
Methyl Isobutyl Ketone	5 U	5 U	5 U	5 U	--
Methylene Chloride	1 U	1 U	1 U	1 U	5
Methyl Acetate	1 U	1 U	1 U	1 U	--
Methylcyclohexane	1 U	1 U	1 U	1 U	--
O-Xylene	1 U	1 U	1 U	1 U	5
Styrene	1 U	1 U	1 U	1 U	5
Tert-Butyl Methyl Ether	0.54 J	0.74 J	1 U	1 U	10
Tetrachloroethylene	0.5 J	***78.9 J***	1 U	1 U	5
Toluene	1 U	1 U	1 U	1 U	5
Trans-1,2-Dichloroethene	1 U	2	1 U	1 U	5
Trans-1,3-Dichloropropene	1 U	1 U	1 U	1 U	0.4
Trichloroethylene	1 U	***34.8***	1 U	1 U	5
Trichlorofluoromethane	1 U	1 U	1 U	1 U	5
Vinyl Chloride	0.31 J	***240 D***	1 U	1 U	2
Total Volatile Compounds	7.05	872	0	0	--

Footnotes/Qualifiers:

ug/l: Micrograms per liter

--: No standard

U: Analyzed for but not detected

D: Detected in the secondary dilution

J: Estimated value

BD: Blind duplicate

Exceeded Class GA value

Table 7
Long Island Rail Road
Arch Street Yard RI
Groundwater Samples
TCL Volatile Organic Compounds

Sample ID	TRIP BLANK	FIELD BLANK	FIELD BLANK	FIELD BLANK	NYSDEC Class GA
Sampling Date	4/7/2016	3/18/2016	3/23/2016	4/7/2016	Standard or Guidance Value
Units	ug/l	ug/l	ug/l	ug/l	ug/l
VOLATILE COMPOUNDS					
1,1,1-Trichloroethane	1 U	1 U	1 U	1 U	5
1,1,2,2-Tetrachloroethane	1 U	1 U	1 U	1 U	5
1,1,2-Trichloroethane	1 U	1 U	1 U	1 U	1
1,1,2-Trichlorotrifluoroethane	1 U	1 U	1 U	1 U	5
1,1-Dichloroethane	1 U	1 U	1 U	1 U	5
1,1-Dichloroethene	1 U	1 U	1 U	1 U	5
1,2,3-Trichlorobenzene	1 U	1 U	1 U	1 U	5
1,2,4-Trichlorobenzene	1 U	1 U	1 U	1 U	5
1,2-Dibromo-3-Chloropropane	1 U	1 U	1 U	1 U	0.04
1,2-Dibromoethane	1 U	1 U	1 U	1 U	0.0006
1,2-Dichlorobenzene	1 U	1 U	1 U	1 U	3
1,2-Dichloroethane	1 U	1 U	1 U	1 U	0.6
1,2-Dichloropropane	1 U	1 U	1 U	1 U	1
1,3-Dichlorobenzene	1 U	1 U	1 U	1 U	3
1,4-Dichlorobenzene	1 U	1 U	1 U	1 U	3
2-Hexanone	5 U	5 U	5 U	5 U	50
Acetone	5 U	5 U	5 U	5 U	50
Benzene	1 U	1 U	1 U	1 U	1
Bromochloromethane	1 U	1 U	1 U	1 U	5
Bromodichloromethane	1 U	1 U	1 U	1 U	50
Bromoform	1 U	1 U	1 U	1 U	50
Bromomethane	1 U	1 U	1 U	1 U	5
Carbon Disulfide	1 U	1 U	1 U	1 U	60
Carbon Tetrachloride	1 U	1 U	1 U	1 U	5
Chlorobenzene	1 U	1 U	1 U	1 U	5
Chloroethane	1 U	1 U	1 U	1 U	5
Chloroform	1 U	1 U	1 U	1 U	7
Chloromethane	1 U	1 U	1 U	1 U	5
Cis-1,2-Dichloroethylene	1 U	1 U	1 U	1 U	5
Cis-1,3-Dichloropropene	1 U	1 U	1 U	1 U	0.4
Cyclohexane	1 U	1 U	1 U	1 U	--
Dibromochloromethane	1 U	1 U	1 U	1 U	50
Dichlorodifluoromethane	1 U	1 U	1 U	1 U	5
Ethylbenzene	1 U	1 U	1 U	1 U	5
Isopropylbenzene	1 U	1 U	1 U	1 U	5
m,p-Xylene	2 U	2 U	2 U	2 U	5
Methyl Ethyl Ketone	5 U	5 U	5 U	5 U	50
Methyl Isobutyl Ketone	5 U	5 U	5 U	5 U	--
Methylene Chloride	1 U	1.8	1 U	1 U	5
Methyl Acetate	1 U	1 U	1 U	1 U	--
Methylcyclohexane	1 U	1 U	1 U	1 U	--
O-Xylene	1 U	1 U	1 U	1 U	5
Styrene	1 U	1 U	1 U	1 U	5
Tert-Butyl Methyl Ether	1 U	1 U	1 U	1 U	10
Tetrachloroethylene	1 U	1 U	1 U	1 U	5
Toluene	1 U	1 U	1 U	1 U	5
Trans-1,2-Dichloroethene	1 U	1 U	1 U	1 U	5
Trans-1,3-Dichloropropene	1 U	1 U	1 U	1 U	0.4
Trichloroethylene	1 U	1 U	1 U	1 U	5
Trichlorofluoromethane	1 U	1 U	1 U	1 U	5
Vinyl Chloride	1 U	1 U	1 U	1 U	2
Total Volatile Compounds	0	1.8	0	0	--

Footnotes/Qualifiers:

ug/l: Micrograms per liter

--: No standard

U: Analyzed for but not detected

D: Detected in the secondary dilution

J: Estimated value

BD: Blind duplicate

Exceeded Class GA value

D&B ENGINEERS AND ARCHITECTS, P.C.

Table 8
Long Island Rail Road
Arch Street Yard RI
Groundwater Samples
TCL Semivolatile Organic Compounds

Sample ID	GW-01	GW-02S	GW-02D	GW-03	NYSDEC Class GA
Sampling Date	4/7/2016	4/7/2016	4/7/2016	4/7/2016	Standard or Guidance Value
Units	ug/l	ug/l	ug/l	ug/l	ug/l
SEMIVOLATILE COMPOUNDS					
1,2,4,5-Tetrachlorobenzene	10.1 UJ	10 U	10.1 U	10.2 U	5
1,4-Dioxane	10.1 UJ	10 UJ	10.1 UJ	10.2 UJ	--
2,3,4,6-Tetrachlorophenol	10.1 UJ	10 U	10.1 U	10.2 U	--
2,4,5-Trichlorophenol	10.1 UJ	10 U	10.1 U	10.2 U	1
2,4,6-Trichlorophenol	10.1 UJ	10 U	10.1 U	10.2 U	1
2,4-Dichlorophenol	10.1 UJ	10 U	10.1 U	10.2 U	5
2,4-Dimethylphenol	10.1 UJ	10 U	10.1 U	10.2 U	50
2,4-Dinitrophenol	10.1 UJ	10 U	10.1 U	10.2 U	10
2,4-Dinitrotoluene	10.1 UJ	10 U	10.1 U	10.2 U	5
2,6-Dinitrotoluene	10.1 UJ	10 U	10.1 U	10.2 U	5
2-Chloronaphthalene	10.1 UJ	10 U	10.1 U	10.2 U	10
2-Chlorophenol	10.1 UJ	10 U	10.1 U	10.2 U	1
2-Methylnaphthalene	10.1 UJ	10 U	10.1 U	10.2 U	--
2-Methylphenol	10.1 UJ	10 U	10.1 U	10.2 U	1
2-Nitroaniline	10.1 UJ	10 U	10.1 U	10.2 U	5
2-Nitrophenol	10.1 UJ	10 U	10.1 U	10.2 U	1
3,3-Dichlorobenzidine	10.1 UJ	10 U	10.1 U	10.2 U	5
3-Nitroaniline	10.1 UJ	10 U	10.1 U	10.2 U	5
3+4-Methylphenols	10.1 UJ	10 UJ	10.1 UJ	10.2 UJ	1
4,6-Dinitro-2-methylphenol	10.1 UJ	10 U	10.1 U	10.2 U	1
4-Bromophenyl-phenylether	10.1 UJ	10 U	10.1 U	10.2 U	--
4-Chloro-3-methylphenol	10.1 UJ	10 U	10.1 U	10.2 U	1
4-Chloroaniline	10.1 UJ	10 U	10.1 U	10.2 U	5
4-Chlorophenylphenyl ether	10.1 UJ	10 U	10.1 U	10.2 U	--
4-Nitroaniline	10.1 UJ	10 U	10.1 U	10.2 U	5
4-Nitrophenol	10.1 UJ	10 U	10.1 U	10.2 U	1
Acenaphthene	10.1 UJ	10 U	10.1 U	10.2 U	20
Acenaphthylene	10.1 UJ	10 U	10.1 U	10.2 U	--
Acetophenone	10.1 UJ	10 U	10.1 U	10.2 U	--
Anthracene	10.1 UJ	10 U	10.1 U	10.2 U	50
Atrazine	10.1 UJ	10 U	10.1 U	10.2 U	7.5
Benzaldehyde	10.1 UJ	10 U	10.1 U	10.2 U	--
Benzo(a)anthracene	10.1 UJ	10 U	10.1 U	10.2 U	0.002
Benzo(a)pyrene	10.1 UJ	10 U	10.1 U	10.2 U	ND
Benzo(b)fluoranthene	10.1 UJ	10 U	10.1 U	10.2 U	0.002
Benzo(ghi)perylene	10.1 UJ	10 U	10.1 U	10.2 U	--
Benzo(k)fluoranthene	10.1 UJ	10 U	10.1 U	10.2 U	0.002
Benzyl butyl phthalate	10.1 UJ	10 U	10.1 U	10.2 U	50
Biphenyl	10.1 UJ	10 U	10.1 U	10.2 U	5
Bis(2-chloroethoxy)methane	10.1 UJ	10 U	10.1 U	10.2 U	5
Bis(2-chloroethyl)ether	10.1 UJ	10 U	10.1 U	10.2 U	1
Bis(2-chloroisopropyl)ether	10.1 UJ	10 U	10.1 U	10.2 U	--
Bis(2-ethylhexyl)phthalate (BEHP)	10.1 UJ	10 U	10.1 U	10.2 U	5
Caprolactam	10.1 UJ	10 U	10.1 U	10.2 U	--
Carbazole	10.1 UJ	10 U	10.1 U	10.2 U	--
Chrysene	10.1 UJ	10 U	10.1 U	10.2 U	0.002
Dibenzo(a,h)anthracene	10.1 UJ	10 U	10.1 U	10.2 U	--
Dibenzofuran	10.1 UJ	10 U	10.1 U	10.2 U	--
Diethyl phthalate	10.1 UJ	10 U	10.1 U	10.2 U	50
Dimethyl phthalate	15.3 J-	10 U	4.9 J	2.6 J	50
Di-n-butyl phthalate	10.1 UJ	10 U	10.1 U	10.2 U	50
Di-n-octyl phthalate	10.1 UJ	10 U	10.1 U	10.2 U	50
Fluoranthene	10.1 UJ	10 U	10.1 U	10.2 U	50
Fluorene	10.1 UJ	10 U	10.1 U	10.2 U	50
Hexachlorobenzene	10.1 UJ	10 U	10.1 U	10.2 U	0.04

See next page for Footnotes/Qualifers.

D&B ENGINEERS AND ARCHITECTS, P.C.

Table 8
Long Island Rail Road
Arch Street Yard RI
Groundwater Samples
TCL Semivolatile Organic Compounds

Sample ID Sampling Date Units	GW-01 4/7/2016 ug/l	GW-02S 4/7/2016 ug/l	GW-02D 4/7/2016 ug/l	GW-03 4/7/2016 ug/l	NYSDEC Class GA Standard or Guidance Value ug/l
COMPOUNDS CONTINUED					
Hexachlorobutadiene	10.1 UJ	10 U	10.1 U	10.2 U	0.5
Hexachlorocyclopentadiene	10.1 UJ	10 U	10.1 U	10.2 U	5
Hexachloroethane	10.1 UJ	10 U	10.1 U	10.2 U	5
Indeno(1,2,3-cd)pyrene	10.1 UJ	10 U	10.1 U	10.2 U	0.002
Isophorone	10.1 UJ	10 U	10.1 U	10.2 U	50
Naphthalene	10.1 UJ	10 U	10.1 U	4.5 J	10
Nitrobenzene	10.1 UJ	10 U	10.1 U	10.2 U	0.4
N-Nitroso-di-n-propylamine	10.1 UJ	10 U	10.1 U	10.2 U	--
N-Nitrosodiphenylamine	10.1 UJ	10 U	10.1 U	10.2 U	50
Pentachlorophenol	10.1 UJ	10 U	10.1 U	10.2 U	1
Phenanthrene	10.1 UJ	10 U	10.1 U	10.2 U	50
Phenol	10.1 UJ	10 U	10.1 U	10.2 U	1
Pyrene	10.1 UJ	10 U	10.1 U	10.2 U	50
Total Semivolatile Compounds	15.3	0	4.9	7.1	--

Footnotes/Qualifiers:

ug/l: Micrograms per liter
--: No standard
U: Analyzed for but not detected
J: Estimated value
J-: Estimated bias low
BD: Blind duplicate

Table 8
Long Island Rail Road
Arch Street Yard RI
Groundwater Samples
TCL Semivolatile Organic Compounds

Sample ID	GW-04S	GW-04D	MW-1	MW-1 BD	NYSDEC Class GA
Sampling Date	4/7/2016	4/7/2016	4/7/2016	4/7/2016	Standard or Guidance Value
Units	ug/l	ug/l	ug/l	ug/l	ug/l
SEMIVOLATILE COMPOUNDS					
1,2,4,5-Tetrachlorobenzene	10.2 U	10.1 U	10.1 U	10.3 U	5
1,4-Dioxane	10.2 UJ	10.1 UJ	10.1 UJ	10.3 UJ	--
2,3,4,6-Tetrachlorophenol	10.2 U	10.1 U	10.1 U	10.3 U	--
2,4,5-Trichlorophenol	10.2 U	10.1 U	10.1 U	10.3 U	1
2,4,6-Trichlorophenol	10.2 U	10.1 U	10.1 U	10.3 U	1
2,4-Dichlorophenol	10.2 U	10.1 U	10.1 U	10.3 U	5
2,4-Dimethylphenol	10.2 U	10.1 U	10.1 U	10.3 U	50
2,4-Dinitrophenol	10.2 U	10.1 U	10.1 U	10.3 U	10
2,4-Dinitrotoluene	10.2 U	10.1 U	10.1 U	10.3 U	5
2,6-Dinitrotoluene	10.2 U	10.1 U	10.1 U	10.3 U	5
2-Chloronaphthalene	10.2 U	10.1 U	10.1 U	10.3 U	10
2-Chlorophenol	10.2 U	10.1 U	10.1 U	10.3 U	1
2-Methylnaphthalene	10.2 U	10.1 U	10.1 U	10.3 U	--
2-Methylphenol	10.2 U	10.1 U	10.1 U	10.3 U	1
2-Nitroaniline	10.2 U	10.1 U	10.1 U	10.3 U	5
2-Nitrophenol	10.2 U	10.1 U	10.1 U	10.3 U	1
3,3-Dichlorobenzidine	10.2 U	10.1 U	10.1 U	10.3 U	5
3-Nitroaniline	10.2 U	10.1 U	10.1 U	10.3 U	5
3+4-Methylphenols	10.2 UJ	10.1 UJ	10.1 UJ	10.3 UJ	1
4,6-Dinitro-2-methylphenol	10.2 U	10.1 U	10.1 U	10.3 U	1
4-Bromophenyl-phenylether	10.2 U	10.1 U	10.1 U	10.3 U	--
4-Chloro-3-methylphenol	10.2 U	10.1 U	10.1 U	10.3 U	1
4-Chloroaniline	10.2 U	10.1 U	10.1 U	10.3 U	5
4-Chlorophenylphenyl ether	10.2 U	10.1 U	10.1 U	10.3 U	--
4-Nitroaniline	10.2 U	10.1 U	10.1 U	10.3 U	5
4-Nitrophenol	10.2 U	10.1 U	10.1 U	10.3 U	1
Acenaphthene	10.2 U	10.1 U	10.1 U	10.3 U	20
Acenaphthylene	10.2 U	10.1 U	10.1 U	10.3 U	--
Acetophenone	10.2 U	10.1 U	10.1 U	10.3 U	--
Anthracene	10.2 U	10.1 U	10.1 U	10.3 U	50
Atrazine	10.2 U	10.1 U	10.1 U	10.3 U	7.5
Benzaldehyde	10.2 U	10.1 U	10.1 U	10.3 U	--
Benzo(a)anthracene	10.2 U	10.1 U	10.1 U	10.3 U	0.002
Benzo(a)pyrene	10.2 U	10.1 U	10.1 U	10.3 U	ND
Benzo(b)fluoranthene	10.2 U	10.1 U	10.1 U	10.3 U	0.002
Benzo(ghi)perylene	10.2 U	10.1 U	10.1 U	10.3 U	--
Benzo(k)fluoranthene	10.2 U	10.1 U	10.1 U	10.3 U	0.002
Benzyl butyl phthalate	10.2 U	10.1 U	10.1 U	10.3 U	50
Biphenyl	10.2 U	10.1 U	10.1 U	10.3 U	5
Bis(2-chloroethoxy)methane	10.2 U	10.1 U	10.1 U	10.3 U	5
Bis(2-chloroethyl)ether	10.2 U	10.1 U	10.1 U	10.3 U	1
Bis(2-chloroisopropyl)ether	10.2 U	10.1 U	10.1 U	10.3 U	--
Bis(2-ethylhexyl)phthalate (BEHP)	10.2 U	10.1 U	10.1 U	10.3 U	5
Caprolactam	10.2 U	10.1 U	10.1 U	10.3 U	--
Carbazole	10.2 U	10.1 U	10.1 U	10.3 U	--
Chrysene	10.2 U	10.1 U	10.1 U	10.3 U	0.002
Dibenzo(a,h)anthracene	10.2 U	10.1 U	10.1 U	10.3 U	--
Dibenzofuran	10.2 U	10.1 U	10.1 U	10.3 U	--
Diethyl phthalate	10.2 U	10.1 U	10.1 U	10.3 U	50
Dimethyl phthalate	10.2 U	2.9 J	10.1 U	10.3 U	50
Di-n-butyl phthalate	10.2 U	10.1 U	10.1 U	10.3 U	50
Di-n-octyl phthalate	10.2 U	10.1 U	10.1 U	10.3 U	50
Fluoranthene	10.2 U	10.1 U	10.1 U	10.3 U	50
Fluorene	10.2 U	10.1 U	10.1 U	10.3 U	50
Hexachlorobenzene	10.2 U	10.1 U	10.1 U	10.3 U	0.04

See next page for Footnotes/Qualifers.

Table 8
Long Island Rail Road
Arch Street Yard RI
Groundwater Samples
TCL Semivolatile Organic Compounds

Sample ID **Sampling Date** **Units**	**GW-04S** **4/7/2016** **ug/l**	**GW-04D** **4/7/2016** **ug/l**	**MW-1** **4/7/2016** **ug/l**	**MW-1 BD** **4/7/2016** **ug/l**	**NYSDEC Class GA Standard or Guidance Value** **ug/l**
COMPOUNDS CONTINUED					
Hexachlorobutadiene	10.2 U	10.1 U	10.1 U	10.3 U	0.5
Hexachlorocyclopentadiene	10.2 U	10.1 U	10.1 U	10.3 U	5
Hexachloroethane	10.2 U	10.1 U	10.1 U	10.3 U	5
Indeno(1,2,3-cd)pyrene	10.2 U	10.1 U	10.1 U	10.3 U	0.002
Isophorone	10.2 U	10.1 U	10.1 U	10.3 U	50
Naphthalene	10.2 U	10.1 U	10.1 U	10.3 U	10
Nitrobenzene	10.2 U	10.1 U	10.1 U	10.3 U	0.4
N-Nitroso-di-n-propylamine	10.2 U	10.1 U	10.1 U	10.3 U	--
N-Nitrosodiphenylamine	10.2 U	10.1 U	10.1 U	10.3 U	50
Pentachlorophenol	10.2 U	10.1 U	10.1 U	10.3 U	1
Phenanthrene	10.2 U	10.1 U	10.1 U	10.3 U	50
Phenol	10.2 U	10.1 U	10.1 U	10.3 U	1
Pyrene	10.2 U	10.1 U	10.1 U	10.3 U	50
Total Semivolatile Compounds	0	2.9	0	0	--

Footnotes/Qualifiers:

ug/l: Micrograms per liter
--: No standard
U: Analyzed for but not detected
BD: Blind duplicate

Table 8
Long Island Rail Road
Arch Street Yard RI
Groundwater Samples
TCL Semivolatile Organic Compounds

Sample ID	MW-2	MW-3	FIELD BLANK	FIELD BLANK	NYSDEC Class GA
Sampling Date	4/7/2016	4/7/2016	3/18/2016	3/23/2016	Standard or Guidance Value
Units	ug/l	ug/l	ug/l	ug/l	ug/l
SEMIVOLATILE COMPOUNDS					
1,2,4,5-Tetrachlorobenzene	10.1 U	10.2 U	10 U	10.2 U	5
1,4-Dioxane	10.1 UJ	10.2 UJ	10 UJ	10.2 UJ	--
2,3,4,6-Tetrachlorophenol	10.1 U	10.2 U	10 U	10.2 U	--
2,4,5-Trichlorophenol	10.1 U	10.2 U	10 U	10.2 U	1
2,4,6-Trichlorophenol	10.1 U	10.2 U	10 U	10.2 U	1
2,4-Dichlorophenol	10.1 U	10.2 U	10 U	10.2 U	5
2,4-Dimethylphenol	10.1 U	10.2 U	10 U	10.2 U	50
2,4-Dinitrophenol	10.1 U	10.2 U	10 U	10.2 U	10
2,4-Dinitrotoluene	10.1 U	10.2 U	10 U	10.2 U	5
2,6-Dinitrotoluene	10.1 U	10.2 U	10 U	10.2 U	5
2-Chloronaphthalene	10.1 U	10.2 U	10 U	10.2 U	10
2-Chlorophenol	10.1 U	10.2 U	10 U	10.2 U	1
2-Methylnaphthalene	10.1 U	10.2 U	10 U	10.2 U	--
2-Methylphenol	10.1 U	10.2 U	10 U	10.2 U	1
2-Nitroaniline	10.1 U	10.2 U	10 U	10.2 U	5
2-Nitrophenol	10.1 U	10.2 U	10 U	10.2 U	1
3,3-Dichlorobenzidine	10.1 U	10.2 U	10 U	10.2 U	5
3-Nitroaniline	10.1 U	10.2 U	10 U	10.2 U	5
3+4-Methylphenols	10.1 UJ	10.2 UJ	10 UJ	10.2 UJ	1
4,6-Dinitro-2-methylphenol	10.1 U	10.2 U	10 U	10.2 U	1
4-Bromophenyl-phenylether	10.1 U	10.2 U	10 U	10.2 U	--
4-Chloro-3-methylphenol	10.1 U	10.2 U	10 U	10.2 U	1
4-Chloroaniline	10.1 U	10.2 U	10 U	10.2 U	5
4-Chlorophenylphenyl ether	10.1 U	10.2 U	10 U	10.2 U	--
4-Nitroaniline	10.1 U	10.2 U	10 U	10.2 U	5
4-Nitrophenol	10.1 U	10.2 U	10 U	10.2 U	1
Acenaphthene	10.1 U	10.2 U	10 U	10.2 U	20
Acenaphthylene	10.1 U	10.2 U	10 U	10.2 U	--
Acetophenone	10.1 U	10.2 U	10 U	10.2 U	--
Anthracene	10.1 U	10.2 U	10 U	10.2 U	50
Atrazine	10.1 U	10.2 U	10 U	10.2 U	7.5
Benzaldehyde	10.1 U	10.2 U	10 U	10.2 U	--
Benzo(a)anthracene	10.1 U	10.2 U	10 U	10.2 U	0.002
Benzo(a)pyrene	10.1 U	10.2 U	10 U	10.2 U	ND
Benzo(b)fluoranthene	10.1 U	10.2 U	10 U	10.2 U	0.002
Benzo(ghi)perylene	10.1 U	10.2 U	10 U	10.2 U	--
Benzo(k)fluoranthene	10.1 U	10.2 U	10 U	10.2 U	0.002
Benzyl butyl phthalate	10.1 U	10.2 U	10 U	10.2 U	50
Biphenyl	10.1 U	10.2 U	10 U	10.2 U	5
Bis(2-chloroethoxy)methane	10.1 U	10.2 U	10 U	10.2 U	5
Bis(2-chloroethyl)ether	10.1 U	10.2 U	10 U	10.2 U	1
Bis(2-chloroisopropyl)ether	10.1 U	10.2 U	10 U	10.2 U	--
Bis(2-ethylhexyl)phthalate (BEHP)	10.1 U	10.2 U	10 U	10.2 U	5
Caprolactam	10.1 U	10.2 U	10 U	10.2 U	--
Carbazole	10.1 U	10.2 U	10 U	10.2 U	--
Chrysene	10.1 U	10.2 U	10 U	10.2 U	0.002
Dibenzo(a,h)anthracene	10.1 U	10.2 U	10 U	10.2 U	--
Dibenzofuran	10.1 U	10.2 U	10 U	10.2 U	--
Diethyl phthalate	10.1 U	10.2 U	10 U	10.2 U	50
Dimethyl phthalate	3.5 J	10.2 U	10 U	10.2 U	50
Di-n-butyl phthalate	10.1 U	10.2 U	10 U	10.2 U	50
Di-n-octyl phthalate	10.1 U	10.2 U	10 U	10.2 U	50
Fluoranthene	10.1 U	10.2 U	10 U	10.2 U	50
Fluorene	10.1 U	10.2 U	10 U	10.2 U	50
Hexachlorobenzene	10.1 U	10.2 U	10 U	10.2 U	0.04

See next page for Footnotes/Qualifers.

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Table 8
Long Island Rail Road
Arch Street Yard RI
Groundwater Samples
TCL Semivolatile Organic Compounds

Sample ID	MW-2	MW-3	FIELD BLANK	FIELD BLANK	NYSDEC Class GA
Sampling Date	4/7/2016	4/7/2016	3/18/2016	3/23/2016	Standard or Guidance Value
Units	ug/l	ug/l	ug/l	ug/l	ug/l
COMPOUNDS CONTINUED					
Hexachlorobutadiene	10.1 U	10.2 U	10 U	10.2 U	0.5
Hexachlorocyclopentadiene	10.1 U	10.2 U	10 U	10.2 U	5
Hexachloroethane	10.1 U	10.2 U	10 U	10.2 U	5
Indeno(1,2,3-cd)pyrene	10.1 U	10.2 U	10 U	10.2 U	0.002
Isophorone	10.1 U	10.2 U	10 U	10.2 U	50
Naphthalene	10.1 U	10.2 U	10 U	10.2 U	10
Nitrobenzene	10.1 U	10.2 U	10 U	10.2 U	0.4
N-Nitroso-di-n-propylamine	10.1 U	10.2 U	10 U	10.2 U	--
N-Nitrosodiphenylamine	10.1 U	10.2 U	10 U	10.2 U	50
Pentachlorophenol	10.1 U	10.2 U	10 U	10.2 U	1
Phenanthrene	10.1 U	10.2 U	10 U	10.2 U	50
Phenol	10.1 U	10.2 U	10 U	10.2 U	1
Pyrene	10.1 U	10.2 U	10 U	10.2 U	50
Total Semivolatile Compounds	3.5	0	0	0	--

Footnotes/Qualifiers:

ug/l: Micrograms per liter
--: No standard
U: Analyzed for but not detected
BD: Blind duplicate

Table 8
Long Island Rail Road
Arch Street Yard RI
Groundwater Samples
TCL Semivolatile Organic Compounds

Sample ID Sampling Date Units	FIELD BLANK 4/7/2016 ug/l	NYSDEC Class GA Standard or Guidance Value ug/l
SEMIVOLATILE COMPOUNDS		
1,2,4,5-Tetrachlorobenzene	10 U	5
1,4-Dioxane	10 UJ	--
2,3,4,6-Tetrachlorophenol	10 U	--
2,4,5-Trichlorophenol	10 U	1
2,4,6-Trichlorophenol	10 U	1
2,4-Dichlorophenol	10 U	5
2,4-Dimethylphenol	10 U	50
2,4-Dinitrophenol	10 U	10
2,4-Dinitrotoluene	10 U	5
2,6-Dinitrotoluene	10 U	5
2-Chloronaphthalene	10 U	10
2-Chlorophenol	10 U	1
2-Methylnaphthalene	10 U	--
2-Methylphenol	10 U	1
2-Nitroaniline	10 U	5
2-Nitrophenol	10 U	1
3,3-Dichlorobenzidine	10 U	5
3-Nitroaniline	10 U	5
3+4-Methylphenols	10 UJ	1
4,6-Dinitro-2-methylphenol	10 U	1
4-Bromophenyl-phenylether	10 U	--
4-Chloro-3-methylphenol	10 U	1
4-Chloroaniline	10 U	5
4-Chlorophenylphenyl ether	10 U	--
4-Nitroaniline	10 U	5
4-Nitrophenol	10 U	1
Acenaphthene	10 U	20
Acenaphthylene	10 U	--
Acetophenone	10 U	--
Anthracene	10 U	50
Atrazine	10 U	7.5
Benzaldehyde	10 U	--
Benzo(a)anthracene	10 U	0.002
Benzo(a)pyrene	10 U	ND
Benzo(b)fluoranthene	10 U	0.002
Benzo(ghi)perylene	10 U	--
Benzo(k)fluoranthene	10 U	0.002
Benzyl butyl phthalate	10 U	50
Biphenyl	10 U	5
Bis(2-chloroethoxy)methane	10 U	5
Bis(2-chloroethyl)ether	10 U	1
Bis(2-chloroisopropyl)ether	10 U	--
Bis(2-ethylhexyl)phthalate (BEHP)	10 U	5
Caprolactam	10 U	--
Carbazole	10 U	--
Chrysene	10 U	0.002
Dibenzo(a,h)anthracene	10 U	--
Dibenzofuran	10 U	--
Diethyl phthalate	10 U	50
Dimethyl phthalate	10 U	50
Di-n-butyl phthalate	10 U	50
Di-n-octyl phthalate	10 U	50
Fluoranthene	10 U	50
Fluorene	10 U	50
Hexachlorobenzene	10 U	0.04

See next page for Footnotes/Qualifers.

Table 8
Long Island Rail Road
Arch Street Yard RI
Groundwater Samples
TCL Semivolatile Organic Compounds

Sample ID Sampling Date Units	FIELD BLANK 4/7/2016 ug/l	NYSDEC Class GA Standard or Guidance Value ug/l
COMPOUNDS CONTINUED		
Hexachlorobutadiene	10 U	0.5
Hexachlorocyclopentadiene	10 U	5
Hexachloroethane	10 U	5
Indeno(1,2,3-cd)pyrene	10 U	0.002
Isophorone	10 U	50
Naphthalene	10 U	10
Nitrobenzene	10 U	0.4
N-Nitroso-di-n-propylamine	10 U	--
N-Nitrosodiphenylamine	10 U	50
Pentachlorophenol	10 U	1
Phenanthrene	10 U	50
Phenol	10 U	1
Pyrene	10 U	50
Total Semivolatile Compounds	0	--

Footnotes/Qualifiers:

ug/l: Micrograms per liter

--: No standard

U: Analyzed for but not detected

BD: Blind duplicate

Table 9
Long Island Rail Road
Arch Street Yard RI
Groundwater Samples
TCL Pesticides and Polychlorinated Biphenyls (PCBs)

Sample ID	GW-02D	MW-3	FIELD BLANK	FIELD BLANK	FIELD BLANK	NYSDEC Class GA
Sampling Date	4/7/2016	4/7/2016	3/18/2016	3/21/2016	3/23/2016	Standard
Dilution Factor						or Guidance Value
Units	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
PESTICIDES						
Aldrin	0.05 U	0.05 U	0.05 U	--	0.05 U	ND
alpha BHC	0.05 U	0.05 U	0.05 U	--	0.05 U	0.01
alpha Endosulfan	0.05 U	0.05 U	0.05 U	--	0.05 U	--
alpha-Chlordane	0.05 U	0.05 U	0.05 U	--	0.05 U	0.05
beta-BHC	0.05 U	0.05 U	0.05 U	--	0.05 U	0.04
beta-Endosulfan	0.05 U	0.05 U	0.05 U	--	0.05 U	--
beta-Chlordane	0.05 U	0.05 U	0.05 U	--	0.05 U	0.05
delta-BHC	0.05 U	0.05 U	0.05 U	--	0.05 U	0.04
Dieldrin	0.05 U	0.05 U	0.05 U	--	0.05 U	0.004
Endosulfan sulfate	0.05 U	0.05 U	0.05 U	--	0.05 U	--
Endrin	0.05 U	0.05 U	0.05 U	--	0.05 U	ND
Endrin aldehyde	0.05 U	0.05 U	0.05 U	--	0.05 U	5
Endrin ketone	0.05 U	0.05 U	0.05 U	--	0.05 U	5
gamma-BHC (Lindane)	0.05 U	0.05 U	0.05 U	--	0.05 U	0.05
Heptachlor	0.05 U	0.05 U	0.05 U	--	0.05 U	0.04
Heptachlor epoxide	0.05 U	0.05 U	0.05 U	--	0.05 U	0.03
Methoxychlor	0.05 U	0.05 U	0.05 U	--	0.05 U	35
P,P'-DDD	0.05 U	0.05 U	0.05 U	--	0.05 U	0.3
P,P'-DDE	0.05 U	0.05 U	0.05 U	--	0.05 U	0.2
P,P'-DDT	0.05 U	0.05 U	0.05 U	--	0.05 U	0.2
Toxaphene	0.51 U	0.5 U	0.51 U	--	0.52 U	0.06
PCBS						
Aroclor-1016	0.52 U	0.52 U	0.51 U	0.52 U	0.51 U	0.09
Aroclor-1221	0.52 U	0.52 U	0.51 U	0.52 U	0.51 U	0.09
Aroclor-1232	0.52 U	0.52 U	0.51 U	0.52 U	0.51 U	0.09
Aroclor-1242	0.52 U	0.52 U	0.51 U	0.52 U	0.51 U	0.09
Aroclor-1248	0.52 U	0.52 U	0.51 U	0.52 U	0.51 U	0.09
Aroclor-1254	0.52 U	0.52 U	0.51 U	0.52 U	0.51 U	0.09
Aroclor-1260	0.52 U	0.52 U	0.51 U	0.52 U	0.51 U	0.09
Aroclor-1262	--	--	0.51 U	0.52 U	0.51 U	0.09
Aroclor-1268	--	--	0.51 U	0.52 U	0.51 U	0.09
Total PCBs	0	0	0	0	0	0.09

Footnotes/Qualifiers:

ug/l: Micrograms per liter
--: No standard or not analyzed
U: Analyzed for but not detected
ND: Compound exceeds if detected

Table 10
Long Island Rail Road
Arch Street Yard RI
Groundwater Samples
TAL Metals

Sample ID	GW-02D	MW-3	FIELD BLANK	FIELD BLANK	NYSDEC Class GA
Sampling Date	4/7/2016	4/7/2016	3/18/2016	3/23/2016	Standard or Guidance Value
Units	ug/l	ug/l	ug/l	ug/l	ug/l
METALS					
Aluminum	211	72.7	8.32 J	15.2 J	--
Antimony	25 U	25 U	25 U	25 U	3
Arsenic	6.13 J	4.63 J	10 U	10 U	25
Barium	158	101	50 U	50 U	1000
Beryllium	3 U	3 U	3 U	3 U	3
Cadmium	3 U	3 U	3 U	3 U	5
Calcium	36100	92500	1000 U	133 J	--
Chromium	2.3 J	4.04 J	5 U	5 U	50
Cobalt	15 U	15 U	15 U	15 U	--
Copper	10 U	10 U	10 U	10 U	200
Iron	***11100***	***4860***	50 U	50 U	300
Lead	4.97 J	6 U	6 U	6 U	25
Magnesium	2770	5850	1000 U	1000 U	35000
Manganese	***357***	148	10 U	10 U	300
Mercury	0.2 U	0.2 U	0.2 U	0.2 U	0.7
Nickel	20 U	20 U	20 U	20 U	100
Potassium	9850	4840	1000 U	1000 U	--
Selenium	10 U	10 U	10 U	10 U	10
Silver	5 U	5 U	5 U	5 U	50
Sodium	***1770000 D***	***201000***	1000 U	92.8 J	20000
Thallium	20 U	20 U	20 U	20 U	0.5
Vanadium	20 U	20 U	20 U	20 U	--
Zinc	6.81 J	20 U	20 U	12.7 J	2000

Footnotes/Qualifiers:

ug/l: Micrograms per liter

--: Not analyzed or no standard

U: Analyzed for but not detected

J: Estimated value or limit

Exceeded Class GA value

ATTACHMENT 5

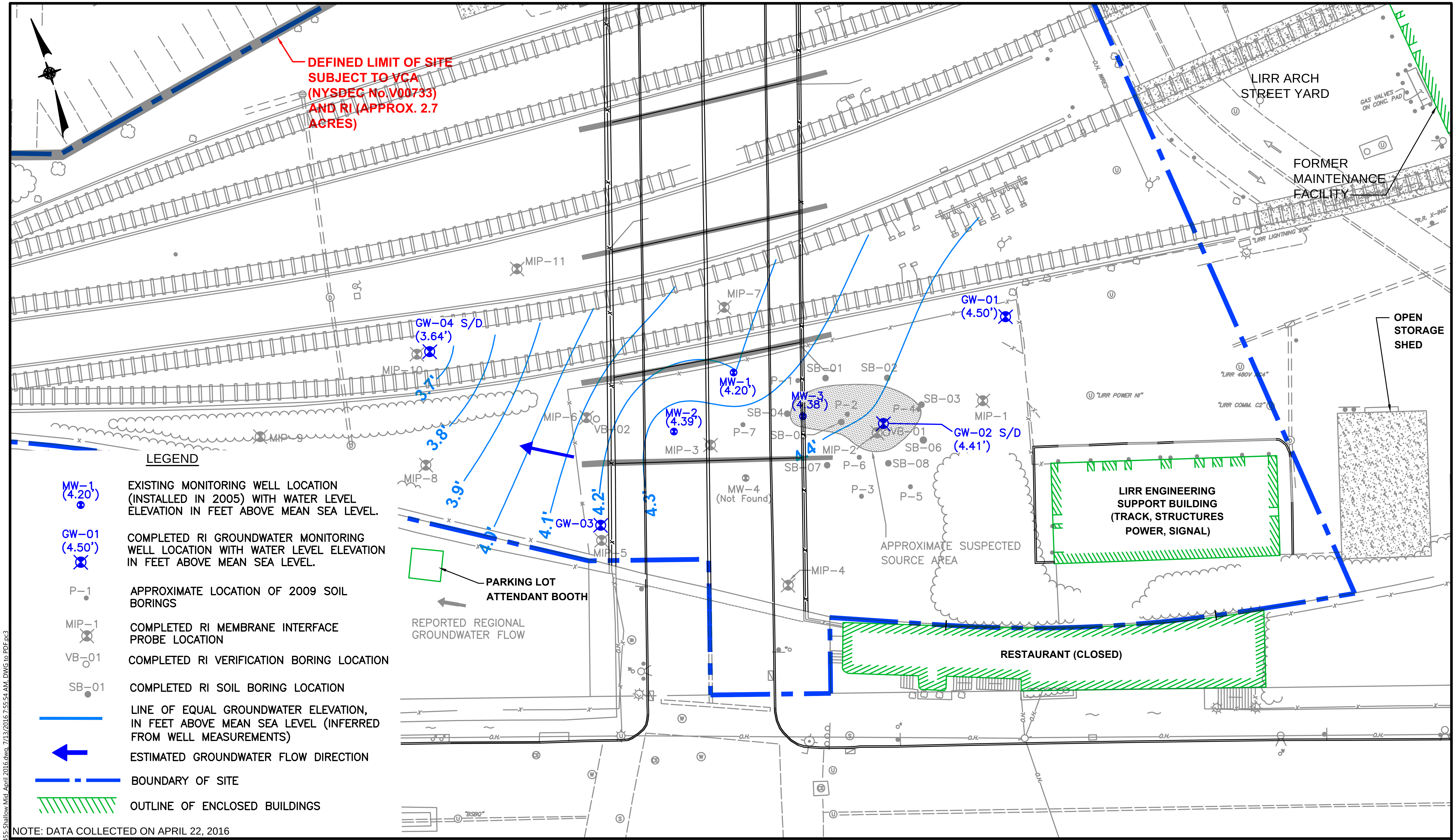
WATER LEVEL MEASUREMENTS AND WATER LEVEL CONTOUR MAPS

TABLE 11
LONG ISLAND RAIL ROAD ARCH STREET YARD

SUMMARY OF GROUNDWATER MEASUREMENTS

Well #	Total Depth of Well (ft)	Casing Elevation (ft msl)	Date	Approximate Tidal Stage	Depth to Water (ft)	Calculated Groundwater Elevation (ft msl)
MW-1	12.60	8.03	4/22/2016	Low	3.83	4.20
				Mid	3.83	4.20
				High	3.83	4.20
			4/27/2016	Low	3.72	4.31
				Mid	3.71	4.32
				High	3.71	4.32
MW-2	6.85	9.43	4/22/2016	Low	5.04	4.39
				Mid	5.04	4.39
				High	5.04	4.39
			4/27/2016	Low	4.98	4.45
				Mid	4.98	4.45
				High	4.98	4.45
MW-3	12.75	9.89	4/22/2016	Low	5.50	4.39
				Mid	5.51	4.38
				High	5.51	4.38
			4/27/2016	Low	5.41	4.48
				Mid	5.41	4.48
				High	5.41	4.48
GW-01	22.80	12.20	4/22/2016	Low	7.68	4.52
				Mid	7.70	4.50
				High	7.69	4.51
			4/27/2016	Low	7.65	4.55
				Mid	7.65	4.55
				High	7.64	4.56
GW-02D	22.80	11.05	4/22/2016	Low	10.68	0.37
				Mid	10.70	0.35
				High	10.70	0.35
			4/27/2016	Low	10.71	0.34
				Mid	10.71	0.34
				High	10.70	0.35
GW-02S	9.45	10.65	4/22/2016	Low	6.24	4.41
				Mid	6.24	4.41
				High	6.24	4.41
			4/27/2016	Low	6.15	4.50
				Mid	6.15	4.50
				High	6.15	4.50
GW-03	20.10	10.41	4/22/2016	Low	11.87	-1.46
				Mid	11.88	-1.47
				High	11.87	-1.46
			4/27/2016	Low	12.13	-1.72
				Mid	12.12	-1.71
				High	12.12	-1.71
GW-04D	19.35	7.12	4/22/2016	Low	9.00	-1.88
				Mid	8.99	-1.87
				High	8.99	-1.87
			4/27/2016	Low	9.18	-2.06
				Mid	9.19	-2.07
				High	9.18	-2.06
GW-04S	7.85	7.01	4/22/2016	Low	3.38	3.63
				Mid	3.37	3.64
				High	3.37	3.64
			4/27/2016	Low	3.28	3.73
				Mid	3.28	3.73
				High	3.28	3.73

NOTES:
Measurements collected in feet below top of casing
NAPL was not detected in any groundwater monitoring well.



NOTE: DATA COLLECTED ON APRIL 22, 2016

D&B ENGINEERS AND ARCHITECTS, P.C.

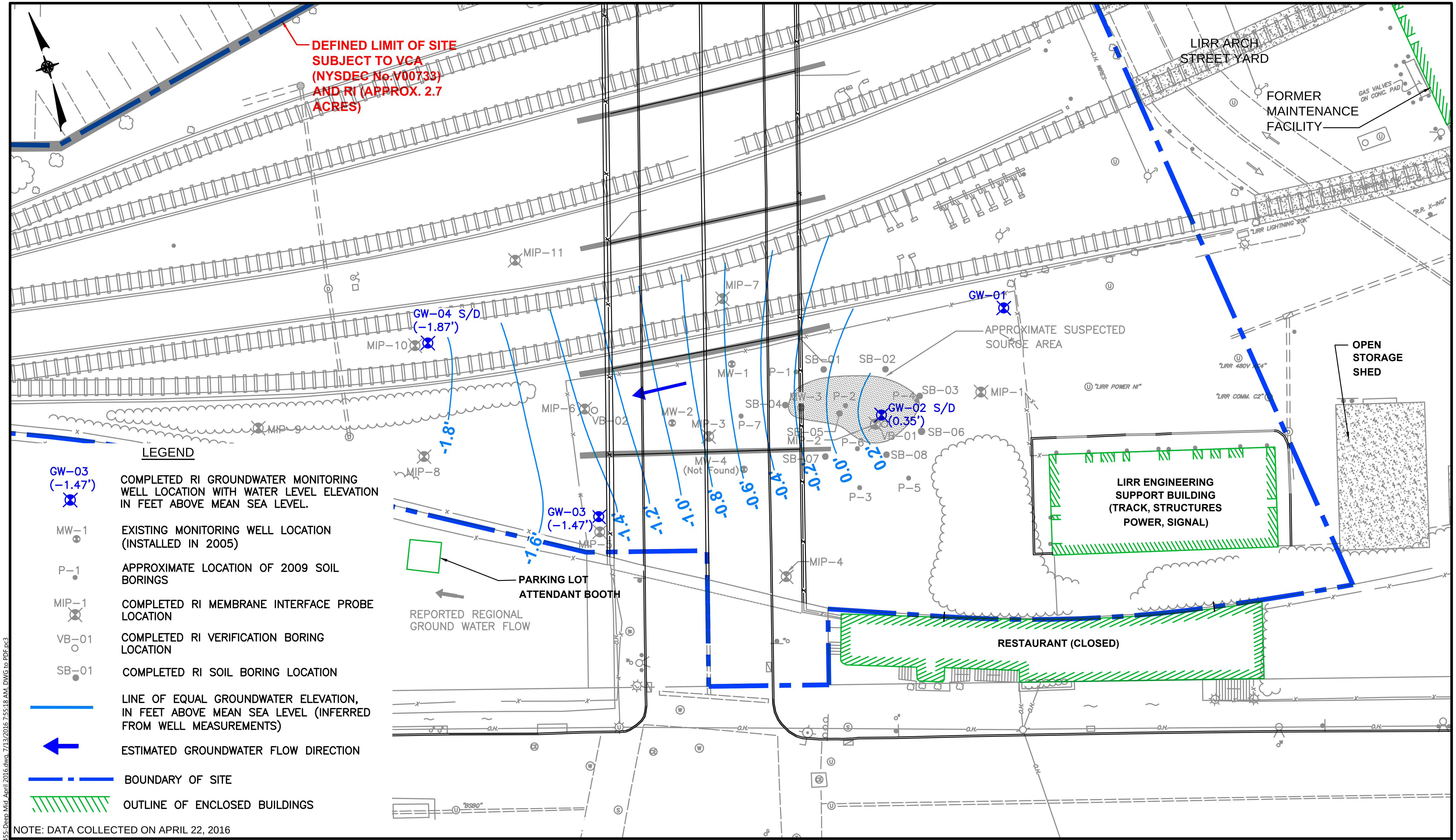
LONG ISLAND RAILROAD - ARCH STREET YARD
LONG ISLAND CITY, NY - REMEDIAL INVESTIGATION

SHALLOW (WATER TABLE) GROUNDWATER CONTOUR MAP

SCALE: 1"=30'

FIGURE 3

F:\3455\MTA\Dwg\FIGURES\3455-Shallow Mid April 2016.dwg, 7/13/2016 7:55:54 AM, DWG to PDF.pc3



LEGEND

GW−03 (−1.47') ⊗	COMPLETED RI GROUNDWATER MONITORING WELL LOCATION WITH WATER LEVEL ELEVATION IN FEET ABOVE MEAN SEA LEVEL.
MW−1 ⊗	EXISTING MONITORING WELL LOCATION (INSTALLED IN 2005)
P−1 ●	APPROXIMATE LOCATION OF 2009 SOIL BORINGS
MIP−1 ⊗	COMPLETED RI MEMBRANE INTERFACE PROBE LOCATION
VB−01 ○	COMPLETED RI VERIFICATION BORING LOCATION
SB−01 ●	COMPLETED RI SOIL BORING LOCATION
─	LINE OF EQUAL GROUNDWATER ELEVATION, IN FEET ABOVE MEAN SEA LEVEL (INFERRED FROM WELL MEASUREMENTS)
←	ESTIMATED GROUNDWATER FLOW DIRECTION
─ · ─	BOUNDARY OF SITE
▨	OUTLINE OF ENCLOSED BUILDINGS

NOTE: DATA COLLECTED ON APRIL 22, 2016

D&B ENGINEERS AND ARCHITECTS, P.C.

LONG ISLAND RAILROAD - ARCH STREET YARD
LONG ISLAND CITY, NY - REMEDIAL INVESTIGATION

DEEP GROUNDWATER CONTOUR MAP

SCALE: 1"=30'

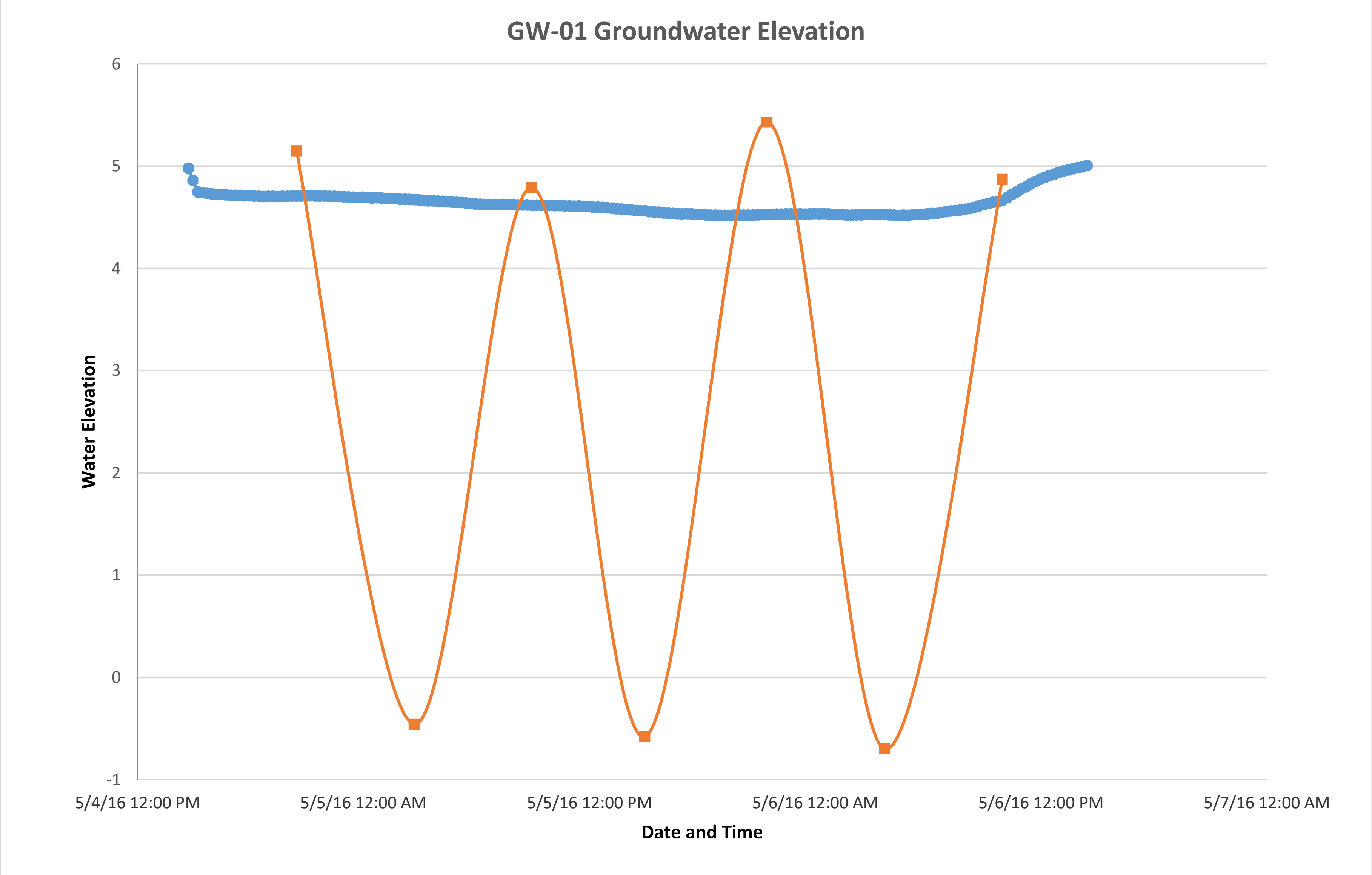
FIGURE 4

F:\3455\MTA\Dwg\FIGURES\3455-Deep Mid April 2016.dwg, 7/13/2016 7:55:18 AM, DWG to PDF.pc3

ATTACHMENT 6

TIDAL STUDY RESULTS

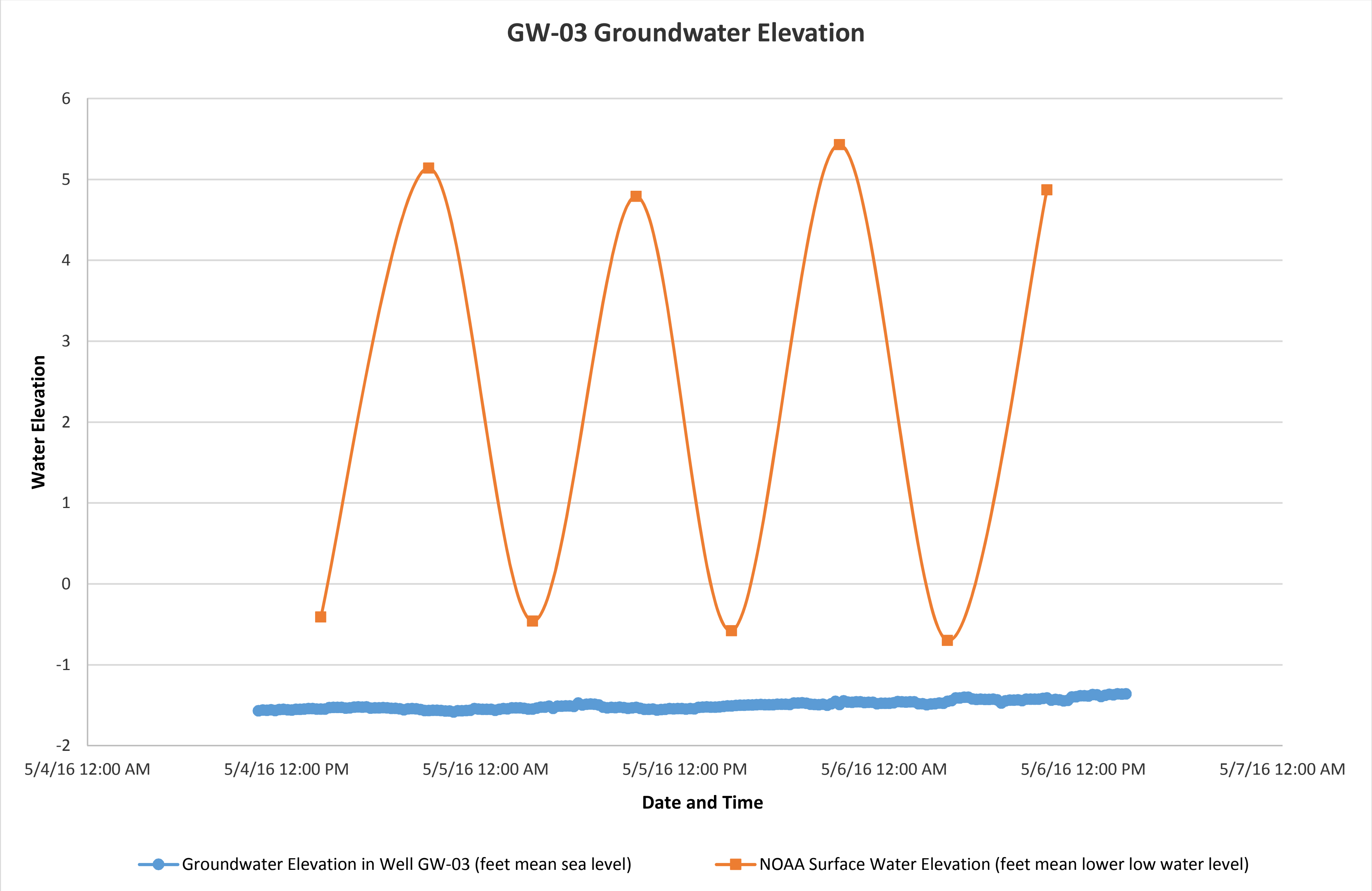
FIGURE 5
LONG ISLAND RAIL ROAD
ARCH STREET YARD RI
TIDAL SURVEY



Note: NOAA Surface Water Elevation is obtained from closest tidal gauge station (Hunters Point, Newtown Creek, NY)

J:_HazWaste\3455 (LIRR On-Call)\Task 2 (Arch Street)\Transducer data\GW-01\well a 2016-05-06 16.52.14.wsl

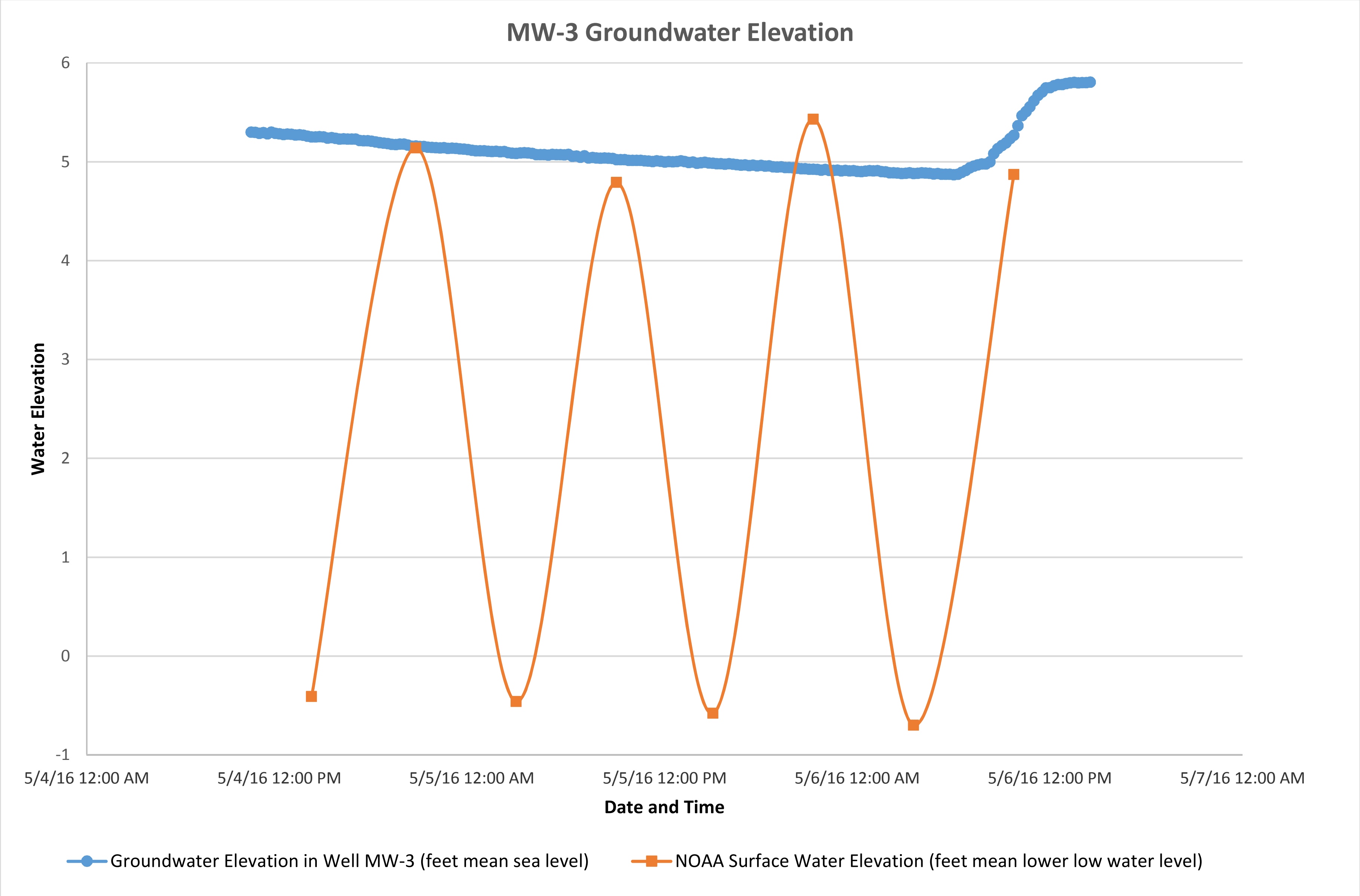
FIGURE 6
LONG ISLAND RAIL ROAD
ARCH STREET YARD RI
TIDAL SURVEY



<u>Note:</u> NOAA Surface Water Elevation is obtained from closest tidal gauge station (Hunters Point, Newtown Creek, NY)

J:_HazWaste\3455 (LIRR On-Call)\Task 2 (Arch Street)\Transducer data\GW-03\well c 2016-05-06 16.49.03.wsl

FIGURE 7
LONG ISLAND RAIL ROAD
ARCH STREET YARD RI
TIDAL SURVEY



<u>Note:</u> NOAA Surface Water Elevation is obtained from closest tidal gauge station (Hunters Point, Newtown Creek, NY)

J:_HazWaste\3455 (LIRR On-Call)\Task 2 (Arch Street)\Transducer data\MW-3\well b 2016-05-06 16.46.13.wsl

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Environmental Remediation, Region 2
47-40 21st Street, Long Island City, NY 11101
P: (718) 482-4995
www.dec.ny.gov

August 8, 2016

Gloria Russo
Director – Environmental Planning & Compliance
Corporate Safety Department
Long Island Rail Road
144-41 94th Avenue, Mail Code 1947, 7th Floor
Jamaica, NY 11435
ggrusso@lirr.org

Re: Arch Street Yards (LIRR) Site
NYSDEC Site No. V00733
Interim Remedial Investigation Report and Proposed Scope of Work

Dear Ms. Russo:

The New York State Department of Environmental Conservation (the Department), in consultation with the New York State Department of Health (NYSDOH), has completed its review of the August 5, 2016 Interim Remedial Investigation Report (Interim RIR) and Proposed Scope of Work, which were prepared by D&B Engineers and Architects, P.C. on behalf of Long Island Rail Road (the Volunteer). The August 5 document reflects revisions made based on comments provided by the Department on an earlier version.

The Interim RIR documents the results of previous soil and groundwater sampling. The Proposed Scope of Work consists of installation of six (6) soil vapor monitoring points (SV- 01 to SV-06) in the yard and one co-located sub-slab soil vapor and indoor air monitoring point in the LIRR Engineering Support Building.

The Department has determined that the Scope of Work is acceptable and is hereby approved.

In accordance with the requirements of the Voluntary Cleanup Agreement, the approved Interim RIR and Proposed Scope of Work, which constitute a modification to the previously approved Remedial Investigation Work Plan (RIWP), must be placed by the Volunteer in all publicly accessible repositories for the project within 5 business days. A certification that this documents have been placed in project repositories, and that the repositories are complete with all project documents, must be submitted to the NYSDEC project manager.

The Volunteer and its contractors are solely responsible for safe execution of all invasive and other field work performed under the modified RIWP. The Volunteer and its contractors must obtain all local, state, and/or federal permits or approvals that may be required to perform work under the modified RIWP. Further, the Volunteer and its contractors are solely responsible for the identification of utilities that might be affected by work under this RIWP and, implementation of all required, appropriate, or necessary health and safety measures during performance of work under the modified RIWP.

According to the revised schedule you submitted via email on July 19, the field work to implement this modified RIWP could begin as early as August 16. Please notify me immediately if this schedule has changed. Please note that the Department requires at least 5 business day notice prior to implementing field work.

If you have any questions, please call me at (718) 482-4065 or email me at ioana.munteanu-ramnic@dec.ny.gov.

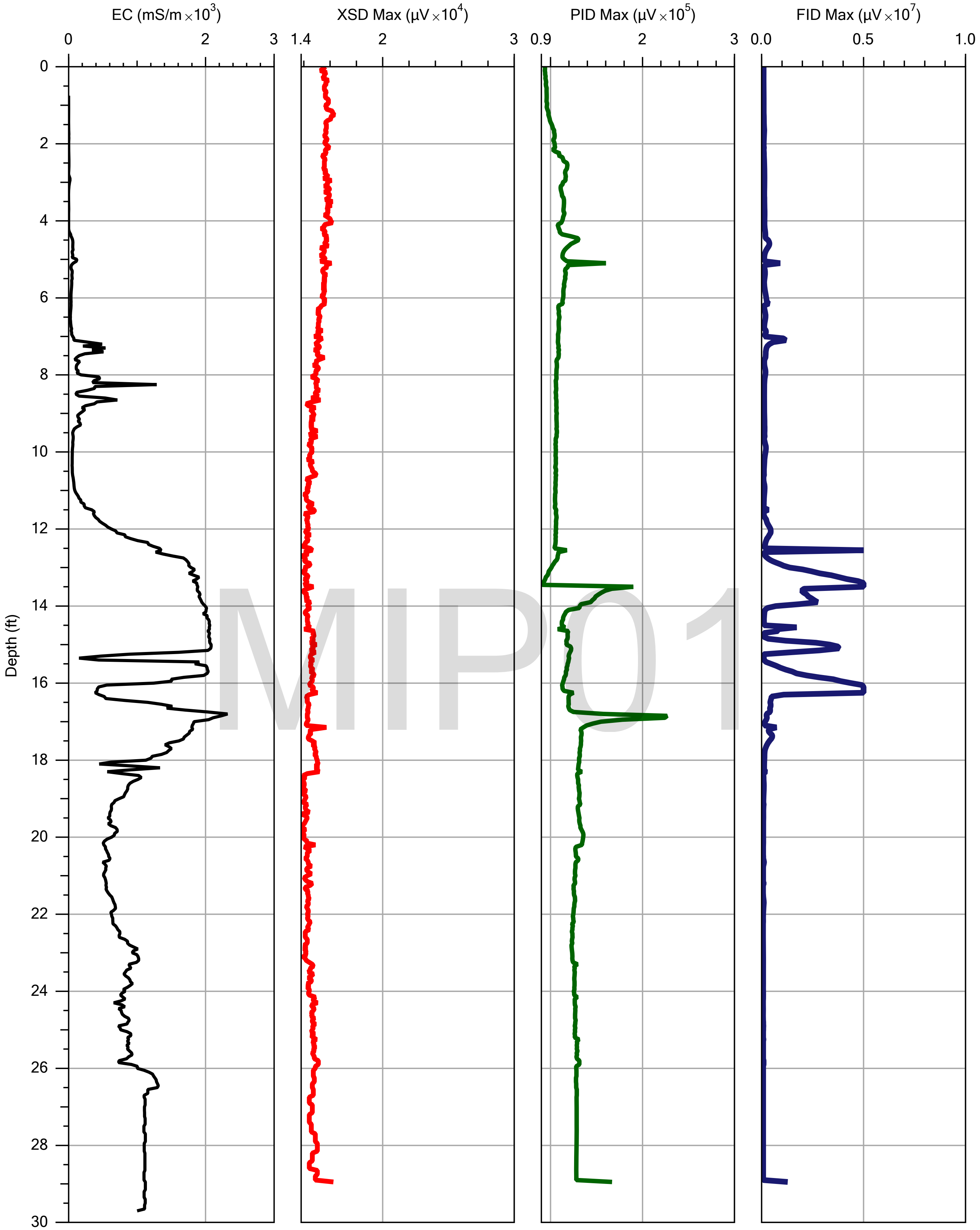
Sincerely,

Ioana Munteanu-Ramnic, P.E.
Environmental Engineer II

ec: J. O'Connell – NYSDEC
B. Boyd – NYSDOH
K. Green – LIRR
T. Fox, A. Caniano – D&B Engineers

APPENDIX B

MEMBRANE INTERFACE PROBE LOGS



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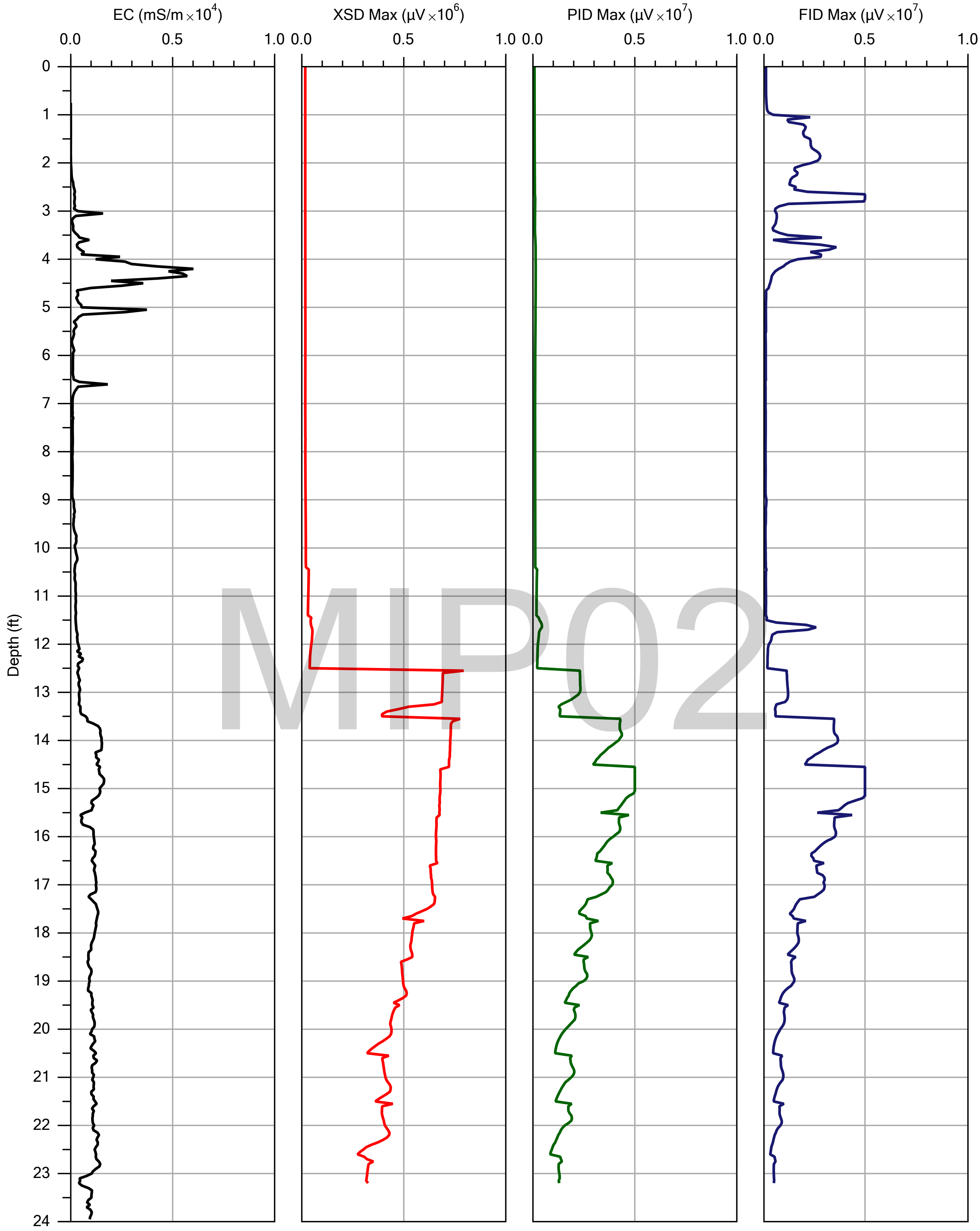
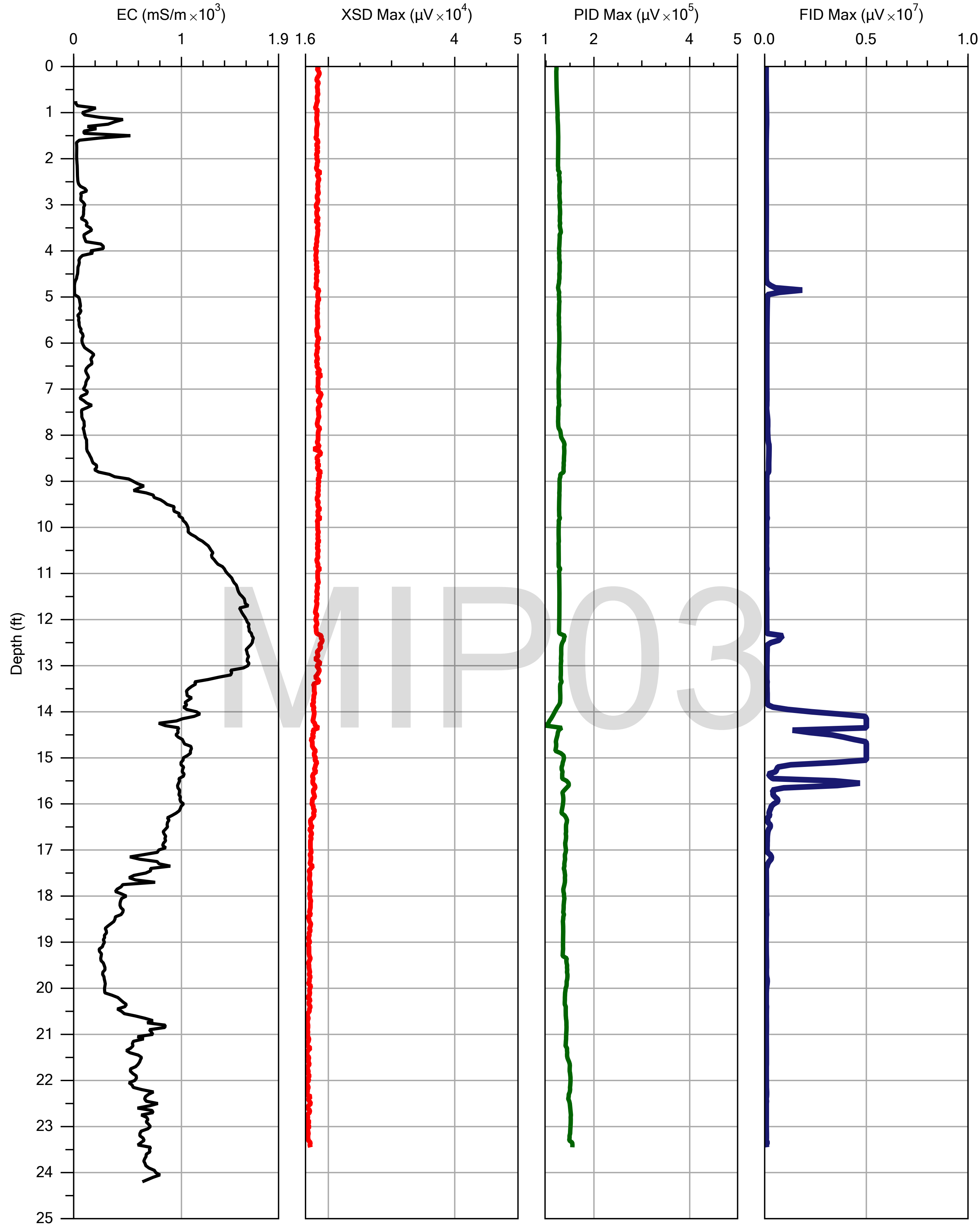
Company: ZTS	Operator: Mike Ryan	Date: 10/9/2015
Project ID: LIRR Arch Street Yard	Client: D&B Engineers and Architects	Location:

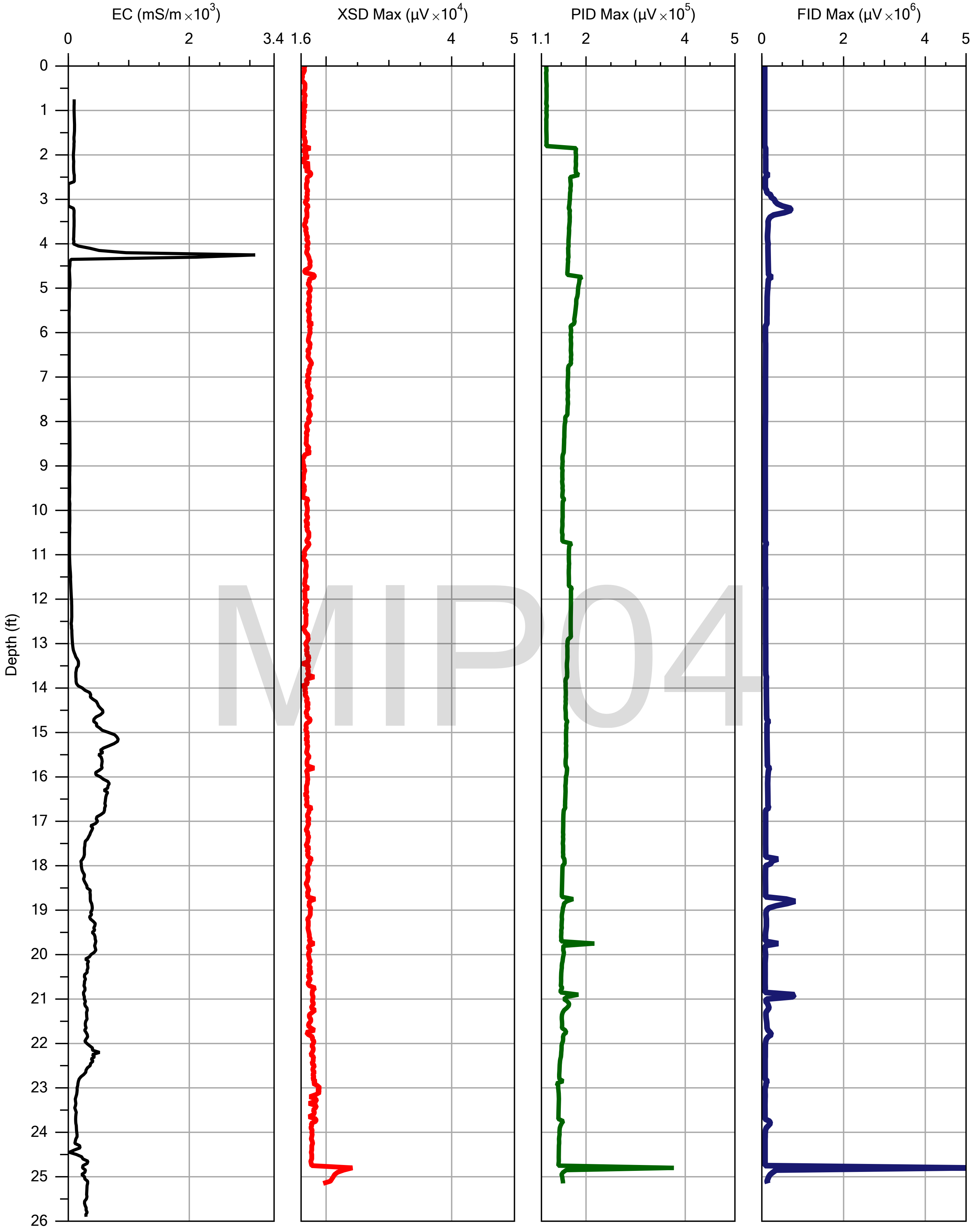


ZEBRA

		File: MIP2.MIP
Company: ZTS	Operator: MR	Date: 10/7/2015
Project ID: LIRR Arch Street Yard	Client: D&B Engineers and Architects,	Location:



		File: MIP3.MIP
Company: ZTS	Operator: Mike Ryan	Date: 10/9/2015
Project ID: LIRR Arch Street Yard	Client: D&B Engineers and Architects	Location:



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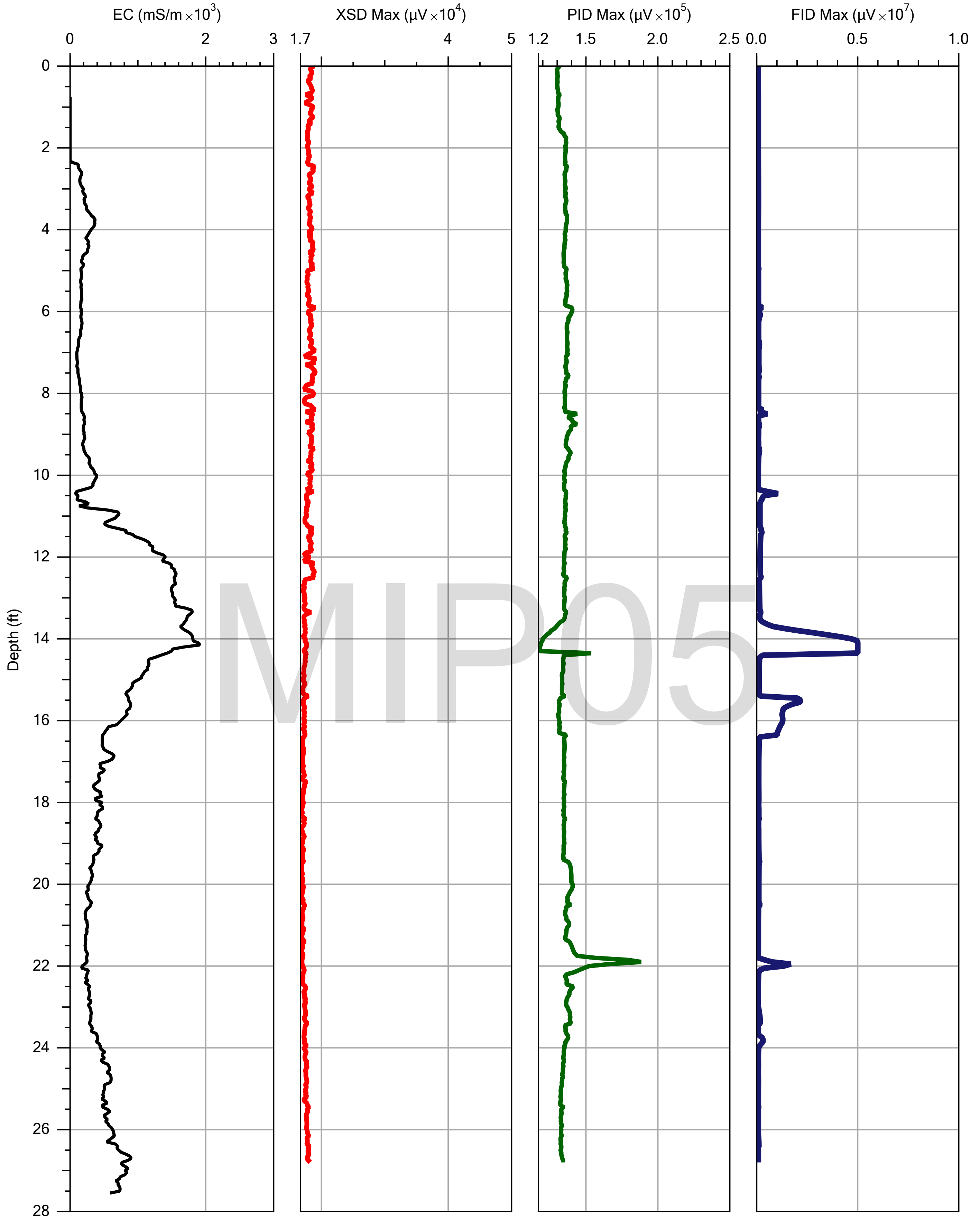
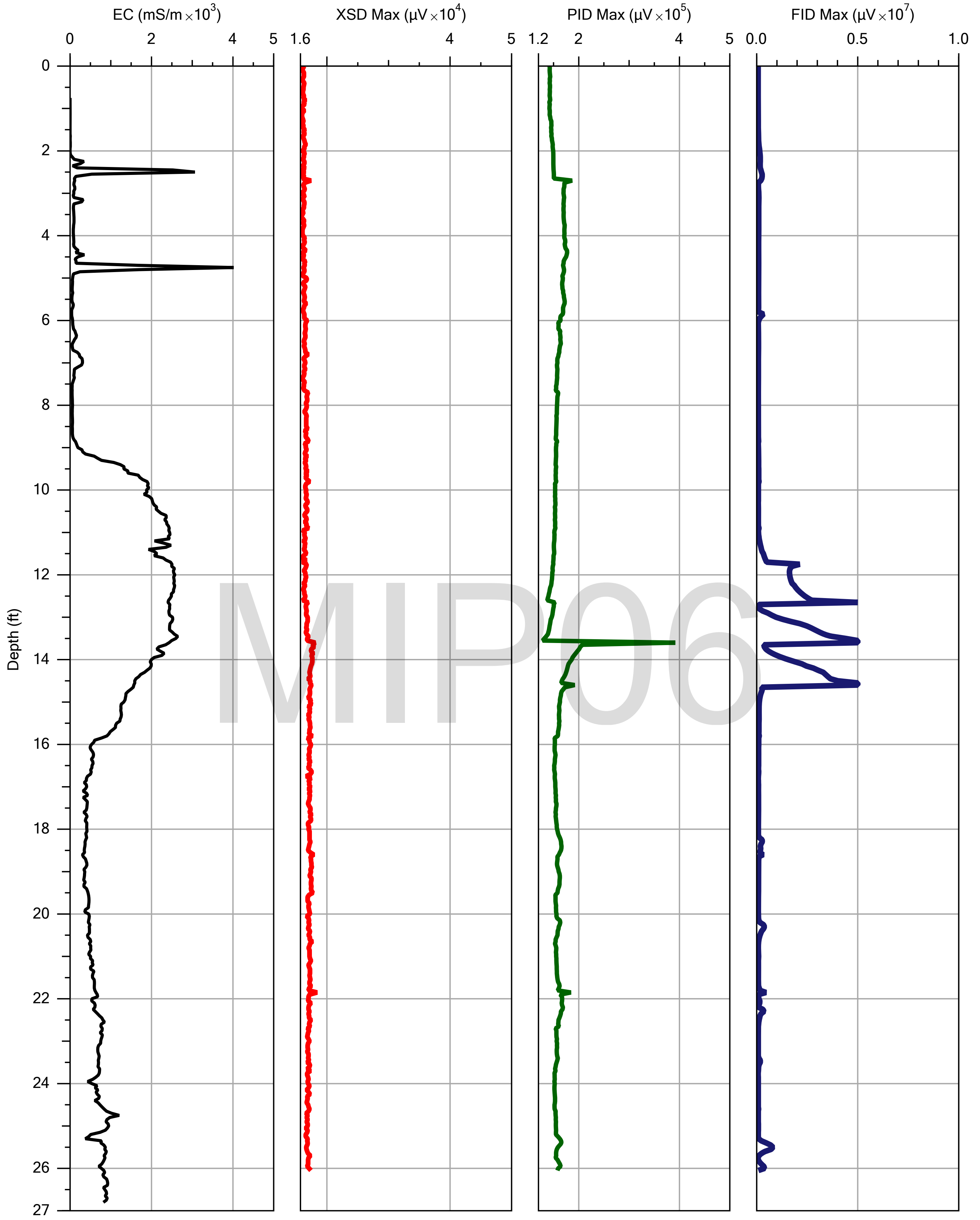
Company: ZTS	Operator: Mike Ryan	Date: 10/9/2015
Project ID: LIRR Arch Street Yard	Client: D&B Engineers and Architects	Location:



		File: MIP5.MIP
Company: ZTS	Operator: Mike Ryan	Date: 10/9/2015
Project ID: LIRR Arch Street Yard	Client: D&B Engineers and Architects	Location:

ZEBRA Technical Services - Subsurface Sampling, Injections and Data Collection for Environmental Professionals Since 1992.



File: MIP6.MIP

Company: ZTS

Operator: Mike Ryan

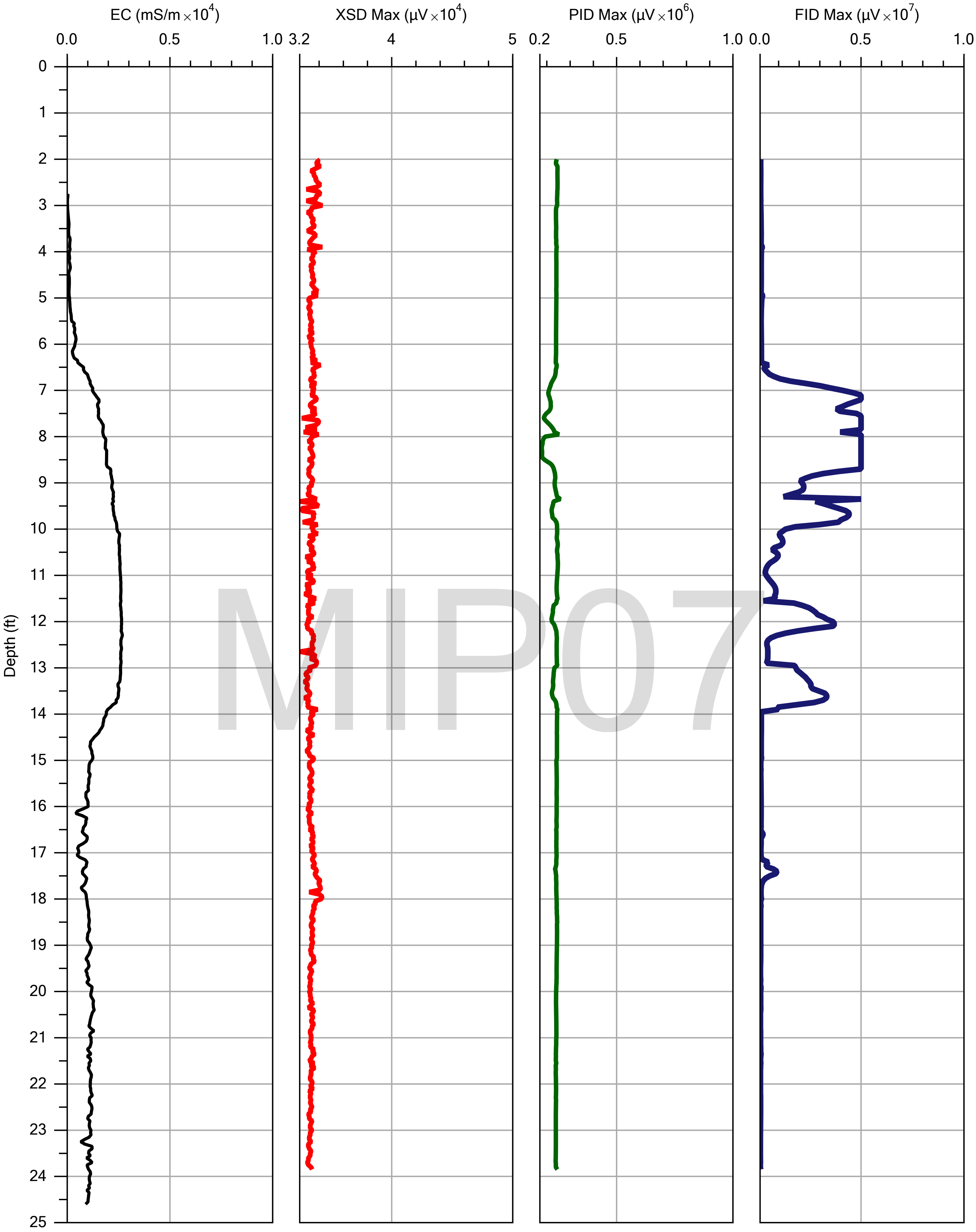
Date: 10/9/2015

Project ID: LIRR Arch Street Yard

Client: D&B Engineers and Architects

Location:

ZEBRA Technical Services - Subsurface Sampling, Injections and Data Collection for Environmental Professionals Since 1992.



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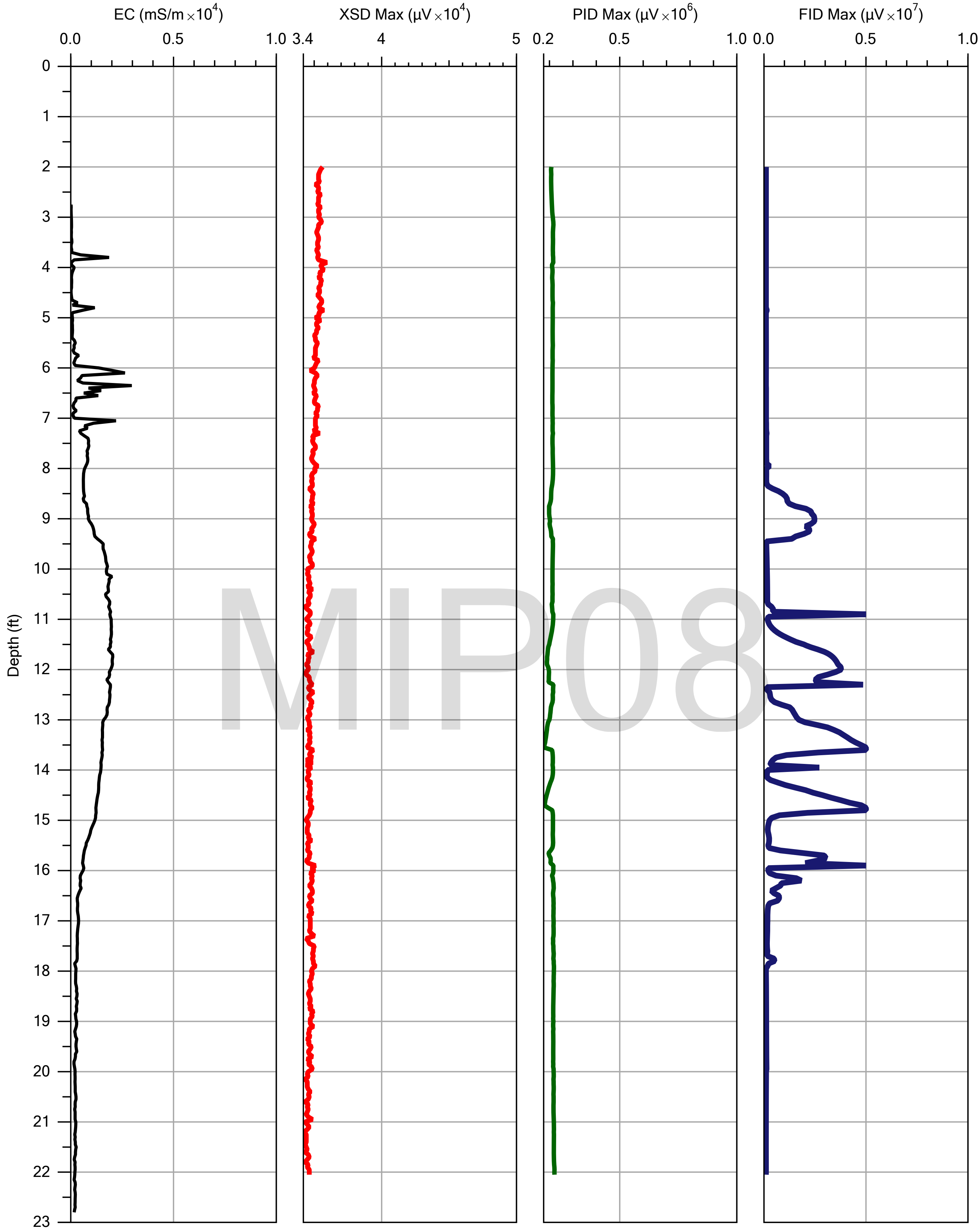
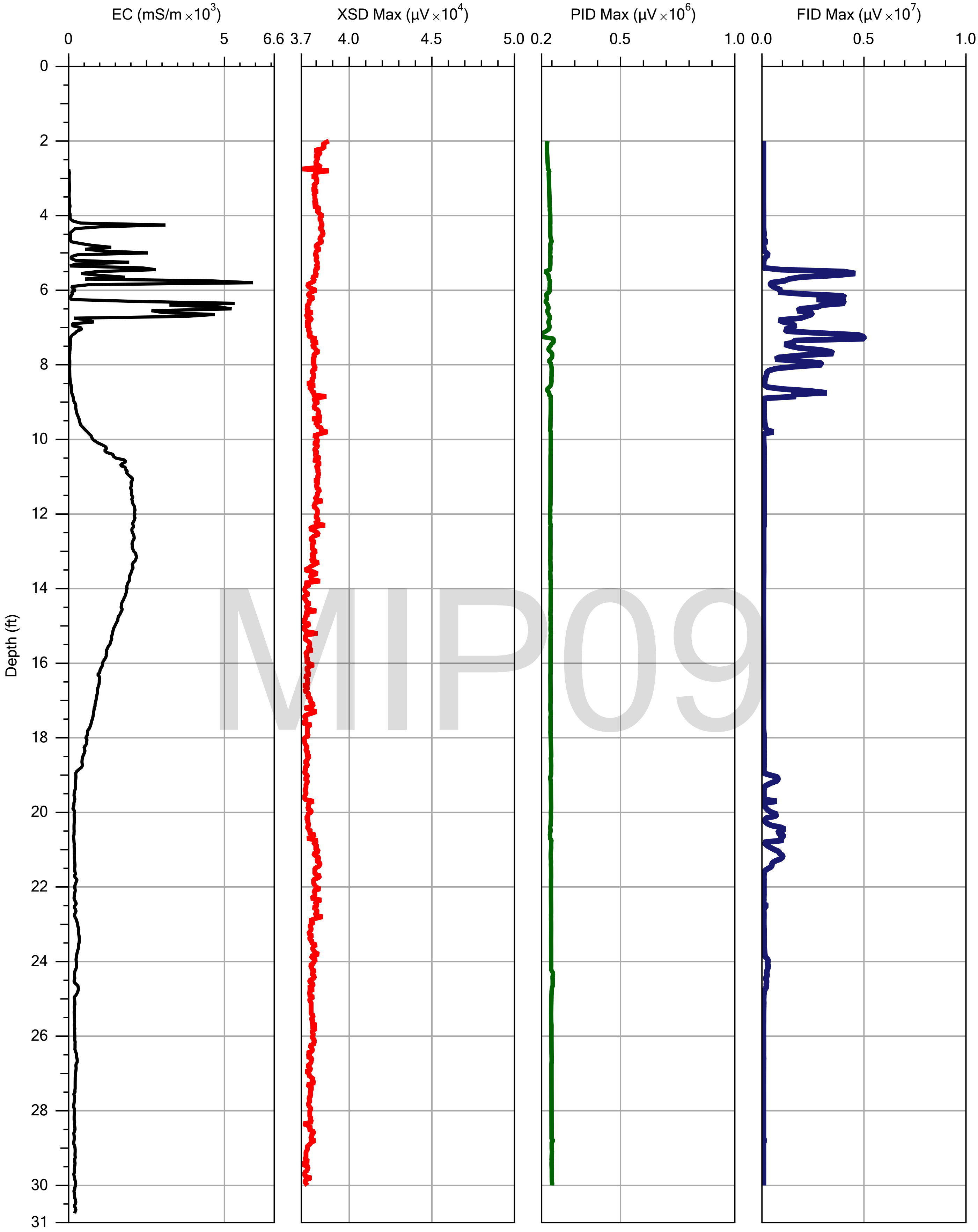
Company: ZTS	Operator: MR	Date: 10/29/2015
Project ID: LIRR Arch Street Yard	Client: D&B Engineers and Architects,	Location:

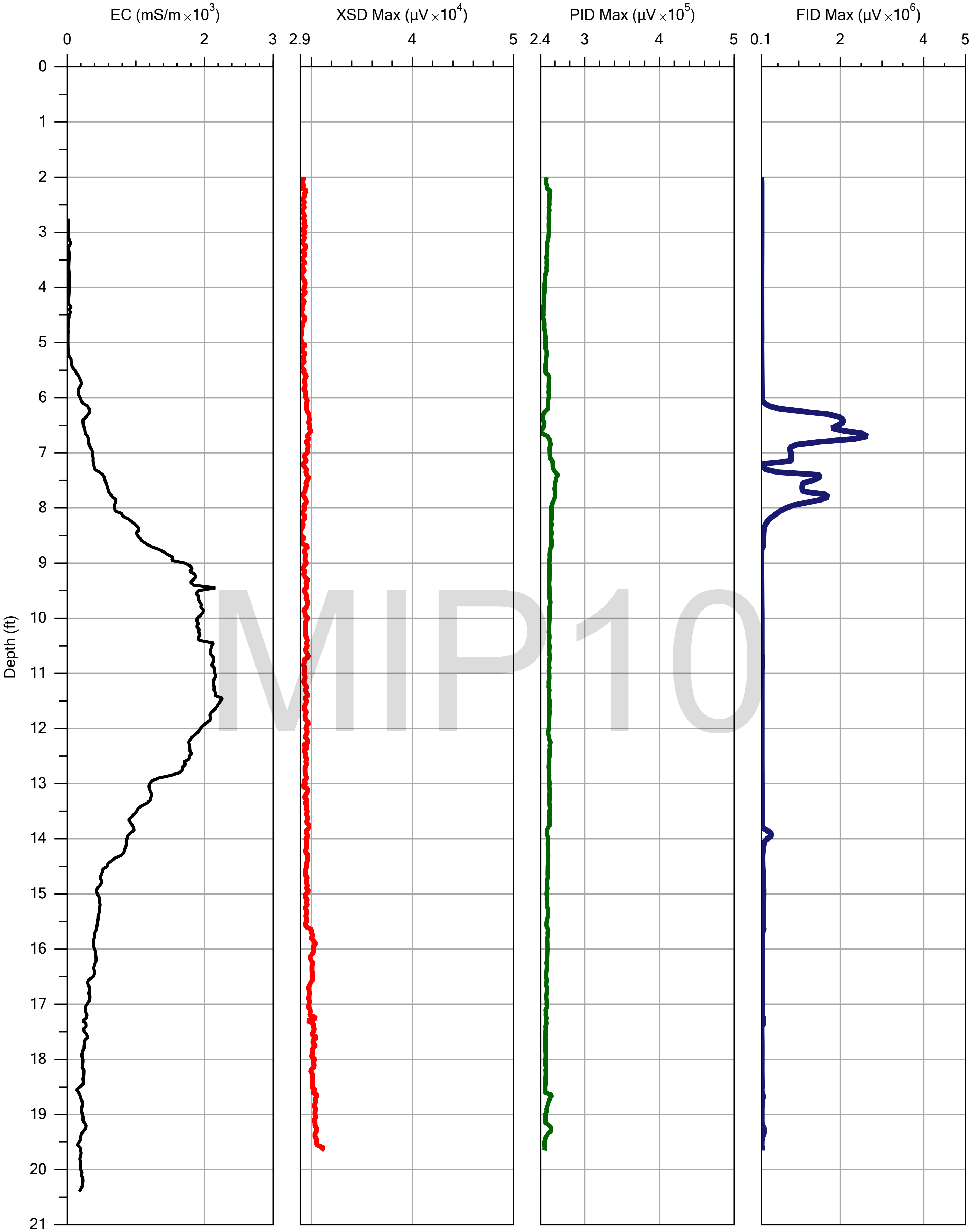


ZEBRA

		File: MIP 8.MIP
Company: ZTS	Operator: MR	Date: 10/29/2015
Project ID: LIRR Arch Street Yard	Client: D&B Engineers and Architects,	Location:

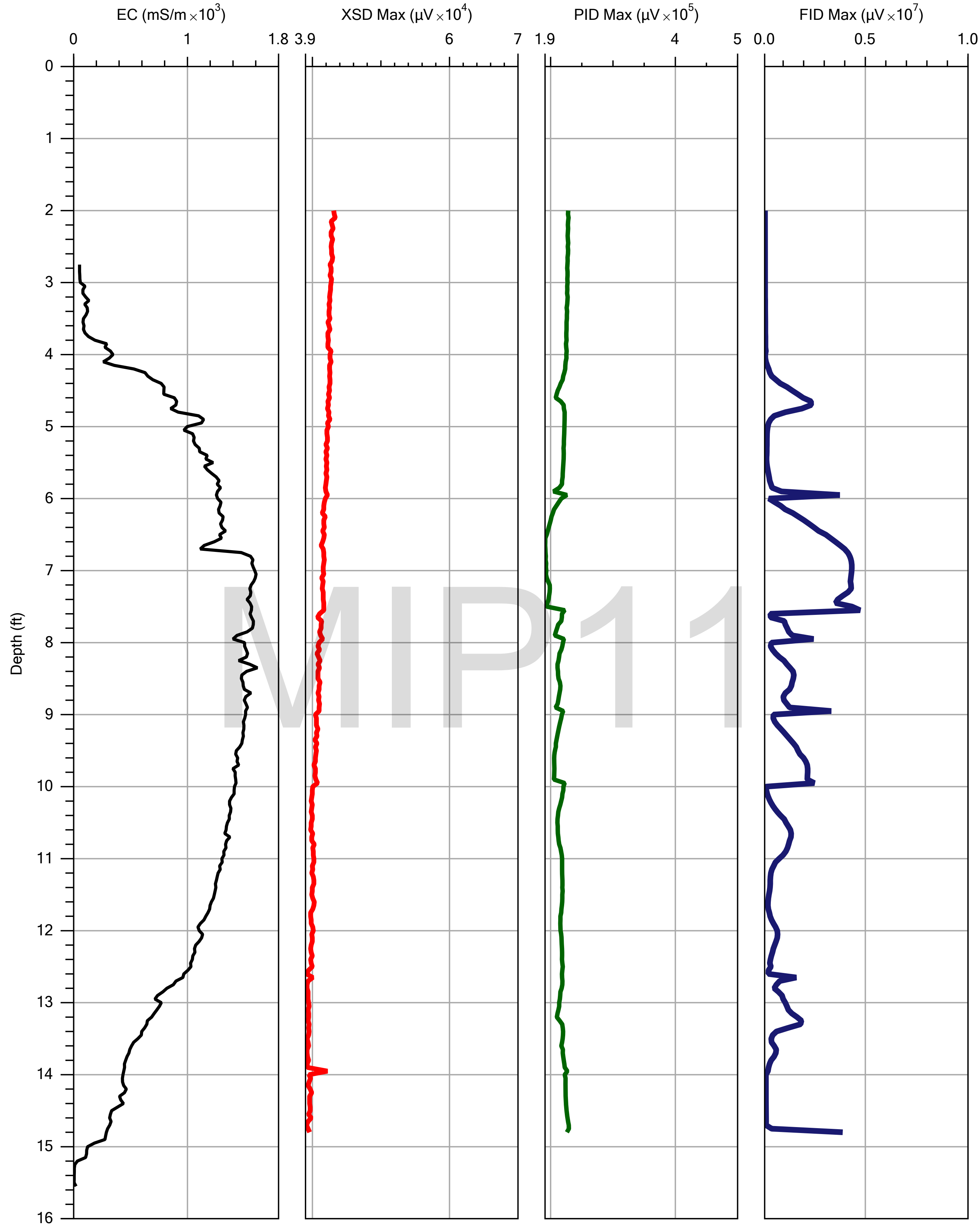


File: MIP-9.MIP
Company: ZTS
Operator: MR
Date: 10/29/2015
Project ID: LIRR Arch Street Yard
Client: D&B Engineers and Architects,
Location:



		File: MIP-10.MIP
Company: ZTS	Operator: MR	Date: 10/29/2015
Project ID: LIRR Arch Street Yard	Client: D&B Engineers and Architects,	Location:

ZEBRA Technical Services - Subsurface Sampling, Injections and Data Collection for Environmental Professionals Since 1992.



		File: MIP-11.MIP
Company: ZTS	Operator: MR	Date: 10/29/2015
Project ID: LIRR Arch Street Yard	Client: D&B Engineers and Architects,	Location:

APPENDIX C

BORING LOGS

D&B ENGINEERS AND ARCHITECTS, P.C.

Project No.: 3455-2
Project Name: LIRR – Arch Street Yard RI

Boring No.: VB-01
Sheet 1 **of** 1
By: Carl Schmidlapp

Drilling Contractor: Zebra
Drill Rig: Geoprobe 6620DT
Date Started: 10/30/15

Geologist: Carl Schmidlapp
Drilling Method: Macrocore
Drive Hammer Weight: N/A
Date Completed: 10/30/15

Boring Completion Depth: 27’
Ground Surface Elevation: ---
Boring Diameter: 2”

Depth (ft.)	**No.**	**Type**	**Rec.**	**PID Per 6" (ppm)**	**Sample Description**
0’-5’	1	HA	60”	0.0	0-3”: Bluestone
				0.7	3”-60”: Dark brown, fine-medium SAND, some fine to medium subangular gravel, trace silt, concrete, medium dense, moist, no odor, no staining.
5’-10’	2	MC	38”	0.0 0.0	0-11”: Dark brown to black, fine to medium SAND, trace subrounded gravel, moist, no odor, no staining.
				62	11”-24”: Brown to light brown, medium to fine SAND, trace silt, wet, no odor, no staining.
				64	24”-38”: Brown to dark brown, medium to fine SAND, trace silt, wet, no odor, no staining.
10’-15’	3	MC	57”	10 0.0	0-7”: Black, fine SAND, trace subangular gravel, no odor, slight staining.
				0.0	7”-24”: Dark brown to black, fine SAND, trace subangular gravel, wet, no odor, no staining.
				150 250	24”-36”: Black/gray, fine SAND, trace clay, moist, hydrocarbon-like odor, no staining.
				40	36”-47”: Gray, CLAY, slightly plastic, trace organics(shells), moist, no odor, no staining.
				0.0	47”-57”: Gray, CLAY, dense, trace organics (shells), dense, moist, no odor, no staining.
15’-20’	4	MC	29”	0.0 0.0	0-12”: Brown, fine SAND, trace SILT, trace fine subangular gravel, wet, loose, no odor, no staining.
				18	12”-24”: Gray, CLAY, slightly plastic, dry, no odor, no staining.
				12.5	24”-29”: Gray to black, CLAY, dense to slightly plastic, dry, no odor, no staining.
20’-25’	5	MC	28”	0.0 0.0	0-13”: Green to brown, fine to medium SAND, trace medium to coarse gravel, dense, dry, no odor, no staining.
				0.0 0.0	13”-28”: Green to brown, medium to coarse SAND, trace medium to coarse gravel, dense, moist, no odor, no staining.
25’-30	6	MC	24”	0.0 0.0	0-24”: Brown to gray, fine to medium SAND, trace fine to medium subangular gravel, poorly sorted, moist, no odor, no staining.

Sample Types:
HA = Hand Auger
MC = Macrocore

NOTES: Refusal encountered at 27’
Soil sample VB-01 (13-15’) and groundwater samples VB-01 (15-16’) and VB-01 (26-27’) collected for VOC analysis.

D&B ENGINEERS AND ARCHITECTS, P.C.	**Project No.:** 3455-2 **Project Name:** LIRR – Arch Street Yard RI	**Boring No.:** VB-02 **Sheet** 1 **of** 1 **By:** Carl Schmidlapp
Drilling Contractor: Zebra **Drill Rig:** Geoprobe 6620DT **Date Started:** 10/30/15	**Geologist:** Carl Schmidlapp **Drilling Method:** Macrocore **Drive Hammer Weight:** N/A **Date Completed:** 10/30/15	**Boring Completion Depth:** 26.5’ **Ground Surface Elevation:** --- **Boring Diameter:** 2”

Depth (ft.)	**No.**	**Type**	**Rec.**	**PID Per 6" (ppm)**	**Sample Description**
0’-5’	1	HA	60”	0.0	0-36”: Bluestone
				0.0, 0.0 0.0, 0.0	36”-60”: Dark brown, fine to medium SAND, trace concrete, trace silt, dense, poorly sorted, moist, no odor, no staining.
5’-10’	2	MC	28”	0.0	0-5”: Black-dark brown, medium to coarse SAND, some medium to coarse subangular gravel, moist, no odor, no staining.
				0.0 0.0	5”-19”: Black-brown, medium to fine SAND, trace medium to coarse gravel, loose, moist, no odor, no staining.
				0.0	19”-23”: Black-brown, medium to fine SAND, dense, moist, no odor, no staining.
				0.0	23”-28”: Gray, fine to medium SAND, trace SILT, loose, dry, no odor, no staining.
10’-15’	3	MC	32”	0.0, 0.0 0.0, 0.0	0”-22”: Gray, CLAY, trace organics and peat, slightly plastic, moist, organic odor, no staining.
				0.0 0.0	22”-32”: Gray-brown, CLAY, some peat and organics, slightly dense, organic odor, no staining.
15’-20’	4	MC	41”	0.0	0-9”: Dark gray, medium to fine SAND, trace silt, trace subangular medium-fine gravel, moist, no odor, no staining.
				0.0, 0.0 0.0	9”-27” Gray, CLAY, some peat and organics, plastic, loose, no odor, no staining.
				0.0 0.0	27”-36”: Gray, medium to coarse SAND, some medium to coarse subangular gravel, rock fragments 34”-36”, poorly sorted, dense, no odor, no staining.
				0.0	36”-41”: Brown-green, medium to coarse SAND, some large rock fragments, dense, poorly sorted, dry, no odor, no staining.
20’-25’	5	MC	42”	0.0, 0.0 0.0, 0.0	0-22”: Green-brown, medium to fine SAND, trace subrounded gravel, dense, well sorted, dry, no odor, no staining.
				0.0	22”-26”: Brown-dark brown/green, medium to fine SAND, poorly sorted, dry, no odor, no staining.
				0.0 0.0	26”-42”: Green to brown, fine to medium SAND, trace subangular gravel, trace rock fragments, well sorted, dense, dry, no odor, no staining.
25’-30’	6	MC	0”	N/A	No Recovery

Sample Types: **HA** = Hand Auger **MC** = Macrocore	**NOTES:** Refusal encountered at 26.5’. Soil sample VB-02 (12-14’) and groundwater samples VB-02 (5’) and VB-02 (12-14’) collected for VOC analysis.

D&B ENGINEERS AND ARCHITECTS, P.C.

Project No.: 3455-2D
Project Name: LIRR – Arch Street

Boring No.: SB-01
Sheet _1_ **of** _1_
By: Keith Robins

Drilling Contractor: AARCO
Drill Rig: Geoprobe 7822DT
Date Started: 3/15/16

Geologist: Keith Robins
Drilling Method: Macrocore
Drive Hammer Weight: N/A
Date Completed: 3/16/16

Boring Completion Depth: 25‘
Ground Surface Elevation: 7.48’
Boring Diameter: 2”

Depth (ft.)	No.	Type	Rec.	PID Per 6" (ppm)	Sample Description
0’-6”	1	HA	6”	0.0	Bluestone.
6”-1’	2	HA	12”	0.0	Same as above.
1’-2’	3	HA	12”	0.0	Dark gray-brown, medium to coarse SAND and STONE and GRAVEL, trace brick, concrete and wood, dense.
2’-2.5’	4	HA	6”	0.0	Bluestone and felt barrier fabric.
2.5’-3’	5	HA	6”	0.1	Black, silty SAND, organic odor, water encountered at 3’ bgs.
3’-5’	6	MC	16”	0.0	Black, fine to medium SAND, some silt, fine to medium gravel, trace slag, fabric, rock fragments, poorly sorted, loose, wet, no staining, organic odor.
5’-10’	7	MC	30”	0.1 0.1	0”-19”: Black-dark gray, silty SAND, little fine gravel, poorly sorted, loose, wet, no staining, no odor. 19”-30”: Gray-brown, clayey SILT, firm-soft, wet-moist, no staining, organic odor.
10’-15’	8	MC	36”	0.0 0.0	0”-29”: Dark gray, CLAY, trace organic material, slightly plastic-firm, moist, no staining, trace organic odor. 29”-36”: Dark brown-gray, CLAY, some organic material, soft, damp, no staining, organic odor.
15’-20’	9	MC	38”	0.0 0.0 0.0	0”-19”: Gray-silver, silty CLAY, slightly plastic firm, moist. 19”-28”: Gray, fine silty SAND, wet. 28”-38”: Olive-brown, clayey SILT, trace fine sand, fine subrounded gravel, dense, no staining, no odor.
20’-25’	10	MC	34”	0.0 0.0	0”-24”: Olive green-brown, fine to medium SAND, some silt, trace fine subrounded gravel, poorly sorted, medium dense, wet, no staining, no odor. 24”-34”: Gray-light gray, fine SAND, trace silt, well sorted, wet, no staining, no odor.

Sample Types:
HA = Hand Auger
MC = Macrocore

NOTES:
Soil samples from 13’-15’ and 23’-25’ submitted for TCL VOC and TCL SVOC analysis.

D&B ENGINEERS AND ARCHITECTS, P.C.	**Project No.:** 3455-2D **Project Name:** LIRR – Arch Street	**Boring No.:** SB-02 **Sheet** 1 **of** 1 **By:** Keith Robins
Drilling Contractor: AARCO **Drill Rig:** Geoprobe 7822DT **Date Started:** 3/14/16	**Geologist:** Keith Robins **Drilling Method:** Macrocore **Drive Hammer Weight:** N/A **Date Completed:** 3/17/16	**Boring Completion Depth:** 25‘ **Ground Surface Elevation:** 8.60’ **Boring Diameter:** 2”

Depth (ft.)	**No.**	**Type**	**Rec.**	**PID Per 6" (ppm)**	**Sample Description**
0’-1’	1	HA	12”	0.0	Bluestone.
1’-2’	2	HA	12”	0.0	Gravel, brick, stone, cobbles, no odor, no staining.
2’-3’	3	HA	12”	0.0	Dark gray, fine to medium SAND, some brick, stone, cobbles, dense gravel, no staining, no odor. Water encountered at 3’ bgs.
3’-5’	4	MC	24”	0.0 0.0	0”-6”: CONCRETE. 6”-24”: Black, fine to medium SAND, some rock, stones, trace silt, fine gravel, trace yellow brick, slag and coal, poorly sorted, loose, wet, no staining, no odor.
5’-10’	5	MC	46”	0.0 0.0 0.0	0”-12”: Black-brown, ASH, COAL, and Cinders, poorly sorted, loose, wet, no staining, no odor. 12”-22”: Olive-gray, fine to medium SAND, some rock, trace fine gravel, stones, poorly sorted, wet, no staining, no odor. 22”-46”: Olive-brown, fine to very fine SAND, little silt, trace fine gravel, well sorted, moist, no staining, no odor.
10’-15’	6	MC	44”	0.0 0.0 0.0	0”-10”: Olive-brown, fine to medium SAND, trace silt, fine subrounded gravel and stone, well sorted, wet, no staining, no odor. 10”-18”: Olive-brown, medium to coarse SAND, trace subrounded gravel, poorly sorted, loose, wet, no staining, no odor. 18”-44”: Gray, CLAY, some organic matter, trace shells, soft, damp-moist, no staining, organic odor.
15’-20’	7	MC	36”	0.0 0.0 0.0 0.0	0”-8”: Brown, CLAY, trace sand, soft, moist, no staining, no odor. 8”-22”: Gray, CLAY, trace fine gravel, dense-firm, damp, no staining, no odor. 22”-27”: Brown-light red, fine SAND, well sorted, wet, no staining, no odor. 27”-36”: Olive-brown, SILT, trace clay, dense, damp.
20’-25’	8	MC	36”	0.0 0.0	0”-24”’: Brown-olive, silty fine SAND, trace fine gravel, poorly sorted, dense, moist, no staining, no odor. 24”-36”: Gray, fine to medium SAND, some silt, trace clay, subrounded gravel, rock, poorly sorted, wet, no staining, no odor.

Sample Types: **HA** = Hand Auger **MC** = Macrocore	**NOTES:** Soil samples from 13’-15’ and 23’-25’ submitted for TCL VOC and TCL SVOC analysis.

D&B ENGINEERS AND ARCHITECTS, P.C.

Project No.: 3455-2D
Project Name: LIRR – Arch Street

Boring No.: SB-03
Sheet 1 **of** 1
By: Keith Robins

Drilling Contractor: AARCO
Drill Rig: Geoprobe 7822DT
Date Started: 3/14/16

Geologist: Keith Robins
Drilling Method: Macrocore
Drive Hammer Weight: N/A
Date Completed: 3/17/16

Boring Completion Depth: 25‘
Ground Surface Elevation: 8.72’
Boring Diameter: 2”

Depth (ft.)	No.	Type	Rec.	PID Per 6" (ppm)	Sample Description
0’-6”	1	HA	6”	0.0	Bluestone.
6”-2’	2	HA	1.5”	0.0	Dark gray, fine SAND, some stone, gravel, dense, no staining, no odor.
2’-5’	3	MC	25”	0.0	0”-16”: Brown, medium to coarse SAND, some fine gravel, cinders, concrete, poorly sorted, loose, wet at 3’ bgs, no staining, no odor.
				0.0	16”-25”: Black, fine to medium SAND, some cinders, slag, angular gravel, trace ash, poorly sorted, loose, wet, no staining, no odor.
5’-10’	4	MC	36”	0.0	0”-18”: Black, medium to coarse SAND and angular GRAVEL, trace angular rock, brick, poorly sorted, very loose, wet, no staining, no odor.
				0.0	18”-21”: Black, fine silty SAND, some gravel, wet.
				0.0	21”-27”: Wood.
				0.0	27”-36”: Black-gray brown, fine to very fine SAND, trace silt, trace wood, wet, no staining, no odor.
10’-15’	5	MC	36”	0.0	0”-10”: Black, coarse SAND and GRAVEL, loose, wet.
				0.0	10”-36”: Brown, fine to very fine silty SAND, well sorted, loose, wet, no staining, no odor.
15’-20’	6	MC	39”	0.0	0”-14”: Dark gray, CLAY, trace shells, soft, moist, no staining, organic odor.
				0.0	14”-27”: Gray-light gray, SILT, trace clay, dense, damp, no staining, no odor.
				0.0	27”-39”: Brown-olive, SILT, some fine sand, trace fine gravel, damp, dense, no staining, no odor.
20’-25’	7	MC	36”	0.0	0”-13”: Brown, fine to medium SAND, trace silt, subrounded gravel, poorly sorted, medium dense, wet, no staining, no odor.
				0.0	13”-25”: Olive-brown, very fine to fine SAND, trace silt, well sorted, moist, no staining, no odor.
				0.0	25”-36”: Gray-brown, silty fine SAND, trace subrounded gravel, dense, moist, no staining, no odor.

Sample Types:
HA = Hand Auger
MC = Macrocore

NOTES:
Soil samples from 12’-14’ and 18’-20’ submitted for TCL VOC and TCL SVOC analysis. Soil sample from 12’-14’ also submitted for analysis of TAL metals, TCL Pesticides and PCBs.

D&B ENGINEERS AND ARCHITECTS, P.C.

Project No.: 3455-2D
Project Name: LIRR – Arch Street

Boring No.: SB-04
Sheet 1 **of** 1
By: Keith Robins

Drilling Contractor: AARCO
Drill Rig: Geoprobe 7822DT
Date Started: 3/14/16

Geologist: Keith Robins
Drilling Method: Macrocore
Drive Hammer Weight: N/A
Date Completed: 3/16/16

Boring Completion Depth: 29‘
Ground Surface Elevation: 7.46’
Boring Diameter: 2”

Depth (ft.)	No.	Type	Rec.	PID Per 6" (ppm)	Sample Description
0’-6”	1	HA	6”	0.0	Bluestone.
6”-1’	2	HA	6”	0.0	Brown, medium to coarse SAND, some gravel, organic matter, trace silt, dry, no odor.
1’-2’	3	HA	12”	0.0	Gray-light black, medium to coarse SAND and GRAVEL, trace cobbles, stone, brick and concrete, very dense, no odor, no staining.
2’-3’	4	HA	12”	0.0	Black, SAND, ROCK and GRAVEL, dense, organic odor, water encountered at 3’ bgs.
3’-5’	5	MC	5”	7.8	Black-dark gray, medium to coarse SAND, some fine to coarse gravel, trace silt, trace stone, concrete and rubber, poorly sorted, loose, wet, no staining, very slight sheen on water, petroleum odor.
5’-10’	6	MC	8”	2.3	Black, medium to coarse SAND and subangular GRAVEL, crushed ROCK, trace wood, poorly sorted, loose, wet, no staining, slight petroleum odor.
10’-15’	7	MC	42”	0.0 0.0	0”-33”: Dark gray, CLAY, trace organic matter, trace shells, soft, slightly plastic, damp-moist, no staining, organic odor. 33”-42”: Dark gray-brown, silty CLAY, some organic matter, firm-dense, slightly plastic, no staining, organic odor, moist-wet.
15’-20’	8	MC	40”	0.0 0.0	0”-21”: Gray, clayey SILT, trace fine gravel, organic matter, firm-dense, damp-moist, no staining, no odor. 21”-40”: Olive-brown, fine to medium SAND, some silt, subrounded gravel, trace rock, muscovite flakes, poorly sorted, dense-moist, no staining, no odor.
20’-25’	9	MC	6”	0.0	Olive-brown, fine to medium SAND, some silt, subrounded gravel, trace rock, poorly sorted, dense, damp-moist, no staining, no odor. Note large stone stuck in tip of soil sampler.
25’-29’	10	MC	23”	0.0	Gray, fine to medium SAND, trace silt, fine gravel and rock fragments, shale/slate, poorly sorted, loose, wet, no staining, no odor. Encountered refusal at 29’.

Sample Types:
HA = Hand Auger
MC = Macrocore

NOTES:
Soil samples from 3’-5’, 10’-12’ and 27’-29’ submitted for TCL VOC and TCL SVOC analysis. Soil sample from 3’-5’ also submitted for analysis of TAL Metals, TCL Pesticides and PCBs.

D&B ENGINEERS AND ARCHITECTS, P.C.

Project No.: 3455-2D
Project Name: LIRR – Arch Street

Boring No.: SB-05
Sheet 1 **of** 1
By: Keith Robins

Drilling Contractor: AARCO
Drill Rig: Geoprobe 7822DT
Date Started: 3/14/16

Geologist: Keith Robins
Drilling Method: Macrocore
Drive Hammer Weight: N/A
Date Completed: 3/16/16

Boring Completion Depth: 25‘
Ground Surface Elevation: 7.94’
Boring Diameter: 2”

Depth (ft.)	No.	Type	Rec.	PID Per 6" (ppm)	Sample Description
0’-6”	1	HA	6”	0.0	Bluestone.
6”-2’	2	HA	18”	0.0	Gray, medium to coarse SAND and GRAVEL, dense, no staining, no odor.
2’-3’	3	HA	12”	0.0	Dark gray, fine SAND and BRICK, some gravel, no staining, no odor. Water encountered at 3’ bgs.
3’-5’	4	MC	21”	0.0	Dark gray-black, medium to coarse SAND, some cinders, slag, brick, trace silt, brick, fine gravel, angular rock, poorly sorted, loose, wet, no staining, no odor.
5’-10’	5	MC	45”	0.0 0.0	0”-18”: Black-dark gray, fine to medium SAND, some silt, trace fine gravel, poorly sorted, loose, wet, no staining, organic odor. 18”-45”’: Gray-olive, silty fine SAND, well sorted, wet, no staining, organic odor.
10’-15’	6	MC	47”	250 0.0 0.0	0”-12”: Black-dark gray, fine to medium SAND, trace silt, fine gravel, poorly sorted, loose, wet, no staining, trace solvent odor. 12”-42”: Gray, CLAY, soft-plastic, damp-moist, no staining, trace organic matter. 42”-47”: Dark gray-brown, CLAY, soft-slightly plastic, some organic matter, dry-damp, no staining.
15’-20’	7	MC	42”	0.0 0.0 0.0	0”-12”: Light gray, CLAY, trace organic matter, dense, moist, no staining, no odor. 12”-24”: Gray-dark gray, silty SAND, wet, no staining, no odor. 24”-42”: Olive-brown, fine to medium SAND, some silt, subrounded gravel, trace clay, poorly sorted, dense, no odor, no staining.
20’-25’	8	MC	44”	0.0 0.0 0.0	0”-20”: Brown-olive, CLAY, trace fine subrounded gravel, rock, dense, damp, no odor, no staining. 20”-32”: Olive-brown, silty SAND, some subrounded gravel, stones, poorly sorted, dense, moist, no staining, no odor. 32”-44”: Gray, fine SAND, trace silt, well sorted, wet, no staining, no odor.

Sample Types:
HA = Hand Auger
MC = Macrocore

NOTES: Soil samples from 10’-11’, 11’-13’ submitted for TCL VOC and TCL SVOC analysis. Soil sample from 10’-11’ also submitted for analysis of TAL metals, TCL Pesticides and PCBs.

D&B ENGINEERS AND ARCHITECTS, P.C.

Project No.: 3455-2D
Project Name: LIRR – Arch Street

Boring No.: SB-06
Sheet 1 **of** 1
By: Keith Robins

Drilling Contractor: AARCO
Drill Rig: Geoprobe 7822DT
Date Started: 3/14/16

Geologist: Keith Robins
Drilling Method: Macrocore
Drive Hammer Weight: N/A
Date Completed: 3/17/16

Boring Completion Depth: 25‘
Ground Surface Elevation: 9.23’
Boring Diameter: 2”

Depth (ft.)	**No.**	**Type**	**Rec.**	**PID Per 6" (ppm)**	**Sample Description**
0’-1”	1	HA	1”	0.0	Bluestone.
1”-3’	2	HA	35”	0.0	Dark gray, fine to medium SAND and BRICK, dense, no staining, no odor.
3’-5’	4	MC	13”	0.0	Black-brown, fine to coarse SAND and Stones, Concrete, Gravel, poorly sorted, loose, no staining, no odor. Water encountered at 4.5’ bgs.
5’-10’	5	MC	31”	0.0	0”-19”: Dark brown-black, medium to coarse SAND and CONCRETE, some rock, stone, gravel, trace brick, poorly sorted, loose, wet, no staining, no odor.
				25	19”-31”: Dark black, silty fine SAND, trace fine gravel, well sorted, wet, no staining, no odor.
10’-15’	6	MC	21”	5.0	0”-4”: Black, fine to coarse SAND, trace fine gravel, poorly sorted, wet, no staining, no odor.
				0.0	4”-16”: Dark brown, fine SAND, trace silt, fine gravel, well sorted, wet, no staining, no odor.
				0.0	16”-21”: Black-dark gray, fine SAND, trace silt, well sorted, wet, no staining, no odor.
15’-20’	7	MC	39”	0.0	0”-12”: Dark gray, CLAY, some organic matter and shells, soft, moist, no staining, trace organic odor.
				0.0	12”-31”: Light gray, SILT, trace clay, subrounded gravel, dense, moist, no staining, no odor.
				0.0	31”-39”: Reddish-brown, silty fine SAND, well sorted, medium dense, wet, no staining, no odor.
20’-25’	8	MC	45”	0.0	0”-18”: Olive-brown, CLAY and SILT, trace fine sand seams, dense, damp-moist, no staining, no odor.
				0.0	18”-34”: Olive-brown, fine to medium SAND, some silt, trace rock, fine subrounded gravel, poorly sorted, dense, moist, no staining, no door.
				0.0	34”-45”: Light gray-tan, fine SAND, some silt, trace clay, subrounded gravel, medium dense, damp-moist, no staining, no odor.

Sample Types:
HA = Hand Auger
MC = Macrocore

NOTES:
Soil samples from 8’-10’ and 11’-13’ submitted for TCL VOC and TCL SVOC analysis. Soil sample from 8’-10’ also submitted for analysis of TAL Metals, TCL Pesticides and PCBs.

D&B ENGINEERS AND ARCHITECTS, P.C.

Project No.: 3455-2D
Project Name: LIRR – Arch Street

Boring No.: SB-07
Sheet 1 **of** 1
By: Keith Robins

Drilling Contractor: AARCO
Drill Rig: Geoprobe 7822DT
Date Started: 3/14/16

Geologist: Keith Robins
Drilling Method: Macrocore
Drive Hammer Weight: N/A
Date Completed: 3/18/16

Boring Completion Depth: 25‘
Ground Surface Elevation: 8.10’
Boring Diameter: 2”

Depth (ft.)	No.	Type	Rec.	PID Per 6" (ppm)	Sample Description
0’-8”	1	HA	8”	0.0	Bluestone.
8”-20”	2	HA	12”	0.0	Gray-brown, medium to coarse SAND and GRAVEL, trace stone, poorly sorted, loose, moist.
20”-36”	3	HA	16”	0.0	Black-dark gray, SILT and SAND, some gravel, trace cobbles, trace metal, brick and slag, poorly sorted, loose, moist, no staining, no odor.
36”-42”	4	HA	6”	0.0	Gray-brown, SILT and SAND, some gravel, poorly sorted, loose, wet at 3.8’ bgs.
3.5’-5’	5	MC	7”	0.0	Bluestone/gravel, wet, loose, no staining, no odor.
5’-10’	6	MC	42”	0.3	Gray-brown, fine to medium SAND, trace fine gravel, trace clayey silt, organic matter, poorly sorted, loose, wet, no staining, no odor.
10’-15’	7	MC	36”	0.2 0.3	0”-8”: Gray-brown, fine to medium SAND, trace coarse sand and gravel, well sorted, loose, wet, no staining, no odor. 8”-36”: Dark gray, CLAY, some organic matter and shells, soft, damp, no staining, organic odor.
15’-20’	8	MC	34”	0.3 0.3	0”-22”: Gray, SILT, trace rock, dense, damp-moist. 22”-34”: Brown-olive, silty fine SAND, trace rock and gravel, poorly sorted, dense, moist, no staining, no odor.
20’-25’	9	MC	35”	0.0 0.0	0”-19”: Brown-olive, fine to medium SAND, some silt, trace rock, gravel, poorly sorted, dense, moist-wet, no staining, no odor. 19”-35”: Gray, fine to very fine SAND, trace fine gravel, well sorted, wet, no staining, no odor.

Sample Types:
HA = Hand Auger
MC = Macrocore

NOTES:
Soil samples from 12’-14’ and 23’-25’ submitted for TCL VOC and TCL SVOC analysis. Soil sample from 12’-14’ also submitted for TAL Metals, TCL Pesticides and PCB analysis.

D&B ENGINEERS AND ARCHITECTS, P.C.

Project No.: 3455-2D
Project Name: LIRR – Arch Street

Boring No.: SB-08
Sheet 1 **of** 1
By: Keith Robins

Drilling Contractor: AARCO
Drill Rig: Geoprobe 7822DT
Date Started: 3/14/16

Geologist: Keith Robins
Drilling Method: Macrocore
Drive Hammer Weight: N/A
Date Completed: 3/17/16

Boring Completion Depth: 25‘
Ground Surface Elevation: 8.62’
Boring Diameter: 2”

Depth (ft.)	**No.**	**Type**	**Rec.**	**PID Per 6" (ppm)**	**Sample Description**
0’-1’	1	HA	12”	0.0	Bluestone.
1’-4’	2	HA	36”	0.0	Dark gray-brown, fine to medium SAND and GRAVEL, no odor, no staining. Water encountered at 4’ bgs.
4’-10’	3	MC	36”	56.0	0”-24”: Black, medium to coarse SAND and fine GRAVEL, some stone, trace clay, coal, cinders, brick, poorly sorted, wet, loose.
				0.0	24”-36”: Dark brown, medium to coarse SAND, Rock and Stones, some gravel, brick, poorly sorted, loose, wet, no staining, no odor.
10’-15’	4	MC	20”	0.0	0”-12”: Black, medium to coarse SAND and fine to coarse angular GRAVEL, some rock, concrete, brick, poorly sorted, very loose, wet, no staining, no odor.
				0.0	12”-20”: Dark brown-gray, silty SAND, some subrounded gravel, trace stone, poorly sorted, wet, no staining, no odor.
15’-20’	5	MC	52”	0.0	0”-12”: Dark gray, CLAY, some organic matter, soft-firm, slightly plastic, moist, no staining, slight organic odor.
				0.0	12”-20”: Dark gray-brown, silty CLAY, moist.
				0.0	20”-40”: Light gray-blue, SILT, trace clay, dense, damp, no staining, no odor.
				0.0	40”-52”: Reddish-olive, silty fine to medium SAND, some fine subrounded gravel, poorly sorted, dense, moist, no staining, no odor.
20’-25’	6	MC	40”	0.0	0”-16”: Olive-brown, SILT, little sand, trace fine gravel, dense, damp, no staining, no odor.
					16”-40”: Olive-brown, silty fine SAND, some subrounded gravel, trace weathered rock, poorly sorted, moist-damp, no staining, no odor.

Sample Types:
HA = Hand Auger
MC = Macrocore

NOTES:
Soil samples from 4’-6’, 6’-8’ and 13’-15’ submitted for TCL VOC and TCL SVOC analysis.

D&B ENGINEERS AND ARCHITECTS, P.C.

Project No.: 3455-2D
Project Name: LIRR – Arch Street

Boring No.: SB-09
Sheet 1 **of** 1
By: Keith Robins

Drilling Contractor: AARCO
Drill Rig: Geoprobe 7822DT
Date Started: 3/18/16

Geologist: Keith Robins
Drilling Method: Macrocore
Drive Hammer Weight: N/A
Date Completed: 3/18/16

Boring Completion Depth: 8‘
Ground Surface Elevation: 7.10’*
Boring Diameter: 2”

Depth (ft.)	No.	Type	Rec.	PID Per 6" (ppm)	Sample Description
0’-5’	1	MC	36”	0.3	0”-12”: Brown, medium to coarse SAND, crushed ROCK and GRAVEL, poorly sorted, loose, damp to wet.
				0.0	12”-18”: Dark gray, silty SAND and STONE, poorly sorted, loose, no staining, no odor.
				0.0	18”-21”: Concrete, dry, no staining, no odor.
				0.0	21”-42”: Black, fine SAND, SLAG and COAL, trace silt, lumber, poorly sorted, very loose, wet, no staining, no odor.
				0.0	42”-46”: Olive-brown, fine SAND, some fine angular gravel, wet, no staining, no odor.
5’-8’	2	MC	34”	0.3	0”-21”: Dark gray, fine to medium SAND, trace fine gravel, well sorted, wet, no staining, no odor.
				0.3	21”-30”: Brown-olive, fine to medium SAND, trace fine gravel, wet, no staining, no odor.
				0.3	30”-34”: Dark gray, very fine SAND, trace silt, wet, no staining, no odor.

Sample Types:
HA = Hand Auger
MC = Macrocore

NOTES:
Soil samples from 0’-1’, 2’-3’, 4’-5’ and 7’-8’ submitted for PCBs analysis.

Boring log begins approximately 2 ft. below bluestone.
*Ground surface elevation is from top of bluestone.

D&B ENGINEERS AND ARCHITECTS, P.C.

Project No.: 3455-2D
Project Name: LIRR – Arch Street

Boring No.: SB-10
Sheet 1 **of** 1
By: Keith Robins

Drilling Contractor: AARCO
Drill Rig: Geoprobe 7822DT
Date Started: 3/18/16

Geologist: Keith Robins
Drilling Method: Macrocore
Drive Hammer Weight: N/A
Date Completed: 3/18/16

Boring Completion Depth: 8‘
Ground Surface Elevation: 7.21’*
Boring Diameter: 2”

Depth (ft.)	No.	Type	Rec.	PID Per 6" (ppm)	Sample Description
0’-1’	1	HA	12”	0.0	Dark gray, medium to fine SAND, some brick, rock, no staining, no odor.
1.5’-5’	2	HA	35”	0.3	0”-17”: Black, medium to coarse SAND, SLAG and GRAVEL, poorly sorted, loose, wet, no staining, no odor.
				0.3	17”-35”: Black, fine to medium SAND and crushed ROCK, trace gravel, lumber, poorly sorted, wet, no staining, no odor.
5’-8’	3	MC	27”	0.2	0”-18”: Black, medium to coarse SAND, fine GRAVEL, SLAG and COAL fragments, poorly sorted, loose, wet, no staining, no odor.
				0.2	18”-27”: Olive-brown, fine SAND, wet, well sorted, wet, no staining, no odor.

Sample Types:
HA = Hand Auger
MC = Macrocore

NOTES:
Soil samples from 2’-3’, 4’-5’ and 7’-8’ submitted for PCBs analysis.

Boring log begins approximately 18” below the bluestone.
*Ground surface elevation is from top of bluestone.

D&B ENGINEERS AND ARCHITECTS, P.C.

Project No.: 3455-2D
Project Name: LIRR – Arch Street

Boring No.: SB-11
Sheet 1 **of** 1
By: Keith Robins

Drilling Contractor: AARCO
Drill Rig: Geoprobe 7822DT
Date Started: 3/18/16

Geologist: Keith Robins
Drilling Method: Macrocore
Drive Hammer Weight: N/A
Date Completed: 3/18/16

Boring Completion Depth: 8‘
Ground Surface Elevation: 7.39’*
Boring Diameter: 2”

Depth (ft.)	No.	Type	Rec.	PID Per 6" (ppm)	Sample Description
0’-5’	1	MC	35”	0.2	0”-15”: Black, medium to coarse SILT, GRAVEL and STONE, trace brick, poorly sorted, loose, wet, no staining, no odor.
				0.2	15”-35”: Olive-brown, fine to medium SAND, some silt, crushed stone, rock, gravel, compacted, dense, wet, no staining, no odor.
5’-8’	2	MC	24”	0.6	0”-12”: Black-dark gray, medium to coarse SAND, STONE, ROCK and GRAVEL, poorly sorted, loose, wet, no staining, no odor.
				0.6	12”-24”: Brown-gray, organic CLAY and PEAT, damp, slightly plastic, soft, no staining, some organic odors.

Sample Types:
HA = Hand Auger
MC = Macrocore

NOTES:
Soil samples from 0’-1’, 2’-3’, 4’-5’ and 7’-8’ submitted for PCBs analysis.

Boring log begins approximately 24” below bluestone.
*Ground surface elevation is from top of bluestone.

D&B ENGINEERS AND ARCHITECTS, P.C.

Project No.: 3455-2D
Project Name: LIRR – Arch Street

Boring No.: SB-12
Sheet 1 **of** 1
By: Keith Robins

Drilling Contractor: AARCO
Drill Rig: Geoprobe 7822DT
Date Started: 3/21/16

Geologist: Keith Robins
Drilling Method: Macrocore
Drive Hammer Weight: N/A
Date Completed: 3/21/16

Boring Completion Depth: 6‘
Ground Surface Elevation: 6.89’*
Boring Diameter: 2”

Depth (ft.)	No.	Type	Rec.	PID Per 6" (ppm)	Sample Description
0’-5’	1	HA/ MC	44”	0.5	0”-16”: Gray, medium-coarse SAND, GRAVEL, STONES, trace brick, concrete, poorly sorted, loose.
				0.5	16”-39”: Black, fine to medium SAND, some slag, trace coal, cinders, gravel, poorly sorted, loose, wet, no staining, no odor.
				0.5	39”-44”: Black-brown, fine to medium SAND, trace gravel, well sorted, wet, no staining, no odor.
5’-6’	2	MC	12”	0.5	Dark gray, organic CLAY, soft-slightly plastic, organic odor, moist.

Sample Types:
HA = Hand Auger
MC = Macrocore

NOTES:
Soil samples from 0’-1’, 2’-3’ and 5’-6’ submitted for PCBs analysis.

Boring log begins approximately 3” below bluestone.
*Ground surface elevation is from top of bluestone.

D&B ENGINEERS AND ARCHITECTS, P.C.

Project No.: 3455-2D
Project Name: LIRR – Arch Street

Boring No.: SB-13
Sheet 1 **of** 1
By: Keith Robins

Drilling Contractor: AARCO
Drill Rig: Geoprobe 7822DT
Date Started: 3/21/16

Geologist: Keith Robins
Drilling Method: Macrocore
Drive Hammer Weight: N/A
Date Completed: 3/21/16

Boring Completion Depth: 6‘
Ground Surface Elevation: 7.12’*
Boring Diameter: 2”

Depth (ft.)	No.	Type	Rec.	PID Per 6" (ppm)	Sample Description
0’-5’	1	MC	50”	0.4	0”-12”: Dark brown-gray, medium to coarse SAND and STONES, some angular gravel, trace concrete, poorly sorted, damp-moist, no staining, no odor.
				0.4	12”-29”: Black, medium to coarse SAND, some coarse gravel, slag, poorly sorted, loose, wet, no staining, no odor.
				0.4	29”-50”: Dark gray-olive, organic CLAY, soft-slightly plastic, moist, organic odor.
5’-6’	2	MC	10”	0.4	Gray, CLAY, some organic material, soft-slightly plastic, moist, no staining, no odor.

Sample Types:
HA = Hand Auger
MC = Macrocore

NOTES:
Soil samples from 0’-1’, 2’-3’ and 5’-6’ submitted for PCBs analysis.

Boring log begins approximately 24” below bluestone.
*Ground surface elevation is from top of bluestone.

D&B ENGINEERS AND ARCHITECTS, P.C.

Project No.: 3455-2D
Project Name: LIRR – Arch Street

Boring No.: SB-14
Sheet 1 **of** 1
By: Keith Robins

Drilling Contractor: AARCO
Drill Rig: Geoprobe 7822DT
Date Started: 3/21/16

Geologist: Keith Robins
Drilling Method: Macrocore
Drive Hammer Weight: N/A
Date Completed: 3/21/16

Boring Completion Depth: 6‘
Ground Surface Elevation: 7.76’*
Boring Diameter: 2”

Depth (ft.)	No.	Type	Rec.	PID Per 6" (ppm)	Sample Description
0’-5’	1	HA/ MC	35”	0.3 0.3	0”-17”: Black-dark gray, medium to coarse SAND, some fine gravel, silt, slag, trace silt, brick, poorly sorted, loose, no staining, no odor. 17”-35”: Brown-light orange, medium SAND, trace fine gravel, well sorted, compacted, wet, no staining, no odor.
5’-6’	2	MC	10”	0.3	Light gray, fine to medium SAND, trace silt, gravel, well sorted, wet, no staining, no odor.

Sample Types:
HA = Hand Auger
MC = Macrocore

NOTES:
Soil samples from 0’-1’, 2’-3’ and 5’-6’ submitted for PCBs analysis.

Boring log begins approximately 24 “ below bluestone.
*Ground surface elevation is from top of bluestone.

D&B ENGINEERS AND ARCHITECTS, P.C.

Project No.: 3455-2D
Project Name: LIRR – Arch Street

Boring No.: SB-15
Sheet 1 **of** 1
By: Keith Robins

Drilling Contractor: AARCO
Drill Rig: Geoprobe 7822DT
Date Started: 3/18/16

Geologist: Keith Robins
Drilling Method: Macrocore
Drive Hammer Weight: N/A
Date Completed: 3/18/16

Boring Completion Depth: 6'
Ground Surface Elevation: 6.94'*
Boring Diameter: 2"

Depth (ft.)	No.	Type	Rec.	PID Per 6" (ppm)	Sample Description
1'-5'	1	HA/ MC	36"	0.1	0"-31": Black-dark gray, medium to coarse SAND, some angular gravel, trace silt, cinders, slag, crushed rock poorly sorted, loose, wet, no staining, no odor.
				0.1	31"-36": Olive green-brown, fine to coarse SAND, trace subrounded-flat gravel, well sorted, wet, no staining, no odor.
5'-6'	2	MC	8"	0.1	Olive-brown, SILT, dense, moist, no staining, no odor.

Sample Types:
HA = Hand Auger
MC = Macrocore

NOTES:
Soil samples from 0'-1', 2'-3' and 5'-6' submitted for PCBs analysis.

Boring log begins approximately 24" below bluestone.
*Ground surface elevation is from top of bluestone.

D&B ENGINEERS AND ARCHITECTS, P.C.

Project No.: 3455-2D
Project Name: LIRR – Arch Street

Boring No.: SB-16
Sheet 1 **of** 1
By: Keith Robins

Drilling Contractor: AARCO
Drill Rig: Geoprobe 7822DT
Date Started: 3/18/16

Geologist: Keith Robins
Drilling Method: Macrocore
Drive Hammer Weight: N/A
Date Completed: 3/18/16

Boring Completion Depth: 6‘
Ground Surface Elevation: 7.13’*
Boring Diameter: 2”

Depth (ft.)	No.	Type	Rec.	PID Per 6" (ppm)	Sample Description
0’-5’	1	HA/ MC	31”	0.3	Black-light gray, fine to medium SAND, some silt, stones, concrete, trace brick, damp-moist, no staining, no odor.
5’-6’	2	MC	10”	0.3	Olive-light black, medium to coarse SAND, some gravel, poorly sorted, medium-loose, moist-wet, no staining, no odor.

Sample Types:
HA = Hand Auger
MC = Macrocore

NOTES:
Soil samples from 0’-1’, 2’-3’ and 5’-6’ submitted for PCBs analysis.

Boring log begins approximately 12” below bluestone.
*Ground surface elevation is from top of bluestone.

D&B ENGINEERS AND ARCHITECTS, P.C.

Project No.: 3455-2D
Project Name: LIRR – Arch Street

Boring No.: SB-17
Sheet 1 **of** 1
By: Keith Robins

Drilling Contractor: AARCO
Drill Rig: Geoprobe 7822DT
Date Started: 3/18/16

Geologist: Keith Robins
Drilling Method: Macrocore
Drive Hammer Weight: N/A
Date Completed: 3/18/16

Boring Completion Depth: 6‘
Ground Surface Elevation: 6.41’*
Boring Diameter: 2”

Depth (ft.)	**No.**	**Type**	**Rec.**	**PID Per 6" (ppm)**	**Sample Description**
0’-1’	1	HA	12”	0.0	Black-dark brown, SAND and GRAVEL, trace brick, wet.
1’-2’	2	HA	12”	0.0	Black, SAND and GRAVEL, poorly sorted, wet.
2’-3’	3	HA	12”	0.0	Black, medium to coarse SAND and subangular GRAVEL, poorly sorted, loose, wet, no staining, no odor.
3’-5’	4	HA	24”	0.0	Black-dark gray, fine to medium SAND, trace gravel, wet, no staining, no odor.
5’-6’	5	HA	12”	0.0	Gray-brown, SILT, some fine to coarse sand, poorly sorted, wet, no staining, no odor.

Sample Types:
HA = Hand Auger
MC = Macrocore

NOTES:
Soil samples from 0’-1’, 2’-3’ and 5’-6’ submitted for PCBs analysis.
Boring log begins approximately 12” below bluestone.
*Ground surface elevation is from top of bluestone.

D&B ENGINEERS AND ARCHITECTS, P.C.

Project No.: 3455-2D
Project Name: LIRR – Arch Street

Boring No.: GW-01
Sheet 1 **of** 1
By: Keith Robins

Drilling Contractor: AARCO
Drill Rig: Geoprobe
Date Started: 3/15/16

Geologist: Keith Robins
Drilling Method: Macrocore
Drive Hammer Weight: N/A
Date Completed: 3/21/16

Boring Completion Depth: 20‘
Ground Surface Elevation: 9.85’
Boring Diameter: 2”

Depth (ft.)	No.	Type	Rec.	PID Per 6" (ppm)	Sample Description
0’-6”	1	HA	6”	0.0	Bluestone.
6”-1’	2	HA	6”	0.0	Dark brown, medium to coarse SAND, GRAVEL and STONE, dry-damp.
1’-3’	3	HA	2”	0.0	Dark brown-brown, medium to coarse SAND, GRAVEL and STONE, trace brick, concrete, tile, wood, glass, poorly sorted, dense, no staining, no odor.
3’-5’	4	HA	24”	0.0	Black-dark brown, medium to coarse SAND, GRAVEL and STONE, trace silt, trace slag, cinders, poorly sorted, dense, no staining, no odor. Water encountered at 4.5’ bgs.
5’-10’	5	MC	39”	0.4	0”-19”: Black, medium to coarse SAND and SLAG, ASH, fine to coarse GRAVEL, trace brick, fill material, poorly sorted, very loose, wet, no staining, no odor.
				0.4	19”-39”: Olive green-light black, fine to medium SAND, trace silt, rock fragments, trace fill material, poorly sorted, wet, no staining, no odor.
10’-15’	6	MC	43”	0.5	0”-11”: Black, fine to medium SAND, trace silt, well sorted, no staining, no odor.
				0.5	11”-32”: Olive-brown, clayey SILT, slightly firm-soft, slightly plastic, wet, no staining, no odor.
				0.5	32”-40”: Olive green-brown, fine SAND, well sorted, wet.
				0.5	40”-43”: Black, fine SAND, trace silt, well sorted, wet, no staining, no odor.
15’-20’	7	MC	42”	0.4	0”-16”: Dark gray, CLAY, trace shells, slightly plastic, soft, damp-moist, no staining, no odor.
				0.4	16”-34”: Gray-light gray, clayey SILT, trace fine subrounded gravel, firm-dense, moist.
				0.4	34”-42”: Olive green-brown, silty fine SAND, trace fine gravel, poorly sorted, compacted-dense, moist-wet, no staining, no odor.

Sample Types:
HA = Hand Auger
MC = Macrocore

NOTES:
Soil samples from 4’-5’, 13’-15’ and 18’-20’ submitted for TCL VOC and TCL SVOC analysis.

D&B ENGINEERS AND ARCHITECTS, P.C.

Project No.: 3455-2D
Project Name: LIRR – Arch Street

Boring No.: GW-03
Sheet 1 **of** 1
By: Keith Robins

Drilling Contractor: AARCO
Drill Rig: Geoprobe
Date Started: 3/15/16

Geologist: Keith Robins
Drilling Method: Macrocore
Drive Hammer Weight: N/A
Date Completed: 3/21/16

Boring Completion Depth: 20‘
Ground Surface Elevation: 8.23’
Boring Diameter: 2”

Depth (ft.)	No.	Type	Rec.	PID Per 6" (ppm)	Sample Description
0’-1’	1	HA	12”	0.0	Bluestone.
1’-3’	2	HA	24”	0.0	Black-dark brown, medium to coarse SAND, STONE and GRAVEL, trace concrete, wood, poorly sorted, dense, no staining, no odor.
3’-5’	3	HA	29”	0.7 0.7 0.7	0”-12”: Black, medium to coarse SAND, some gravel, trace silt, poorly sorted, loose, wet, no staining, no odor. 12”-23”: Black, fine to medium SAND, some fine to coarse angular gravel, rock, poorly sorted, very loose, wet, no staining, no odor. 23”-29”: Dark brown, medium SAND, trace fine gravel, well sorted, dense, wet, no staining, no odor.
5’-10’	4	MC	52”	0.6	Dark brown-gray, fine to medium SAND, trace silt, coarse subrounded gravel, well sorted, medium compaction, wet, no staining, no odor.
10’-15’	5	MC	52”	0.5 2.2 2.2	0”-5”: Dark gray-brown, fine to medium SAND, trace fine gravel, coarse sand, poorly sorted, wet, no staining, no odor. 5”-48”: Dark gray, CLAY, some organic matter, trace shells, firm, slightly plastic, damp-moist, some organic odor. 48”-52”: Dark brown-red, Organic Clay and PEAT, slightly plastic, organic odor, damp.
15’-20’	6	MC	48”	0.6 0.6	0”-30”: Gray, silty CLAY, trace subrounded gravel, soft-firm, slightly plastic, damp-moist. 30”-48”: Dark brown, SILT and fine SAND, trace black gravel, rock, muscovite flakes, poorly sorted, compacted, wet, no staining, no odor.

Sample Types:
HA = Hand Auger
MC = Macrocore

NOTES:
Soil samples from 3’-4’, 12’-14’ and 18’-20’ submitted for TCL VOC and TCL SVOC analysis.

D&B ENGINEERS AND ARCHITECTS, P.C.

Project No.: 3455-2D
Project Name: LIRR – Arch Street

Boring No.: GW-04D
Sheet 1 **of** 1
By: Keith Robins

Drilling Contractor: AARCO
Drill Rig: Geoprobe
Date Started: 3/15/16

Geologist: Keith Robins
Drilling Method: Macrocore
Drive Hammer Weight: N/A
Date Completed: 3/23/16

Boring Completion Depth: 19'
Ground Surface Elevation: 7.31'
Boring Diameter: 2"

Depth (ft.)	No.	Type	Rec.	PID Per 6" (ppm)	Sample Description
0'-2'	1	HA	24"	0.0	Bluestone. Encountered water at 2 feet.
2'-4'	2	HA	24"	0.0	0"-6": Dark gray, medium to coarse SAND, some silt, gravel and stone, poorly sorted, damp, no staining, no odor.
				0.0	6"-12": Black, fine to medium SAND, trace fine gravel, cobbles, trace brick, poorly sorted, damp-moist, no staining, no odor.
				0.0	12"-18": Olive-brown, medium SAND, well sorted, moist-wet.
				0.0	18"-24": Black, fine to medium SAND, some silt, trace gravel, poorly sorted, dense, moist-wet, no staining, no odor.
4'-5'	3	HA	12"	0.0	Olive green-brown, silty fine SAND, some fine gravel, compacted, well sorted, wet, no staining, no odor.
5'-10'	4	MC	48"	0.2	0"-19": Olive-dark brown, medium SAND, trace coarse sand, fine to coarse gravel, well sorted, wet, no staining, no odor.
				0.2	19"-40": Brown, SILT, trace fine sand, well sorted, compacted-dense, wet, no staining, no odor.
				0.2	40"-48": Dark gray, CLAY, some organic material, slightly plastic-soft, organic odor, moist.
10'-15'	5	MC	45"	0.2	0"-32": Gray, CLAY, some organic material, trace shells, firm, slightly plastic, no staining, organic odor.
				0.2	32"-45": Gray-light gray, clayey SILT, trace subrounded stone, slightly plastic-soft, wet-moist, no staining, no odor.
15'-19'	6	MC	48"	0.2	0"-40": Dark brown-light gray, medium to coarse SAND, well sorted, loose, wet, no staining, no odor.
				0.2	40"-48": Gray-brown, SILT, trace fine gravel, compact-dense, moist-wet, no staining, no odor.

Sample Types:
HA = Hand Auger
MC = Macrocore

NOTES:
Soil samples from 2'-3', 12'-14' and 16'-18' submitted for TCL VOC and TCL SVOC analysis. Refusal at 19' below top of bluestone.

APPENDIX D

MONITORING WELL CONSTRUCTION LOGS

D&B ENGINEERS AND ARCHITECTS, P.C.

Well Construction Log

Site LIRR – Arch Street Job Number 3455 Well No. GW-01

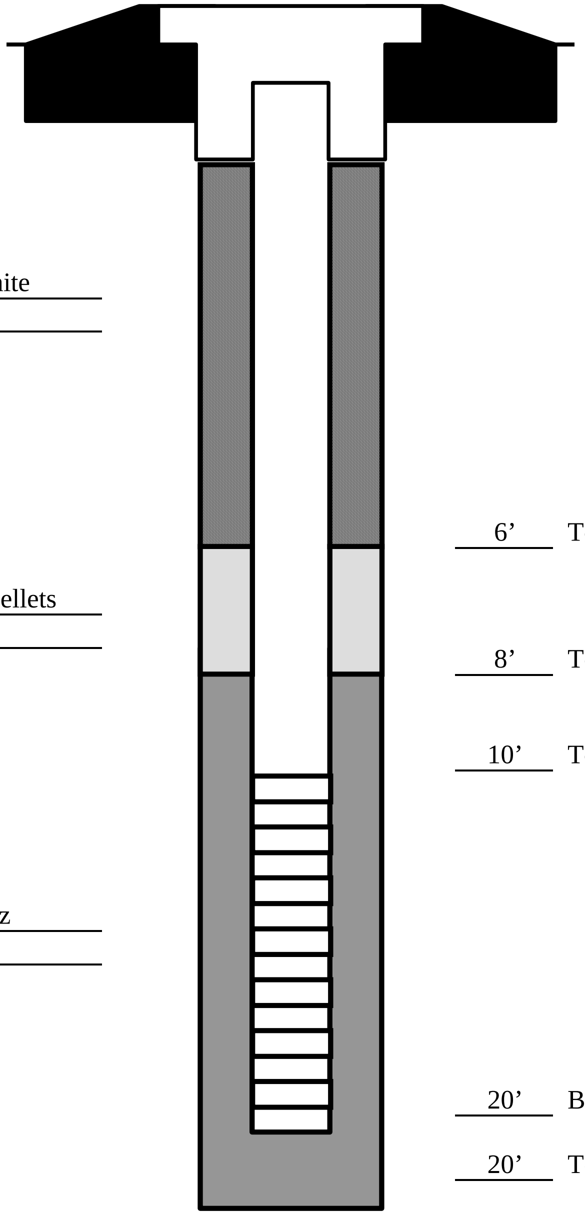
Total Depth 20’ Surface Elevation 12.57’ Top Riser Elevation 12.20’

Water Levels (Depth, Date, Time) 7.65, 4/27/16, 0725 Date Installed 3/22/16

Riser Dia. 1” Material PVC Length 12’
Screen Dia. 1” Material PVC Length 10’ Slot Size 0.010

SCHEMATIC

Surface Seal Type
Concrete
Stickup



Grout Type Cement/bentonite

Seal Type Bentonite pellets

Sand Pack Type Silica quartz
Size #2/ #1/ #00

6’ Top Seal
8’ Top Sand Pack
10’ Top Screen
20’ Bottom Screen
20’ Total Depth of Boring

D&B ENGINEERS AND ARCHITECTS, P.C.

Well Construction Log

Site LIRR – Arch Street Job Number 3455 Well No. GW-02S

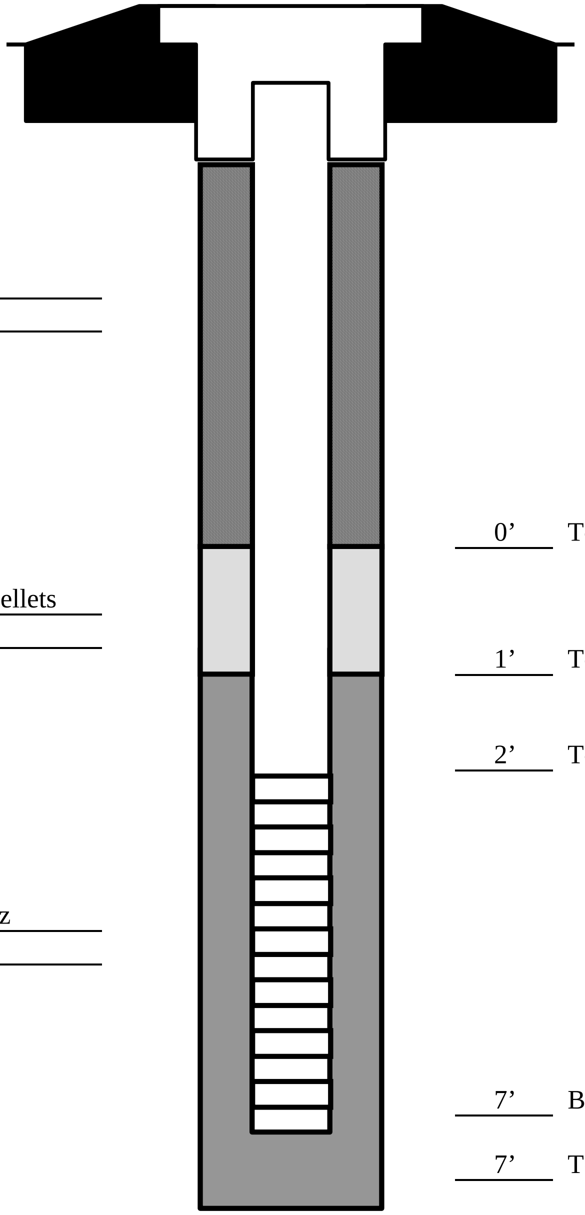
Total Depth 7’ Surface Elevation 11.15’ Top Riser Elevation 10.65’

Water Levels (Depth, Date, Time) 6.15’, 4/27/16, 0726 Date Installed 3/22/16

Riser	Dia.	1”	Material	PVC	Length	4’		
Screen	Dia.	1”	Material	PVC	Length	5’	Slot Size	0.010

SCHEMATIC

Surface Seal Type
Concrete
Stickup



Grout Type --

Seal Type Bentonite pellets

Sand Pack Type Silica quartz
Size #2/ #1/ #00

0’ Top Seal

1’ Top Sand Pack

2’ Top Screen

7’ Bottom Screen

7’ Total Depth of Boring

D&B ENGINEERS AND ARCHITECTS, P.C.

Well Construction Log

Site LIRR – Arch Street Job Number 3455 Well No. GW-02D

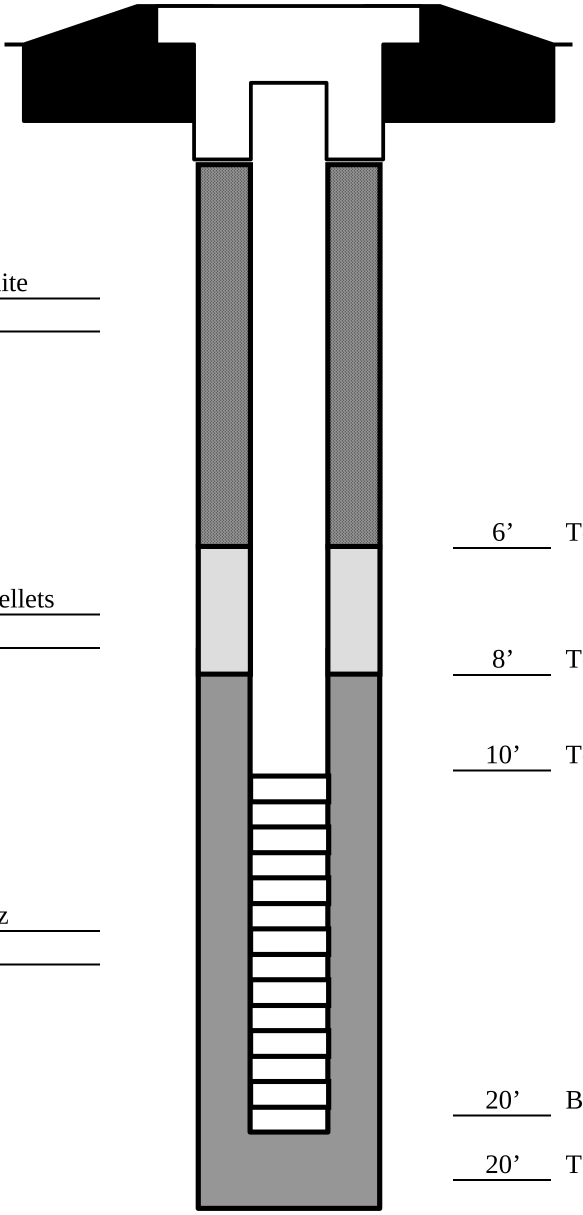
Total Depth 20’ Surface Elevation 11.49’ Top Riser Elevation 11.05’

Water Levels (Depth, Date, Time) 10.71’, 4/27/16, 0726 Date Installed 3/22/16

Riser Dia. 1” Material PVC Length 12’
Screen Dia. 1” Material PVC Length 10’ Slot Size 0.010

SCHEMATIC

Surface Seal Type
Concrete
Stickup



Grout Type Cement/bentonite

Seal Type Bentonite pellets

Sand Pack Type Silica quartz
Size #2/ #1/ #00

6’ Top Seal

8’ Top Sand Pack

10’ Top Screen

20’ Bottom Screen

20’ Total Depth of Boring

D&B ENGINEERS AND ARCHITECTS, P.C.

Well Construction Log

Site LIRR – Arch Street Job Number 3455 Well No. GW-03

Total Depth 19’ Surface Elevation 10.88’ Top Riser Elevation 10.41’

Water Levels (Depth, Date, Time) 12.13’, 4/27/16, 0730 Date Installed 3/21/16

Riser Dia. 1” Material PVC Length 11’

Screen Dia. 1” Material PVC Length 10’ Slot Size 0.010

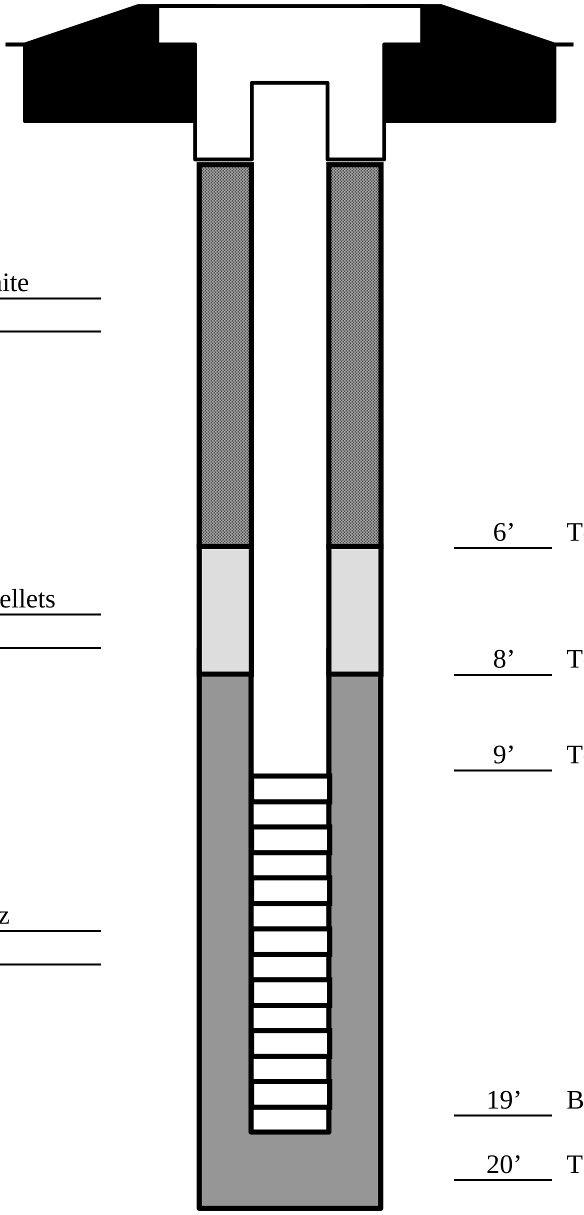
SCHEMATIC

Surface Seal Type
Concrete
Stickup

Grout Type Cement/bentonite

Seal Type Bentonite pellets

Sand Pack Type Silica quartz
Size #2/ #1/ #00



6’ Top Seal

8’ Top Sand Pack

9’ Top Screen

19’ Bottom Screen

20’ Total Depth of Boring

D&B ENGINEERS AND ARCHITECTS, P.C.

Well Construction Log

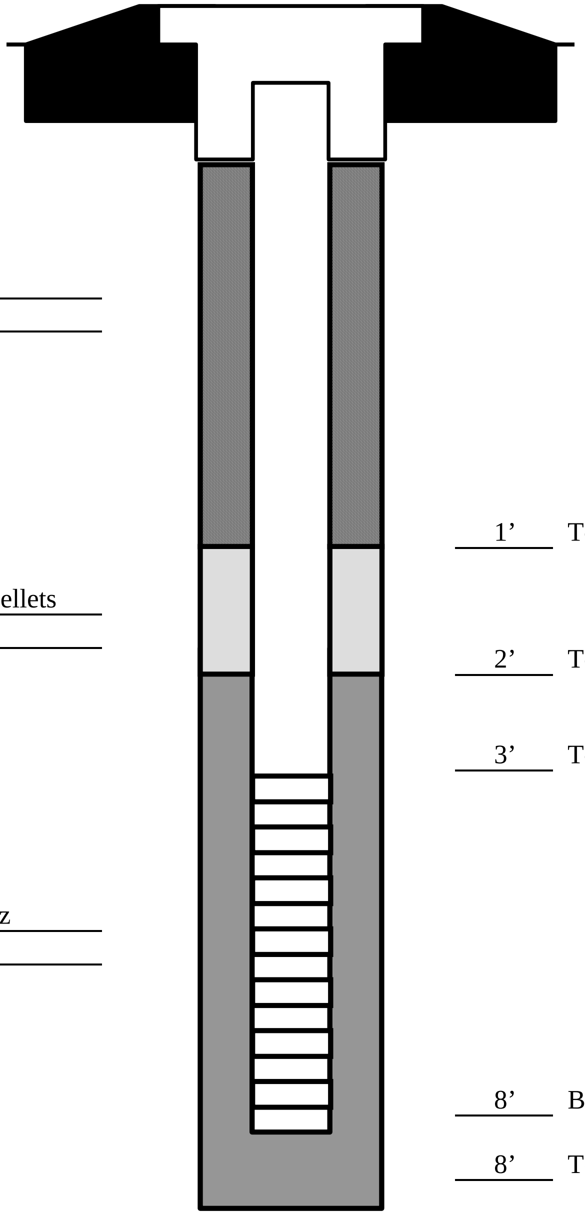
Site LIRR – Arch Street Job Number 3455 Well No. GW-04S

Total Depth 8’ Surface Elevation 7.32’ Top Riser Elevation 7.01’

Water Levels (Depth, Date, Time) 3.28’, 4/27/16, 0730 Date Installed 3/23/16

Riser	Dia.	1”	Material	PVC	Length	3’		
Screen	Dia.	1”	Material	PVC	Length	5’	Slot Size	0.010

SCHEMATIC



Surface Seal Type
Concrete
Flush-mounted

Grout Type --

Seal Type Bentonite pellets

Sand Pack Type Silica quartz
Size #2/ #1/ #00

1’ Top Seal

2’ Top Sand Pack

3’ Top Screen

8’ Bottom Screen

8’ Total Depth of Boring

D&B ENGINEERS AND ARCHITECTS, P.C.

Well Construction Log

Site LIRR – Arch Street Job Number 3455 Well No. GW-04D

Total Depth 18’ Surface Elevation 7.32’ Top Riser Elevation 7.12’

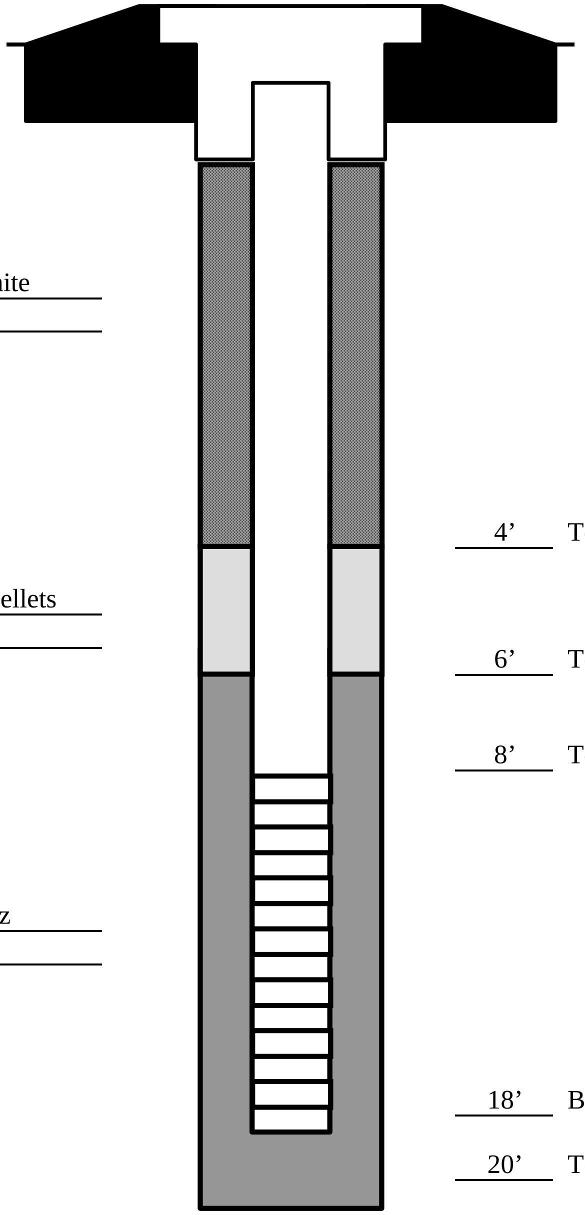
Water Levels (Depth, Date, Time) 9.18’, 4/27/16, 0728 Date Installed 3/23/16

Riser Dia. 1” Material PVC Length 8’

Screen Dia. 1” Material PVC Length 10’ Slot Size 0.010

SCHEMATIC

Surface Seal Type
Concrete
Flush mounted



Grout Type Cement/bentonite

4’ Top Seal

Seal Type Bentonite pellets

6’ Top Sand Pack

8’ Top Screen

Sand Pack Type Silica quartz
Size #2/ #1/ #00

18’ Bottom Screen

20’ Total Depth of Boring

APPENDIX E

REMEDIAL INVESTIGATION CHEMICAL DATA TABLES

Table E-1
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
TCL Volatile Organic Compounds

Sample ID	VB-01(13-15)	VB-02(12-14)	SB-01(13-15)	SB-01(23-25)	SB-02(13-15)	SB-02(23-25)	NYCRR 6 Part 375 Protection of Groundwater* Soil Cleanup Objectives (SCOs)	NYCRR 6 Part 375 Restricted-Residential Use Soil Cleanup Objectives (SCO)	NYCRR 6 Part 375 Industrial Use Soil Cleanup Objectives (SCO)
Sampling Date	10/30/15	10/30/15	3/16/2016	3/16/2016	3/17/2016	3/17/2016			
Start Depth (in Feet)	13	12	13	23	13	23			
End Depth (in Feet)	15	14	15	25	15	25			
Units	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/kg	ug/kg
VOLATILE COMPOUNDS									
1,1,1-Trichloroethane	66900 U	7.6 U	8.6 U	4.2 U	10.7 U	4.5 U	680	100000	1000000
1,1,2,2-Tetrachloroethane	66900 U	7.6 U	8.6 UJ	4.2 U	10.7 U	4.5 U	600	--	--
1,1,2-Trichloroethane	66900 U	7.6 UJ	8.6 U	4.2 U	10.7 U	4.5 U	--	--	--
1,1,2-Trichlorotrifluoroethane	66900 U	7.6 U	8.6 U	4.2 U	10.7 U	4.5 U	--	--	--
1,1-Dichloroethane	66900 U	7.6 U	8.6 U	4.2 U	10.7 U	4.5 U	270	26000	480000
1,1-Dichloroethene	66900 U	7.6 U	8.6 U	4.2 U	10.7 U	4.5 U	330	100000	1000000
1,2,3-Trichlorobenzene	66900 U	7.6 UJ	8.6 UJ	4.2 U	10.7 U	4.5 U	--	--	--
1,2,4-Trichlorobenzene	66900 U	7.6 UJ	8.6 UJ	4.2 U	10.7 U	4.5 U	--	--	--
1,2-Dibromo-3-Chloropropane	66900 U	7.6 UJ	8.6 UJ	4.2 U	10.7 U	4.5 U	--	--	--
1,2-Dibromoethane	66900 U	7.6 U	8.6 U	4.2 U	10.7 U	4.5 U	--	--	--
1,2-Dichlorobenzene	66900 U	7.6 UJ	8.6 UJ	4.2 U	10.7 U	4.5 U	--	100000	1000000
1,2-Dichloroethane	66900 U	7.6 U	8.6 U	4.2 U	10.7 U	4.5 U	20	3100	60000
1,2-Dichloropropane	66900 U	7.6 U	8.6 U	4.2 U	10.7 U	4.5 U	--	--	--
1,3-Dichlorobenzene	66900 U	7.6 UJ	8.6 UJ	4.2 U	10.7 U	4.5 U	--	49000	560000
1,4-Dichlorobenzene	66900 U	7.6 UJ	8.6 UJ	4.2 U	10.7 U	4.5 U	--	13000	250000
1,4-Dioxane	1338700 U	150 U	--	--	--	--	--	13000	250000
2-Butanone	334700 U	37.8 U	42.9 U	21.2 U	9.6 J	22.7 U	--	100000	1000000
2-Hexanone	334700 U	37.8 U	42.9 U	21.2 U	53.3 U	22.7 U	--	--	--
4-Methyl-2-Pentanone	334700 U	37.8 U	42.9 U	21.2 U	53.3 U	22.7 U	--	--	--
Acetone	334700 U	63.4	15.4 J	9.1 J	37.4 J	22.7 U	--	100000	1000000
Benzene	66900 U	7.6 U	8.6 U	4.2 U	10.7 U	4.5 U	--	4800	89000
Bromochloromethane	66900 U	7.6 U	8.6 U	4.2 U	10.7 U	4.5 U	--	--	--
Bromodichloromethane	66900 U	7.6 U	8.6 U	4.2 U	10.7 U	4.5 U	--	--	--
Bromoform	66900 U	7.6 U	8.6 U	4.2 U	10.7 U	4.5 U	--	--	--
Bromomethane	66900 U	7.6 U	8.6 U	4.2 U	10.7 U	4.5 U	--	--	--
Carbon Disulfide	66900 U	49.4	8.9 J	4.2 U	11.3 J	4.5 U	--	--	--
Carbon Tetrachloride	66900 U	7.6 U	8.6 U	4.2 U	10.7 U	4.5 U	760	2400	44000
Chlorobenzene	66900 U	7.6 U	8.6 U	4.2 U	10.7 U	4.5 U	--	100000	1000000
Chloroethane	66900 U	7.6 U	8.6 U	4.2 U	10.7 U	4.5 U	--	--	--
Chloroform	66900 U	7.6 U	8.6 U	4.2 U	10.7 U	4.5 U	370	49000	700000
Chloromethane	66900 U	7.6 U	8.6 U	4.2 U	10.7 U	4.5 U	--	--	--
cis-1,2-Dichloroethene	66900 U	40.4	5 J	1.3 J	7.3 J	1.1 J	250	100000	1000000
cis-1,3-Dichloropropene	66900 U	7.6 U	8.6 U	4.2 U	10.7 U	4.5 U	--	--	--
Cyclohexane	66900 U	7.6 U	8.6 U	4.2 U	10.7 U	4.5 U	--	--	--
Dibromochloromethane	66900 U	7.6 U	8.6 U	4.2 U	10.7 U	4.5 U	--	--	--
Dichlorodifluoromethane	66900 U	7.6 U	8.6 U	4.2 U	10.7 U	4.5 U	--	--	--

See next page for Footnotes/Qualifiers

D&B ENGINEERS AND ARCHITECTS, P.C.

Table E-1
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
TCL Volatile Organic Compounds

Sample ID	VB-01(13-15)	VB-02(12-14)	SB-01(13-15)	SB-01(23-25)	SB-02(13-15)	SB-02(23-25)	NYCRR 6 Part 375 Protection of Groundwater* Soil Cleanup Objectives (SCOs)	NYCRR 6 Part 375 Restricted-Residential Use Soil Cleanup Objectives (SCO)	NYCRR 6 Part 375 Industrial Use Soil Cleanup Objectives (SCO)
Sampling Date	10/30/15	10/30/15	3/16/2016	3/16/2016	3/17/2016	3/17/2016			
Start Depth (in Feet)	13	12	13	23	13	23			
End Depth (in Feet)	15	14	15	25	15	25			
Units	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/kg	ug/kg
Ethyl Benzene	66900 U	7.6 U	8.6 U	4.2 U	10.7 U	4.5 U	--	41000	780000
Isopropylbenzene	66900 U	7.6 UJ	8.6 UJ	4.2 U	10.7 U	4.5 U	--	--	--
m/p-Xylenes	133900 U	15.1 U	17.4 U	8.5 U	21.3 U	9.1 U	--	100000	1000000
Methyl Acetate	66900 U	7.6 U	8.6 U	4.2 U	10.7 U	4.5 U	--	--	--
Methyl tert-butyl Ether	66900 U	6.5 J	2.5 J	4.2 U	51.3	4.5 U	--	100000	1000000
Methylcyclohexane	66900 U	7.6 U	8.6 U	4.2 U	10.7 U	4.5 U	--	--	--
Methylene Chloride	66900 U	1.8 J	7.9 UB	4.2 U	10.7 U	4.5 U	50	100000	1000000
o-Xylene	66900 U	7.6 U	8.6 U	4.2 U	10.7 U	4.5 U	--	100000	1000000
Styrene	66900 U	7.6 U	8.6 U	4.2 U	10.7 U	4.5 U	--	--	--
t-1,3-Dichloropropene	66900 U	7.6 U	8.6 U	4.2 U	10.7 U	4.5 U	--	--	--
Tetrachloroethene	***1160900***	6	8.6 U	4.2 U	10.7 U	3 J	1,300	19000	300000
Toluene	66900 U	7.6 U	8.6 U	4.2 U	10.7 U	4.5 U	--	100000	1000000
trans-1,2-Dichloroethene	66900 U	2.2 J	8.6 U	4.2 U	10.7 U	4.5 U	190	100000	1000000
Trichloroethene	66900 U	2.7 J	8.6 U	4.2 U	10.7 U	4.5 U	470	21000	400000
Trichlorofluoromethane	66900 U	7.6 U	8.6 U	4.2 U	10.7 U	4.5 U	--	--	--
Vinyl Chloride	66900 U	7.6 U	8.6 U	1.5 J	7.7 J	4.5 U	20	900	27000
Total Volatile Organic Compounds	1160900	172.4	39.7	12	125	4	--	--	--

Footnotes/Qualifiers:

ug/kg:	Micrograms per kilogram
BD:	Blind duplicate
U:	Analyzed for but not detected
UB:	Not detected based on blank results
J+:	Estimated bias high
D:	Reported from secondary dilution
E:	Exceeded calibration range estimated value
J:	Estimated value or detection limits
--:	No standard

Exceeds Protection of Groundwater SCO (only compared to chlorinated VOCs per NYSDEC)

Exceeded the Restricted-Residential Use SCO

Exceeded the Industrial Use SCO

Table E-1
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
TCL Volatile Organic Compounds

Sample ID	SB-03(12-14)	SB-03(18-20)	SB-04(3-5)	SB-04(10-12)	SB-04(27-29)	SB-05(10-11)	SB-05(10-11)BD	NYCRR 6 Part 375 Protection of Groundwater* Soil Cleanup Objectives (SCOs)	NYCRR 6 Part 375 Restricted-Residential Use Soil Cleanup Objectives (SCO)	NYCRR 6 Part 375 Industrial Use Soil Cleanup Objectives (SCO)
Sampling Date	**3/17/2016**	**3/17/2016**	**3/16/2016**	**3/16/2016**	**3/16/2016**	**3/16/2016**	**3/16/2016**			
Start Depth (in Feet)	**12**	**18**	**3**	**10**	**27**	**10**	**10**			
End Depth (in Feet)	**14**	**20**	**5**	**12**	**29**	**11**	**11**			
Units	**ug/Kg**	**ug/Kg**	**ug/Kg**	**ug/Kg**	**ug/Kg**	**ug/Kg**	**ug/Kg**	**ug/Kg**	**ug/kg**	**ug/kg**
VOLATILE COMPOUNDS										
1,1,1-Trichloroethane	5.7 U	4.8 U	5.5 U	10.1 U	5.1 U	5.3 U	5 U	680	100000	1000000
1,1,2,2-Tetrachloroethane	5.7 U	4.8 U	4.6 J+	10.1 U	5.1 U	5.3 U	5 U	600	--	--
1,1,2-Trichloroethane	5.7 U	4.8 U	5.5 U	10.1 U	5.1 U	5.3 U	5 U	--	--	--
1,1,2-Trichlorotrifluoroethane	5.7 U	4.8 U	5.5 U	10.1 U	5.1 U	5.3 U	5 U	--	--	--
1,1-Dichloroethane	5.7 U	4.8 U	5.5 U	10.1 U	5.1 U	5.3 U	5 U	270	26000	480000
1,1-Dichloroethene	5.7 U	4.8 U	5.5 U	10.1 U	5.1 U	5.3 U	5 U	330	100000	1000000
1,2,3-Trichlorobenzene	5.7 U	4.8 U	5.5 UJ	10.1 U	5.1 U	5.3 U	5 U	--	--	--
1,2,4-Trichlorobenzene	5.7 U	4.8 U	5.5 UJ	10.1 U	5.1 U	5.3 U	5 U	--	--	--
1,2-Dibromo-3-Chloropropane	5.7 U	4.8 U	5.5 UJ	10.1 U	5.1 U	5.3 U	5 U	--	--	--
1,2-Dibromoethane	5.7 U	4.8 U	5.5 U	10.1 U	5.1 U	5.3 U	5 U	--	--	--
1,2-Dichlorobenzene	5.7 U	4.8 U	5.5 UJ	10.1 U	5.1 U	5.3 U	5 U	--	100000	1000000
1,2-Dichloroethane	5.7 U	4.8 U	5.5 U	10.1 U	5.1 U	5.3 U	5 U	20	3100	60000
1,2-Dichloropropane	5.7 U	4.8 U	5.5 U	10.1 U	5.1 U	5.3 U	5 U	--	--	--
1,3-Dichlorobenzene	5.7 U	4.8 U	5.5 UJ	10.1 U	5.1 U	5.3 U	5 U	--	49000	560000
1,4-Dichlorobenzene	5.7 U	4.8 U	5.5 UJ	10.1 U	5.1 U	5.3 U	5 U	--	13000	250000
1,4-Dioxane	--	--	--	--	--	--	--	--	13000	250000
2-Butanone	5.5 J	23.8 U	8.9 J	9.9 J	25.6 U	3.8 J	5.9 J	--	100000	1000000
2-Hexanone	28.7 U	23.8 U	27.7 U	50.4 U	25.6 U	26.6 U	25.1 U	--	--	--
4-Methyl-2-Pentanone	28.7 U	23.8 U	27.7 U	50.4 U	25.6 U	26.6 U	25.1 U	--	--	--
Acetone	40.3	12.6 J	57	68.7	25.6 U	15.8 J	27.4	--	100000	1000000
Benzene	5.7 U	4.8 U	1.4 J	10.1 U	5.1 U	5.3 U	5 U	--	4800	89000
Bromochloromethane	5.7 U	4.8 U	5.5 U	10.1 U	5.1 U	5.3 U	5 U	--	--	--
Bromodichloromethane	5.7 U	4.8 U	5.5 U	10.1 U	5.1 U	5.3 U	5 U	--	--	--
Bromoform	5.7 U	4.8 U	5.5 U	10.1 U	5.1 U	5.3 U	5 U	--	--	--
Bromomethane	5.7 U	4.8 U	5.5 U	10.1 U	5.1 U	5.3 U	5 U	--	--	--
Carbon Disulfide	5.7 U	2.6 J	5.5 U	10.1 U	5.1 U	5.3 U	6.2 J	--	--	--
Carbon Tetrachloride	5.7 U	4.8 U	5.5 U	10.1 U	5.1 U	5.3 U	5 U	760	2400	44000
Chlorobenzene	5.7 U	4.8 U	5.5 U	10.1 U	5.1 U	5.3 U	5 U	--	100000	1000000
Chloroethane	5.7 U	4.8 U	5.5 U	10.1 U	5.1 U	5.3 U	5 U	--	--	--
Chloroform	5.7 U	4.8 U	5.5 U	10.1 U	5.1 U	5.3 U	5 U	370	49000	700000
Chloromethane	5.7 U	4.8 U	5.5 U	10.1 U	5.1 U	5.3 U	5 U	--	--	--
cis-1,2-Dichloroethene	5.7 U	4.8 U	12.5	43.4	5.1 U	***880 JD***	180 JD	250	100000	1000000
cis-1,3-Dichloropropene	5.7 U	4.8 U	5.5 U	10.1 U	5.1 U	5.3 U	5 U	--	--	--
Cyclohexane	5.7 U	4.8 U	5.5 U	10.1 U	5.1 U	5.3 U	5 U	--	--	--
Dibromochloromethane	5.7 U	4.8 U	5.5 U	10.1 U	5.1 U	5.3 U	5 U	--	--	--
Dichlorodifluoromethane	5.7 U	4.8 U	5.5 U	10.1 U	5.1 U	5.3 U	5 U	--	--	--

See next page for Footnotes/Qualifiers

Table E-1
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
TCL Volatile Organic Compounds

Sample ID	SB-03(12-14)	SB-03(18-20)	SB-04(3-5)	SB-04(10-12)	SB-04(27-29)	SB-05(10-11)	SB-05(10-11)BD	NYCRR 6 Part 375 Protection of Groundwater* Soil Cleanup Objectives (SCOs)	NYCRR 6 Part 375 Restricted-Residential Use Soil Cleanup Objectives (SCO)	NYCRR 6 Part 375 Industrial Use Soil Cleanup Objectives (SCO)
Sampling Date	**3/17/2016**	**3/17/2016**	**3/16/2016**	**3/16/2016**	**3/16/2016**	**3/16/2016**	**3/16/2016**			
Start Depth (in Feet)	**12**	**18**	**3**	**10**	**27**	**10**	**10**			
End Depth (in Feet)	**14**	**20**	**5**	**12**	**29**	**11**	**11**			
Units	**ug/Kg**	**ug/Kg**	**ug/Kg**	**ug/Kg**	**ug/Kg**	**ug/Kg**	**ug/Kg**	**ug/Kg**	**ug/kg**	**ug/kg**
Ethyl Benzene	5.7 U	4.8 U	5.5 U	10.1 U	5.1 U	5.3 U	5 U	--	41000	780000
Isopropylbenzene	5.7 U	4.8 U	4.8 J+	10.1 U	5.1 U	5.3 U	5 U	--	--	--
m/p-Xylenes	11.5 U	9.5 U	11.1 U	20.2 U	10.2 U	10.6 U	10.1 U	--	100000	1000000
Methyl Acetate	5.7 U	4.8 U	5.5 U	10.1 U	5.1 U	5.3 U	5 U	--	--	--
Methyl tert-butyl Ether	5.7 U	4.8 U	5.5 U	35.5	1.1 J	2.8 J	1.3 J	--	100000	1000000
Methylcyclohexane	5.7 U	4.8 U	5.5 U	10.1 U	5.1 U	5.3 U	5 U	--	--	--
Methylene Chloride	5.7 U	4.8 U	5.5 U	10.1 U	5.1 U	5.3 U	5 U	50	100000	1000000
o-Xylene	5.7 U	4.8 U	1.4 J	10.1 U	5.1 U	5.3 U	5 U	--	100000	1000000
Styrene	5.7 U	4.8 U	5.5 U	10.1 U	5.1 U	5.3 U	5 U	--	--	--
t-1,3-Dichloropropene	5.7 U	4.8 U	5.5 U	10.1 U	5.1 U	5.3 U	5 U	--	--	--
Tetrachloroethene	5.7 U	4.8 U	19.6	10.5	1.1 J	***20900 JD***	***7000 JD***	1,300	19000	300000
Toluene	5.7 U	4.8 U	5.5 U	10.1 U	5.1 U	5.3 U	5 U	--	100000	1000000
trans-1,2-Dichloroethene	5.7 U	4.8 U	5.5 U	10.1 U	5.1 U	100 J	75.3 J	190	100000	1000000
Trichloroethene	5.7 U	4.8 U	2.9 J	10.1 U	5.1 U	400 JD	81 JD	470	21000	400000
Trichlorofluoromethane	5.7 U	4.8 U	5.5 U	10.1 U	5.1 U	5.3 U	5 U	--	--	--
Vinyl Chloride	5.7 U	4.8 U	6	6.2 J	5.1 U	***560 JD***	***120 JD***	20	900	27000
Total Volatile Organic Compounds	46	15	119.1	174.2	2.2	22862	7497	--	--	--

Footnotes/Qualifiers:

ug/kg:	Micrograms per kilogram
BD:	Blind duplicate
U:	Analyzed for but not detected
UB:	Not detected based on blank results
J+:	Estimated bias high
D:	Reported from secondary dilution
E:	Exceeded calibration range estimated value
J:	Estimated value or detection limits
--:	No standard

Exceeds Protection of Groundwater SCO (only compared to chlorinated VOCs per NYSDEC)

🟩 Exceeded the Restricted-Residential Use SCO

▭ Exceeded the Industrial Use SCO

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Table E-1
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
TCL Volatile Organic Compounds

Sample ID	SB-05(11-13)	SB-06(8-10)	SB-06(11-13)	SB-07(12-14)	SB-07(23-25)	SB-08(4-6)	NYCRR 6 Part 375 Protection of Groundwater* Soil Cleanup Objectives (SCOs)	NYCRR 6 Part 375 Restricted-Residential Use Soil Cleanup Objectives (SCO)	NYCRR 6 Part 375 Industrial Use Soil Cleanup Objectives (SCO)
Sampling Date	3/16/2016	3/17/2016	3/17/2016	3/18/2016	3/18/2016	3/17/2016			
Start Depth (in Feet)	11	8	11	12	23	4			
End Depth (in Feet)	13	10	13	14	25	6			
Units	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/kg	ug/kg
VOLATILE COMPOUNDS									
1,1,1-Trichloroethane	7.6 U	6.2 U	6.2 U	5.7 U	4.3 U	10.3 U	680	100000	1000000
1,1,2,2-Tetrachloroethane	7.6 UJ	6.2 U	6.2 U	5.7 U	4.3 U	10.3 UJ	600	--	--
1,1,2-Trichloroethane	7.6 U	6.2 U	6.2 U	5.7 U	4.3 U	10.3 U	--	--	--
1,1,2-Trichlorotrifluoroethane	7.6 U	6.2 U	6.2 U	5.7 U	4.3 U	10.3 U	--	--	--
1,1-Dichloroethane	7.6 U	6.2 U	6.2 U	5.7 U	4.3 U	10.3 U	270	26000	480000
1,1-Dichloroethene	8.7	6.2 U	6.2 U	5.7 U	4.3 U	10.3 U	330	100000	1000000
1,2,3-Trichlorobenzene	7.6 UJ	6.2 U	6.2 U	5.7 U	4.3 U	10.3 UJ	--	--	--
1,2,4-Trichlorobenzene	7.6 UJ	6.2 U	6.2 U	5.7 U	4.3 U	10.3 UJ	--	--	--
1,2-Dibromo-3-Chloropropane	7.6 UJ	6.2 U	6.2 U	5.7 U	4.3 U	10.3 UJ	--	--	--
1,2-Dibromoethane	7.6 U	6.2 U	6.2 U	5.7 U	4.3 U	10.3 U	--	--	--
1,2-Dichlorobenzene	7.6 UJ	6.2 U	6.2 U	5.7 U	4.3 U	10.3 UJ	--	100000	1000000
1,2-Dichloroethane	7.6 U	6.2 U	6.2 U	5.7 U	4.3 U	10.3 U	20	3100	60000
1,2-Dichloropropane	7.6 U	6.2 U	6.2 U	5.7 U	4.3 U	10.3 U	--	--	--
1,3-Dichlorobenzene	7.6 UJ	6.2 U	6.2 U	5.7 U	4.3 U	10.3 UJ	--	49000	560000
1,4-Dichlorobenzene	7.6 UJ	6.2 U	6.2 U	5.7 U	4.3 U	10.3 UJ	--	13000	250000
1,4-Dioxane	--	--	--	--	--	--	--	13000	250000
2-Butanone	15.1 J	4.4 J	5.2 J	28.7 U	21.7 U	51.5 U	--	100000	1000000
2-Hexanone	37.8 U	4 J	31 U	28.7 U	21.7 U	51.5 U	--	--	--
4-Methyl-2-Pentanone	37.8 U	3.1 J	31 U	28.7 U	21.7 U	51.5 U	--	--	--
Acetone	75	16.6 J	33.4	17.1 J	13.9 J	140	--	100000	1000000
Benzene	2.4 J	6.2 U	6.2 U	5.7 U	4.3 U	10.3 U	--	4800	89000
Bromochloromethane	7.6 U	6.2 U	6.2 U	5.7 U	4.3 U	10.3 U	--	--	--
Bromodichloromethane	7.6 U	6.2 U	6.2 U	5.7 U	4.3 U	10.3 U	--	--	--
Bromoform	7.6 U	6.2 U	6.2 U	5.7 U	4.3 U	10.3 U	--	--	--
Bromomethane	7.6 U	6.2 U	6.2 U	5.7 U	4.3 U	10.3 U	--	--	--
Carbon Disulfide	37.9 J	2.3 J	6.2 U	5.7 U	4.3 U	4.6 J	--	--	--
Carbon Tetrachloride	7.6 U	6.2 U	6.2 U	5.7 U	4.3 U	10.3 U	760	2400	44000
Chlorobenzene	7.6 U	6.2 U	6.2 U	5.7 U	4.3 U	10.3 U	--	100000	1000000
Chloroethane	7.6 U	6.2 U	6.2 U	5.7 U	4.3 U	10.3 U	--	--	--
Chloroform	7.6 U	6.2 U	6.2 U	5.7 U	4.3 U	10.3 U	370	49000	700000
Chloromethane	7.6 U	6.2 U	6.2 U	5.7 U	4.3 U	10.3 U	--	--	--
cis-1,2-Dichloroethene	***3400 JD***	***1600 D***	6.1 J	1.6 J	1.4 J	5.8 J	250	100000	1000000
cis-1,3-Dichloropropene	7.6 U	6.2 U	6.2 U	5.7 U	4.3 U	10.3 U	--	--	--
Cyclohexane	7.6 U	6.2 U	6.2 U	5.7 U	4.3 U	10.3 U	--	--	--
Dibromochloromethane	7.6 U	6.2 U	6.2 U	5.7 U	4.3 U	10.3 U	--	--	--
Dichlorodifluoromethane	7.6 U	6.2 U	6.2 U	5.7 U	4.3 U	10.3 U	--	--	--

See next page for Footnotes/Qualifiers

Table E-1
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
TCL Volatile Organic Compounds

Sample ID	SB-05(11-13)	SB-06(8-10)	SB-06(11-13)	SB-07(12-14)	SB-07(23-25)	SB-08(4-6)	NYCRR 6 Part 375 Protection of Groundwater* Soil Cleanup Objectives (SCOs)	NYCRR 6 Part 375 Restricted-Residential Use Soil Cleanup Objectives (SCO)	NYCRR 6 Part 375 Industrial Use Soil Cleanup Objectives (SCO)
Sampling Date	3/16/2016	3/17/2016	3/17/2016	3/18/2016	3/18/2016	3/17/2016			
Start Depth (in Feet)	11	8	11	12	23	4			
End Depth (in Feet)	13	10	13	14	25	6			
Units	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/kg	ug/kg
Ethyl Benzene	7.6 U	6.2 U	6.2 U	5.7 U	4.3 U	10.3 U	--	41000	780000
Isopropylbenzene	7.6 UJ	6.2 U	1.4 J	5.7 U	4.3 U	10.3 UJ	--	--	--
m/p-Xylenes	15.1 U	12.5 U	12.4 U	11.5 U	8.7 U	17.4 U	--	100000	1000000
Methyl Acetate	7.6 U	6.2 U	6.2 U	5.7 U	4.3 U	10.3 U	--	--	--
Methyl tert-butyl Ether	26.7	6.2 U	6.2 U	4.2 J	4.3 U	10.3 U	--	100000	1000000
Methylcyclohexane	7.6 U	6.2 U	6.2 U	5.7 U	4.3 U	10.3 U	--	--	--
Methylene Chloride	7.6 U	6.2 U	6.2 U	5.7 UB	5.1 UB	35.2	50	100000	1000000
o-Xylene	7.6 U	6.2 U	6.2 U	5.7 U	4.3 U	10.3 U	--	100000	1000000
Styrene	7.6 U	6.2 U	6.2 U	5.7 U	4.3 U	10.3 U	--	--	--
t-1,3-Dichloropropene	7.6 U	6.2 U	6.2 U	5.7 U	4.3 U	10.3 U	--	--	--
Tetrachloroethene	***31300 D***	1300 D	2 J	2.8 J	2.1 J	10.3 U	1,300	19000	300000
Toluene	2.7 J	6.2 U	6.2 U	5.7 U	4.3 U	10.3 U	--	100000	1000000
trans-1,2-Dichloroethene	190 EJ	15.2 J	6.2 U	2.8 J	1.4 J	10.3 U	190	100000	1000000
Trichloroethene	***2600 JD***	22.2 J	6.2 U	1.9 J	4.3 U	10.3 U	470	21000	400000
Trichlorofluoromethane	7.6 U	6.2 U	6.2 U	5.7 U	4.3 U	10.3 U	--	--	--
Vinyl Chloride	***2200 JD***	***410 JD***	2.2 J	5.7 U	4.3 U	10.3 U	20	900	27000
Total Volatile Organic Compounds	39669	3378	50.3	33.1	23.9	185.6	--	--	--

Footnotes/Qualifiers:

ug/kg:	Micrograms per kilogram
BD:	Blind duplicate
U:	Analyzed for but not detected
UB:	Not detected based on blank results
J+:	Estimated bias high
D:	Reported from secondary dilution
E:	Exceeded calibration range estimated value
J:	Estimated value or detection limits
--:	No standard

Exceeds Protection of Groundwater SCO (only compared to chlorinated VOCs per NYSDEC)

🟩 Exceeded the Restricted-Residential Use SCO

☐ Exceeded the Industrial Use SCO

Table E-1
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
TCL Volatile Organic Compounds

Sample ID	SB-08(6-8)	SB-08(13-15)	GW-01(4-5)	GW-01(13-15)	GW-01(18-20)	GW-03(3-4)	GW-03(12-14)	NYCRR 6 Part 375	NYCRR 6 Part 375	NYCRR 6 Part 375
Sampling Date	3/17/2016	3/17/2016	3/21/2016	3/21/2016	3/21/2016	3/21/2016	3/21/2016	Protection of Groundwater* Soil Cleanup Objectives (SCOs)	Restricted-Residential Use Soil Cleanup Objectives (SCO)	Industrial Use Soil Cleanup Objectives (SCO)
Start Depth (in Feet)	6	13	4	13	18	3	12			
End Depth (in Feet)	8	15	5	15	20	4	14			
Units	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/kg	ug/kg
VOLATILE COMPOUNDS										
1,1,1-Trichloroethane	5 U	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	9.2 U	680	100000	1000000
1,1,2,2-Tetrachloroethane	5 UJ	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 UJ	9.2 U	600	--	--
1,1,2-Trichloroethane	5 U	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	9.2 U	--	--	--
1,1,2-Trichlorotrifluoroethane	5 U	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	9.2 U	--	--	--
1,1-Dichloroethane	5 U	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	9.2 U	270	26000	480000
1,1-Dichloroethene	5 U	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	9.2 U	330	100000	1000000
1,2,3-Trichlorobenzene	5 UJ	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 UJ	9.2 U	--	--	--
1,2,4-Trichlorobenzene	5 UJ	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 UJ	9.2 U	--	--	--
1,2-Dibromo-3-Chloropropane	5 UJ	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 UJ	9.2 U	--	--	--
1,2-Dibromoethane	5 U	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	9.2 U	--	--	--
1,2-Dichlorobenzene	5 UJ	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 UJ	9.2 U	--	100000	1000000
1,2-Dichloroethane	5 U	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	9.2 U	20	3100	60000
1,2-Dichloropropane	5 U	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	9.2 U	--	--	--
1,3-Dichlorobenzene	5 UJ	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 UJ	9.2 U	--	49000	560000
1,4-Dichlorobenzene	5 UJ	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 UJ	9.2 U	--	13000	250000
1,4-Dioxane	--	--	--	--	--	--	--	--	13000	250000
2-Butanone	24.9 U	24.3 U	28.9 UJ	4.3 J	21.5 U	22.3 U	46.1 U	--	100000	1000000
2-Hexanone	24.9 U	24.3 U	28.9 UJ	24.7 U	21.5 U	22.3 U	46.1 U	--	--	--
4-Methyl-2-Pentanone	24.9 U	24.3 U	10.9 J+	24.7 U	21.5 U	22.3 U	46.1 U	--	--	--
Acetone	29.7	14.2 J	30.8 J+	22 J	12.4 J	20.0 J	60.7 J	--	100000	1000000
Benzene	5 U	4.9 U	5.8 UJ	4.9 U	4.3 U	1.6 J	9.2 U	--	4800	89000
Bromochloromethane	5 U	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	9.2 U	--	--	--
Bromodichloromethane	5 U	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	9.2 U	--	--	--
Bromoform	5 U	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 UJ	9.2 U	--	--	--
Bromomethane	5 U	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	9.2 U	--	--	--
Carbon Disulfide	1.3 J	1.2 J	5.8 UJ	4.9 U	4.3 U	4.5 U	43.5	--	--	--
Carbon Tetrachloride	5 U	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	9.2 U	760	2400	44000
Chlorobenzene	5 U	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 UJ	9.2 U	--	100000	1000000
Chloroethane	5 U	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	9.2 U	--	--	--
Chloroform	5 U	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	9.2 U	370	49000	700000
Chloromethane	5 U	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	9.2 U	--	--	--
cis-1,2-Dichloroethene	4.6 J	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	9.2 U	250	100000	1000000
cis-1,3-Dichloropropene	5 U	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	9.2 U	--	--	--
Cyclohexane	5 U	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	9.2 U	--	--	--
Dibromochloromethane	5 U	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	9.2 U	--	--	--
Dichlorodifluoromethane	5 U	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	9.2 U	--	--	--

See next page for Footnotes/Qualifiers

Table E-1
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
TCL Volatile Organic Compounds

Sample ID	SB-08(6-8)	SB-08(13-15)	GW-01(4-5)	GW-01(13-15)	GW-01(18-20)	GW-03(3-4)	GW-03(12-14)	NYCRR 6 Part 375 Protection of Groundwater* Soil Cleanup Objectives (SCOs)	NYCRR 6 Part 375 Restricted-Residential Use Soil Cleanup Objectives (SCO)	NYCRR 6 Part 375 Industrial Use Soil Cleanup Objectives (SCO)
Sampling Date	3/17/2016	3/17/2016	3/21/2016	3/21/2016	3/21/2016	3/21/2016	3/21/2016			
Start Depth (in Feet)	6	13	4	13	18	3	12			
End Depth (in Feet)	8	15	5	15	20	4	14			
Units	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/kg	ug/kg
Ethyl Benzene	5 U	4.9 U	5.8 UJ	4.9 U	4.3 U	0.97 J+	9.2 U	--	41000	780000
Isopropylbenzene	5 UJ	4.9 U	5.8 UJ	4.9 U	4.3 U	1.4 J+	9.2 U	--	--	--
m/p-Xylenes	10 U	9.7 U	11.8 UJ	9.9 U	8.6 U	3.1 J+	18.4 U	--	100000	1000000
Methyl Acetate	5 U	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	9.2 U	--	--	--
Methyl tert-butyl Ether	5 U	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	9.2 U	--	100000	1000000
Methylcyclohexane	5 U	4.9 U	5.8 UJ	4.9 U	4.3 U	8	9.2 U	--	--	--
Methylene Chloride	5 U	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	9.2 U	50	100000	1000000
o-Xylene	5 U	4.9 U	5.8 UJ	4.9 U	4.3 U	2.9 J+	9.2 U	--	100000	1000000
Styrene	5 U	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 UJ	9.2 U	--	--	--
t-1,3-Dichloropropene	5 U	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	9.2 U	--	--	--
Tetrachloroethene	3.6 J	4.9 U	5.8 UJ	4.9 U	4.3 U	3.0 J+	9.2 U	1,300	19000	300000
Toluene	5 U	4.9 U	5.8 UJ	4.9 U	4.3 U	2.4 J	9.2 U	--	100000	1000000
trans-1,2-Dichloroethene	5 U	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	9.2 U	190	100000	1000000
Trichloroethene	5 U	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	9.2 U	470	21000	400000
Trichlorofluoromethane	5 U	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	9.2 U	--	--	--
Vinyl Chloride	4.8 J	4.9 U	5.8 UJ	4.9 U	4.3 U	4.5 U	9.2 U	20	900	27000
Total Volatile Organic Compounds	44	15.4	41.7	26.3	12.4	43.37	104.2	--	--	--

Footnotes/Qualifiers:

ug/kg:	Micrograms per kilogram
BD:	Blind duplicate
U:	Analyzed for but not detected
UB:	Not detected based on blank results
J+:	Estimated bias high
D:	Reported from secondary dilution
E:	Exceeded calibration range estimated value
J:	Estimated value or detection limits
--:	No standard

Exceeds Protection of Groundwater SCO (only compared to chlorinated VOCs per NYSDEC)

Exceeded the Restricted-Residential Use SCO

Exceeded the Industrial Use SCO

Table E-1
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
TCL Volatile Organic Compounds

Sample ID	GW-03(18-20)	GW-04(2-3)	GW-04(12-14)	GW-04(12-14)BD	GW-04(16-18)	NYCRR 6 Part 375 Protection of Groundwater* Soil Cleanup Objectives (SCOs)	NYCRR 6 Part 375 Restricted-Residential Use Soil Cleanup Objectives (SCO)	NYCRR 6 Part 375 Industrial Use Soil Cleanup Objectives (SCO)
Sampling Date	3/21/2016	3/23/2016	3/23/2016	3/23/2016	3/23/2016			
Start Depth (in Feet)	18	2	12	12	16			
End Depth (in Feet)	20	3	14	14	18			
Units	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/kg	ug/kg
VOLATILE COMPOUNDS								
1,1,1-Trichloroethane	5.1 U	4.9 U	6.5 U	7 U	4.5 U	680	100000	1000000
1,1,2,2-Tetrachloroethane	5.1 U	4.9 UJ	6.5 U	7 U	4.5 U	600	--	--
1,1,2-Trichloroethane	5.1 U	4.9 U	6.5 U	7 U	4.5 U	--	--	--
1,1,2-Trichlorotrifluoroethane	5.1 U	4.9 U	6.5 U	7 U	4.5 U	--	--	--
1,1-Dichloroethane	5.1 U	4.9 U	6.5 U	7 U	4.5 U	270	26000	480000
1,1-Dichloroethene	5.1 U	4.9 U	6.5 U	7 U	4.5 U	330	100000	1000000
1,2,3-Trichlorobenzene	5.1 U	4.9 UJ	6.5 U	7 U	4.5 U	--	--	--
1,2,4-Trichlorobenzene	5.1 U	4.9 UJ	6.5 U	7 U	4.5 U	--	--	--
1,2-Dibromo-3-Chloropropane	5.1 U	4.9 UJ	6.5 U	7 U	4.5 U	--	--	--
1,2-Dibromoethane	5.1 U	4.9 U	6.5 U	7 U	4.5 U	--	--	--
1,2-Dichlorobenzene	5.1 U	4.9 UJ	6.5 U	7 U	4.5 U	--	100000	1000000
1,2-Dichloroethane	5.1 U	4.9 U	6.5 U	7 U	4.5 U	20	3100	60000
1,2-Dichloropropane	5.1 U	4.9 U	6.5 U	7 U	4.5 U	--	--	--
1,3-Dichlorobenzene	5.1 U	4.9 UJ	6.5 U	7 U	4.5 U	--	49000	560000
1,4-Dichlorobenzene	5.1 U	4.9 UJ	6.5 U	7 U	4.5 U	--	13000	250000
1,4-Dioxane	--	--	--	--	--	--	13000	250000
2-Butanone	25.4 U	24.3 U	32.5 U	35.2 U	22.4 U	--	100000	1000000
2-Hexanone	25.4 U	24.3 U	32.5 U	35.2 U	22.4 U	--	--	--
4-Methyl-2-Pentanone	25.4 U	24.3 U	32.5 U	35.2 U	22.4 U	--	--	--
Acetone	28.5 J	22.7 J	14.1 J	18.7 J	9.7 J	--	100000	1000000
Benzene	5.1 U	4.9 U	6.5 U	7 U	4.5 U	--	4800	89000
Bromochloromethane	5.1 U	4.9 U	6.5 U	7 U	4.5 U	--	--	--
Bromodichloromethane	5.1 U	4.9 U	6.5 U	7 U	4.5 U	--	--	--
Bromoform	5.1 U	4.9 UJ	6.5 U	7 U	4.5 U	--	--	--
Bromomethane	5.1 U	4.9 U	6.5 U	7 U	4.5 U	--	--	--
Carbon Disulfide	5.1 U	4.9 U	3.2 J	10.2 J	2.7 J	--	--	--
Carbon Tetrachloride	5.1 U	4.9 U	6.5 U	7 U	4.5 U	760	2400	44000
Chlorobenzene	5.1 U	4.9 UJ	6.5 U	7 U	4.5 U	--	100000	1000000
Chloroethane	5.1 U	4.9 U	6.5 U	7 U	4.5 U	--	--	--
Chloroform	5.1 U	4.9 U	6.5 U	7 U	4.5 U	370	49000	700000
Chloromethane	5.1 U	4.9 U	6.5 U	7 U	4.5 U	--	--	--
cis-1,2-Dichloroethene	5.1 U	4.9 U	6.5 U	7 U	4.5 U	250	100000	1000000
cis-1,3-Dichloropropene	5.1 U	4.9 U	6.5 U	7 U	4.5 U	--	--	--
Cyclohexane	5.1 U	4.9 U	6.5 U	7 U	4.5 U	--	--	--
Dibromochloromethane	5.1 U	4.9 U	6.5 U	7 U	4.5 U	--	--	--
Dichlorodifluoromethane	5.1 U	4.9 U	6.5 U	7 U	4.5 U	--	--	--

See next page for Footnotes/Qualifiers

Table E-1
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
TCL Volatile Organic Compounds

Sample ID Sampling Date Start Depth (in Feet) End Depth (in Feet) Units	GW-03(18-20) 3/21/2016 18 20 ug/Kg	GW-04(2-3) 3/23/2016 2 3 ug/Kg	GW-04(12-14) 3/23/2016 12 14 ug/Kg	GW-04(12-14)BD 3/23/2016 12 14 ug/Kg	GW-04(16-18) 3/23/2016 16 18 ug/Kg	NYCRR 6 Part 375 Protection of Groundwater* Soil Cleanup Objectives (SCOs) ug/Kg	NYCRR 6 Part 375 Restricted-Residential Use Soil Cleanup Objectives (SCO) ug/kg	NYCRR 6 Part 375 Industrial Use Soil Cleanup Objectives (SCO) ug/kg
Ethyl Benzene	5.1 U	4.9 U	6.5 U	7 U	4.5 U	--	41000	780000
Isopropylbenzene	5.1 U	4.9 U	6.5 U	7 U	4.5 U	--	--	--
m/p-Xylenes	10.2 U	9.7 U	13 U	14.1 U	9 U	--	100000	1000000
Methyl Acetate	5.1 U	4.9 U	6.5 U	7 U	4.5 U	--	--	--
Methyl tert-butyl Ether	5.1 U	4.9 U	6.5 U	7 U	4.5 U	--	100000	1000000
Methylcyclohexane	5.1 U	4.9 U	6.5 U	7 U	4.5 U	--	--	--
Methylene Chloride	5.1 U	3.3 J	7.5	7 U	5.1	50	100000	1000000
o-Xylene	5.1 U	4.9 U	6.5 U	7 U	4.5 U	--	100000	1000000
Styrene	5.1 U	4.9 UJ	6.5 U	7 U	4.5 U	--	--	--
t-1,3-Dichloropropene	5.1 U	4.9 U	6.5 U	7 U	4.5 U	--	--	--
Tetrachloroethene	5.1 U	4.9 U	6.5 U	7 U	4.5 U	1,300	19000	300000
Toluene	5.1 U	4.9 U	6.5 U	7 U	4.5 U	--	100000	1000000
trans-1,2-Dichloroethene	5.1 U	4.9 U	6.5 U	7 U	4.5 U	190	100000	1000000
Trichloroethene	5.1 U	4.9 U	6.5 U	7 U	4.5 U	470	21000	400000
Trichlorofluoromethane	5.1 U	4.9 U	6.5 U	7 U	4.5 U	--	--	--
Vinyl Chloride	5.1 U	4.9 U	6.5 U	7 U	4.5 U	20	900	27000
Total Volatile Organic Compounds	28.5	26	24.8	28.9	17.5	--	--	--

Footnotes/Qualifiers:

ug/kg:	Micrograms per kilogram
BD:	Blind duplicate
U:	Analyzed for but not detected
UB:	Not detected based on blank results
J+:	Estimated bias high
D:	Reported from secondary dilution
E:	Exceeded calibration range estimated value
J:	Estimated value or detection limits
--:	No standard

Exceeds Protection of Groundwater SCO (only compared to chlorinated VOCs per NYSDEC)

Exceeded the Restricted-Residential Use SCO

Exceeded the Industrial Use SCO

Table E-2
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
TCL Semivolatile Organic Compounds

Sample ID			SB-01(13-15)	SB-01(23-25)	SB-02(13-15)	SB-02(23-25)	SB-03(12-14)	SB-03(18-20)	SB-04(3-5)
Sampling Date			3/16/2016	3/16/2016	3/17/2016	3/17/2016	3/17/2016	3/17/2016	3/16/2016
Start Depth (in Feet)			13	23	13	23	12	18	3
End Depth (in Feet)			15	25	15	25	14	20	5
Units			ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
	NYCRR 6 Part 375 Restricted-Residential Use Soil Cleanup Objectives (SCO) ug/kg	NYCRR 6 Part 375 Industrial Use Soil Cleanup Objectives (SCO) ug/kg							
SEMIVOLATILE COMPOUNDS									
1,1-Biphenyl	--	--	550 U	370 U	580 U	380 U	410 U	380 U	300 J
1,2,4,5-Tetrachlorobenzene	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
1,4-Dioxane	13000	250000	550 U	370 U	580 U	380 U	410 U	380 U	400 U
2,2-oxybis(1-Chloropropane)	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
2,3,4,6-Tetrachlorophenol	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
2,4,5-Trichlorophenol	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
2,4,6-Trichlorophenol	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
2,4-Dichlorophenol	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
2,4-Dimethylphenol	--	--	550 U	370 U	580 U	380 U	410 U	380 U	100 J
2,4-Dinitrophenol	--	--	550 UJ	370 UJ	580 UJ	380 UJ	410 UJ	380 UJ	400 UJ
2,4-Dinitrotoluene	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
2,6-Dinitrotoluene	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
2-Chloronaphthalene	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
2-Chlorophenol	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
2-Methylnaphthalene	--	--	550 U	370 U	580 U	380 U	410 U	380 U	990
2-Methylphenol	100000	1000000	550 U	370 U	580 U	380 U	410 U	380 U	400 U
2-Nitroaniline	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
2-Nitrophenol	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
3,3-Dichlorobenzidine	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
3+4-Methylphenols	100000	1000000	550 U	370 U	580 U	380 U	410 U	380 U	400 U
3-Nitroaniline	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
4,6-Dinitro-2-methylphenol	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
4-Bromophenyl-phenylether	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
4-Chloro-3-methylphenol	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
4-Chloroaniline	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
4-Chlorophenyl-phenylether	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
4-Nitroaniline	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
4-Nitrophenol	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
Acenaphthene	100000	1000000	550 U	370 U	580 U	380 U	410 U	380 U	2300
Acenaphthylene	100000	1000000	550 U	370 U	580 U	380 U	410 U	380 U	400 U
Acetophenone	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
Anthracene	100000	1000000	550 U	370 U	580 U	380 U	410 U	380 U	5600 D
Atrazine	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
Benzaldehyde	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
Benzo(a)anthracene	1000	11000	550 U	370 U	580 U	380 U	410 U	380 U	***5300 D***
Benzo(a)pyrene	1000	1100	550 U	370 U	580 U	380 U	410 U	380 U	***2900***
Benzo(b)fluoranthene	1000	11000	550 U	370 U	580 U	380 U	410 U	380 U	***4000 D***
Benzo(g,h,i)perylene	100000	1000000	550 U	370 U	580 U	380 U	410 U	380 U	1500

See next page for Footnotes/Qualifiers

Table E-2
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
TCL Semivolatile Organic Compounds

Sample ID			SB-01(13-15)	SB-01(23-25)	SB-02(13-15)	SB-02(23-25)	SB-03(12-14)	SB-03(18-20)	SB-04(3-5)
Sampling Date			3/16/2016	3/16/2016	3/17/2016	3/17/2016	3/17/2016	3/17/2016	3/16/2016
Start Depth (in Feet)			13	23	13	23	12	18	3
End Depth (in Feet)			15	25	15	25	14	20	5
Units			ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
	NYCRR 6 Part 375 Restricted-Residential Use Soil Cleanup Objectives (SCO) ug/kg	NYCRR 6 Part 375 Industrial Use Soil Cleanup Objectives (SCO) ug/kg							
COMPOUNDS CONTINUED									
Benzo(k)fluoranthene	3900	110000	550 U	370 U	580 U	380 U	410 U	380 U	1100
bis(2-Chloroethoxy)methane	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
bis(2-Chloroethyl)ether	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
Bis(2-ethylhexyl)phthalate	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
Butylbenzylphthalate	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
Caprolactam	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
Carbazole	--	--	550 U	370 U	580 U	380 U	410 U	380 U	1600
Chrysene	3900	110000	550 U	370 U	580 U	380 U	410 U	380 U	3800 JD
Dibenzo(a,h)anthracene	330	1100	550 U	370 U	580 U	380 U	410 U	380 U	***430***
Dibenzofuran	59000	1000000	550 U	370 U	580 U	380 U	410 U	380 U	1900
Diethylphthalate	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
Dimethylphthalate	--	--	1000	550	1000	620	660	620	520
Di-n-butylphthalate	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
Di-n-octyl phthalate	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
Fluoranthene	100000	1000000	550 U	370 U	580 U	380 U	410 U	380 U	10000 D
Fluorene	100000	1000000	550 U	370 U	580 U	380 U	410 U	380 U	2700
Hexachlorobenzene	1200	12000	550 U	370 U	580 U	380 U	410 U	380 U	400 U
Hexachlorobutadiene	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
Hexachlorocyclopentadiene	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
Hexachloroethane	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
Indeno(1,2,3-cd)pyrene	500	11000	550 U	370 U	580 U	380 U	410 U	380 U	***1900***
Isophorone	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
Naphthalene	100000	1000000	550 U	370 U	580 U	380 U	410 U	380 U	1400
Nitrobenzene	15000	140000	550 U	370 U	580 U	380 U	410 U	380 U	400 U
n-Nitroso-di-n-propylamine	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
n-Nitrosodiphenylamine	--	--	550 U	370 U	580 U	380 U	410 U	380 U	400 U
Pentachlorophenol	6700	55000	550 U	370 U	580 U	380 U	410 U	380 U	400 U
Phenanthrene	100000	1000000	550 U	370 U	580 U	380 U	410 U	380 U	17100 D
Phenol	100000	1000000	550 U	370 U	580 U	380 U	410 U	380 U	400 U
Pyrene	100000	1000000	550 U	370 U	580 U	380 U	410 U	380 U	7500 D
Total Semivolatile Compounds	--	--	1000	550	1000	620	660	620	72940

Footnotes/Qualifiers:

ug/kg: Micrograms per kilogram --: No standard

BD: Blind duplicate

Exceeded the Industrial Use SCO

U: Analyzed for but not detected

D: Reported from secondary dilution

J: Estimated value or detection limits

Exceeded the Restricted-Residential Use SCO

Table E-2
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
TCL Semivolatile Organic Compounds

Sample ID			SB-04(10-12)	SB-04(27-29)	SB-05(10-11)	SB-05(10-11) BD	SB-05(11-13)	SB-06(8-10)	SB-06(11-13)
Sampling Date			3/16/2016	3/16/2016	3/16/2016	3/16/2016	3/16/2016	3/17/2016	3/17/2016
Start Depth (in Feet)			10	27	10	10	11	8	11
End Depth (in Feet)			12	29	11	11	13	10	13
Units			ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
	NYCRR 6 Part 375 Restricted-Residential Use Soil Cleanup Objectives (SCO) ug/kg	NYCRR 6 Part 375 Industrial Use Soil Cleanup Objectives (SCO) ug/kg							
SEMIVOLATILE COMPOUNDS									
1,1-Biphenyl	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
1,2,4,5-Tetrachlorobenzene	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
1,4-Dioxane	13000	250000	570 U	370 U	400 U	390 U	490 U	430 U	380 U
2,2-oxybis(1-Chloropropane)	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
2,3,4,6-Tetrachlorophenol	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
2,4,5-Trichlorophenol	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
2,4,6-Trichlorophenol	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
2,4-Dichlorophenol	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
2,4-Dimethylphenol	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
2,4-Dinitrophenol	--	--	570 UJ	370 UJ	400 UJ	390 UJ	490 UJ	430 UJ	380 UJ
2,4-Dinitrotoluene	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
2,6-Dinitrotoluene	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
2-Chloronaphthalene	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
2-Chlorophenol	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
2-Methylnaphthalene	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
2-Methylphenol	100000	1000000	570 U	370 U	400 U	390 U	490 U	430 U	380 U
2-Nitroaniline	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
2-Nitrophenol	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
3,3-Dichlorobenzidine	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
3+4-Methylphenols	100000	1000000	570 U	370 U	400 U	390 U	490 U	430 U	380 U
3-Nitroaniline	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
4,6-Dinitro-2-methylphenol	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
4-Bromophenyl-phenylether	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
4-Chloro-3-methylphenol	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
4-Chloroaniline	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
4-Chlorophenyl-phenylether	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
4-Nitroaniline	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
4-Nitrophenol	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Acenaphthene	100000	1000000	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Acenaphthylene	100000	1000000	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Acetophenone	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Anthracene	100000	1000000	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Atrazine	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Benzaldehyde	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Benzo(a)anthracene	1000	11000	570 U	370 U	400 U	390 U	490 U	92.3 J	380 U
Benzo(a)pyrene	1000	1100	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Benzo(b)fluoranthene	1000	11000	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Benzo(g,h,i)perylene	100000	1000000	570 U	370 U	400 U	390 U	490 U	430 U	380 U

See next page for Footnotes/Qualifiers

Table E-2
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
TCL Semivolatile Organic Compounds

Sample ID			SB-04(10-12)	SB-04(27-29)	SB-05(10-11)	SB-05(10-11) BD	SB-05(11-13)	SB-06(8-10)	SB-06(11-13)
Sampling Date			3/16/2016	3/16/2016	3/16/2016	3/16/2016	3/16/2016	3/17/2016	3/17/2016
Start Depth (in Feet)			10	27	10	10	11	8	11
End Depth (in Feet)			12	29	11	11	13	10	13
Units			ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
COMPOUNDS CONTINUED	NYCRR 6 Part 375 Restricted-Residential Use Soil Cleanup Objectives (SCO) ug/kg	NYCRR 6 Part 375 Industrial Use Soil Cleanup Objectives (SCO) ug/kg							
Benzo(k)fluoranthene	3900	110000	570 U	370 U	400 U	390 U	490 U	430 U	380 U
bis(2-Chloroethoxy)methane	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
bis(2-Chloroethyl)ether	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Bis(2-ethylhexyl)phthalate	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Butylbenzylphthalate	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Caprolactam	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Carbazole	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Chrysene	3900	110000	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Dibenzo(a,h)anthracene	330	1100	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Dibenzofuran	59000	1000000	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Diethylphthalate	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Dimethylphthalate	--	--	890	580	660	680	860	550	610
Di-n-butylphthalate	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Di-n-octyl phthalate	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Fluoranthene	100000	1000000	570 U	370 U	84.3 J	390 U	490 U	170 J	380 U
Fluorene	100000	1000000	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Hexachlorobenzene	1200	12000	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Hexachlorobutadiene	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Hexachlorocyclopentadiene	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Hexachloroethane	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Indeno(1,2,3-cd)pyrene	500	11000	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Isophorone	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Naphthalene	100000	1000000	570 U	370 U	400 U	390 U	490 U	160 J	380 U
Nitrobenzene	15000	140000	570 U	370 U	400 U	390 U	490 U	430 U	380 U
n-Nitroso-di-n-propylamine	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
n-Nitrosodiphenylamine	--	--	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Pentachlorophenol	6700	55000	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Phenanthrene	100000	1000000	570 U	370 U	400 U	390 U	490 U	180 J	380 U
Phenol	100000	1000000	570 U	370 U	400 U	390 U	490 U	430 U	380 U
Pyrene	100000	1000000	570 U	370 U	91.6 J	390 U	490 U	190 J	380 U
Total Semivolatile Compounds	--	--	890	580	835.9	680	860	1342.3	610

Footnotes/Qualifiers:

ug/kg:	Micrograms per kilogram	--:	No standard
BD:	Blind duplicate		Exceeded the Industrial Use SCO
U:	Analyzed for but not detected		
D:	Reported from secondary dilution		
J:	Estimated value or detection limits		

Exceeded the Restricted-Residential Use SCO

Table E-2
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
TCL Semivolatile Organic Compounds

Sample ID			SB-07(12-14)	SB-07(23-25)	SB-08(4-6)	SB-08(6-8)	SB-08(13-15)	GW-01(4-5)	GW-01(13-15)
Sampling Date			3/18/2016	3/18/2016	3/17/2016	3/17/2016	3/17/2016	3/21/2016	3/21/2016
Start Depth (in Feet)			12	23	4	6	13	4	13
End Depth (in Feet)			14	25	6	8	15	5	15
Units			ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
	NYCRR 6 Part 375 Restricted-Residential Use Soil Cleanup Objectives (SCO) ug/kg	NYCRR 6 Part 375 Industrial Use Soil Cleanup Objectives (SCO) ug/kg							
SEMIVOLATILE COMPOUNDS									
1,1-Biphenyl	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
1,2,4,5-Tetrachlorobenzene	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
1,4-Dioxane	13000	250000	450 U	360 U	660 U	380 U	380 U	400 U	390 U
2,2-oxybis(1-Chloropropane)	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
2,3,4,6-Tetrachlorophenol	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
2,4,5-Trichlorophenol	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
2,4,6-Trichlorophenol	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
2,4-Dichlorophenol	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
2,4-Dimethylphenol	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
2,4-Dinitrophenol	--	--	450 U	360 U	660 UJ	380 UJ	380 U	400 U	390 U
2,4-Dinitrotoluene	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
2,6-Dinitrotoluene	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
2-Chloronaphthalene	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
2-Chlorophenol	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
2-Methylnaphthalene	--	--	450 U	360 U	290 J	380 U	380 U	400 U	390 U
2-Methylphenol	100000	1000000	450 U	360 U	660 U	380 U	380 U	400 U	390 U
2-Nitroaniline	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
2-Nitrophenol	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
3,3-Dichlorobenzidine	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
3+4-Methylphenols	100000	1000000	450 U	360 U	660 U	380 U	380 U	400 U	390 U
3-Nitroaniline	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
4,6-Dinitro-2-methylphenol	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
4-Bromophenyl-phenylether	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
4-Chloro-3-methylphenol	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
4-Chloroaniline	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
4-Chlorophenyl-phenylether	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
4-Nitroaniline	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
4-Nitrophenol	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
Acenaphthene	100000	1000000	450 U	360 U	660 U	380 U	380 U	400 U	390 U
Acenaphthylene	100000	1000000	450 U	360 U	660 U	380 U	380 U	400 U	390 U
Acetophenone	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
Anthracene	100000	1000000	450 U	360 U	230 J	100 J	380 U	90.4 J	390 U
Atrazine	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
Benzaldehyde	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
Benzo(a)anthracene	1000	11000	450 U	360 U	590 J	220 J	380 U	330 J	390 U
Benzo(a)pyrene	1000	1100	450 U	360 U	520 J	190 J	380 U	250 J	390 U
Benzo(b)fluoranthene	1000	11000	450 U	360 U	680	260 J	380 U	340 J	390 U
Benzo(g,h,i)perylene	100000	1000000	450 U	360 U	320 J	120 J	380 U	140 J	390 U

See next page for Footnotes/Qualifiers

Table E-2
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
TCL Semivolatile Organic Compounds

		Sample ID	SB-07(12-14)	SB-07(23-25)	SB-08(4-6)	SB-08(6-8)	SB-08(13-15)	GW-01(4-5)	GW-01(13-15)
		Sampling Date	3/18/2016	3/18/2016	3/17/2016	3/17/2016	3/17/2016	3/21/2016	3/21/2016
		Start Depth (in Feet)	12	23	4	6	13	4	13
		End Depth (in Feet)	14	25	6	8	15	5	15
		Units	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
	NYCRR 6 Part 375 Restricted-Residential Use Soil Cleanup Objectives (SCO) ug/kg	NYCRR 6 Part 375 Industrial Use Soil Cleanup Objectives (SCO) ug/kg							
COMPOUNDS CONTINUED									
Benzo(k)fluoranthene	3900	110000	450 U	360 U	300 J	100 J	380 U	180 J	390 U
bis(2-Chloroethoxy)methane	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
bis(2-Chloroethyl)ether	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
Bis(2-ethylhexyl)phthalate	--	--	450 U	360 U	290 J	140 J	380 U	130 J	390 U
Butylbenzylphthalate	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
Caprolactam	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
Carbazole	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
Chrysene	3900	110000	450 U	360 U	630 J	220 J	380 U	280 J	390 U
Dibenzo(a,h)anthracene	330	1100	450 U	360 U	660 U	380 U	380 U	400 U	390 U
Dibenzofuran	59000	1000000	450 U	360 U	660 U	380 U	380 U	400 U	390 U
Diethylphthalate	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
Dimethylphthalate	--	--	800	600	970	450	750	590 J	660 J
Di-n-butylphthalate	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
Di-n-octyl phthalate	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
Fluoranthene	100000	1000000	450 U	360 U	1100	410	380 U	430 J	390 U
Fluorene	100000	1000000	450 U	360 U	660 U	380 U	380 U	400 U	390 U
Hexachlorobenzene	1200	12000	450 U	360 U	660 U	380 U	380 U	400 U	390 U
Hexachlorobutadiene	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
Hexachlorocyclopentadiene	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
Hexachloroethane	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
Indeno(1,2,3-cd)pyrene	500	11000	450 U	360 U	240 J	91.5 J	380 U	170 J	390 U
Isophorone	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
Naphthalene	100000	1000000	450 U	360 U	300 J	88.9 J	380 U	400 U	390 U
Nitrobenzene	15000	140000	450 U	360 U	660 U	380 U	380 U	400 U	390 U
n-Nitroso-di-n-propylamine	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
n-Nitrosodiphenylamine	--	--	450 U	360 U	660 U	380 U	380 U	400 U	390 U
Pentachlorophenol	6700	55000	450 U	360 U	660 U	380 U	380 U	400 U	390 U
Phenanthrene	100000	1000000	450 U	360 U	820	340 J	380 U	300 J	390 U
Phenol	100000	1000000	450 U	360 U	660 U	380 U	380 U	400 U	390 U
Pyrene	100000	1000000	450 U	360 U	950	400	380 U	370 J	390 U
Total Semivolatile Compounds	--	--	800	600	8230	3130.4	750	3600.4	660

Footnotes/Qualifiers:

ug/kg:	Micrograms per kilogram	--:	No standard
BD:	Blind duplicate		Exceeded the Industrial Use SCO
U:	Analyzed for but not detected		
D:	Reported from secondary dilution		
J:	Estimated value or detection limits		

Exceeded the Restricted-Residential Use SCO

Table E-2
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
TCL Semivolatile Organic Compounds

		Sample ID	**GW-01(18-20)**	**GW-03(3-4)**	**GW-03(12-14)**	**GW-03(18-20)**	**GW-04(2-3)**	**GW-04(12-14)**	**GW-04(12-14)BD**	**GW-04(16-18)**
		Sampling Date	**3/21/2016**	**3/21/2016**	**3/21/2016**	**3/21/2016**	**3/23/2016**	**3/23/2016**	**3/23/2016**	**3/23/2016**
		Start Depth (in Feet)	**18**	**3**	**12**	**18**	**2**	**12**	**12**	**16**
		End Depth (in Feet)	**20**	**4**	**14**	**20**	**3**	**14**	**14**	**18**
		Units	**ug/Kg**	**ug/Kg**	**ug/Kg**	**ug/Kg**	**ug/Kg**	**ug/Kg**	**ug/Kg**	**ug/Kg**
	NYCRR 6 Part 375 Restricted-Residential Use Soil Cleanup Objectives (SCO) ug/kg	**NYCRR 6 Part 375** Industrial Use Soil Cleanup Objectives (SCO) ug/kg								
SEMIVOLATILE COMPOUNDS										
1,1-Biphenyl	--	--	370 U	77.7 J	540 U	390 U	370 U	520 U	550 U	370 U
1,2,4,5-Tetrachlorobenzene	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
1,4-Dioxane	13000	250000	370 U	360 U	540 U	390 U	370 UJ	520 UJ	550 UJ	370 UJ
2,2-oxybis(1-Chloropropane)	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
2,3,4,6-Tetrachlorophenol	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
2,4,5-Trichlorophenol	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
2,4,6-Trichlorophenol	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
2,4-Dichlorophenol	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
2,4-Dimethylphenol	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
2,4-Dinitrophenol	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
2,4-Dinitrotoluene	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
2,6-Dinitrotoluene	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
2-Chloronaphthalene	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
2-Chlorophenol	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
2-Methylnaphthalene	--	--	370 U	310 J	540 U	390 U	110 J	520 U	550 U	370 U
2-Methylphenol	100000	1000000	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
2-Nitroaniline	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
2-Nitrophenol	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
3,3-Dichlorobenzidine	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
3+4-Methylphenols	100000	1000000	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
3-Nitroaniline	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
4,6-Dinitro-2-methylphenol	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
4-Bromophenyl-phenylether	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
4-Chloro-3-methylphenol	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
4-Chloroaniline	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
4-Chlorophenyl-phenylether	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
4-Nitroaniline	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
4-Nitrophenol	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
Acenaphthene	100000	1000000	370 U	280 J	540 U	390 U	660 J	520 U	550 U	370 U
Acenaphthylene	100000	1000000	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
Acetophenone	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
Anthracene	100000	1000000	370 U	540 J	540 U	390 U	1200 J	520 U	550 U	370 U
Atrazine	--	--	370 U	540 J	540 U	390 U	370 U	520 U	550 U	370 U
Benzaldehyde	--	--	370 U	360 U	540 U	390 U	370 UJ	520 UJ	550 UJ	370 UJ
Benzo(a)anthracene	1000	11000	370 U	610 J	540 U	390 U	***1200 J***	520 U	550 U	370 U
Benzo(a)pyrene	1000	1100	370 U	370 J	540 U	390 U	810 J	520 U	550 U	370 U
Benzo(b)fluoranthene	1000	11000	370 U	580 J	540 U	390 U	950 J	520 U	550 U	370 U
Benzo(g,h,i)perylene	100000	1000000	370 U	190 J	540 U	390 U	430 J	520 U	550 U	370 U

See next page for Footnotes/Qualifiers

Table E-2
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
TCL Semivolatile Organic Compounds

Sample ID			GW-01(18-20)	GW-03(3-4)	GW-03(12-14)	GW-03(18-20)	GW-04(2-3)	GW-04(12-14)	GW-04(12-14)BD	GW-04(16-18)
Sampling Date			3/21/2016	3/21/2016	3/21/2016	3/21/2016	3/23/2016	3/23/2016	3/23/2016	3/23/2016
Start Depth (in Feet)			18	3	12	18	2	12	12	16
End Depth (in Feet)			20	4	14	20	3	14	14	18
Units			ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
	NYCRR 6 Part 375 Restricted-Residential Use Soil Cleanup Objectives (SCO) ug/kg	NYCRR 6 Part 375 Industrial Use Soil Cleanup Objectives (SCO) ug/kg								
COMPOUNDS CONTINUED										
Benzo(k)fluoranthene	3900	110000	370 U	270 J	540 U	390 U	290 J	520 U	550 U	370 U
bis(2-Chloroethoxy)methane	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
bis(2-Chloroethyl)ether	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
Bis(2-ethylhexyl)phthalate	--	--	370 U	120 J	540 U	390 U	370 U	520 U	550 U	370 U
Butylbenzylphthalate	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
Caprolactam	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
Carbazole	--	--	370 U	360 U	540 U	390 U	410 J	520 U	550 U	370 U
Chrysene	3900	110000	370 U	660 J	540 U	390 U	990 J	520 U	550 U	370 U
Dibenzo(a,h)anthracene	330	1100	370 U	360 U	540 U	390 U	120 J	520 U	550 U	370 U
Dibenzofuran	59000	1000000	370 U	340 J	540 U	390 U	430 J	520 U	550 U	370 U
Diethylphthalate	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
Dimethylphthalate	--	--	370 J	240 J	440 J	580 J	510 J	960 J	780 J	590 J
Di-n-butylphthalate	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
Di-n-octyl phthalate	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
Fluoranthene	100000	1000000	370 U	1500 J	540 U	390 U	2000 J	520 U	550 U	370 U
Fluorene	100000	1000000	370 U	230 J	540 U	390 U	690 J	520 U	550 U	370 U
Hexachlorobenzene	1200	12000	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
Hexachlorobutadiene	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
Hexachlorocyclopentadiene	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
Hexachloroethane	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
Indeno(1,2,3-cd)pyrene	500	11000	370 U	270 J	540 U	390 U	***600 J***	520 U	550 U	370 U
Isophorone	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
Naphthalene	100000	1000000	370 U	420 J	540 U	390 U	200 J	520 U	550 U	370 U
Nitrobenzene	15000	140000	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
n-Nitroso-di-n-propylamine	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
n-Nitrosodiphenylamine	--	--	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
Pentachlorophenol	6700	55000	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
Phenanthrene	100000	1000000	370 U	850 J	540 U	390 U	3000 D	520 U	550 U	370 U
Phenol	100000	1000000	370 U	360 U	540 U	390 U	370 U	520 U	550 U	370 U
Pyrene	100000	1000000	370 U	1000 J	540 U	390 U	2000 J	520 U	550 U	370 U
Total Semivolatile Compounds	--	--	370	9397.7	440	580	16600	960	780	590

Footnotes/Qualifiers:

ug/kg: Micrograms per kilogram --: No standard

BD: Blind duplicate

Exceeded the Industrial Use SCO

U: Analyzed for but not detected

D: Reported from secondary dilution

J: Estimated value or detection limits

Exceeded the Restricted-Residential Use SCO

D&B ENGINEERS AND ARCHITECTS, P.C.

Table E-3
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
Polychlorinated Biphenyls (PCBs)

		Sample ID	SB-03(12-14)	SB-04(3-5)	SB-05(10-11)	SB-05(10-11) BD	SB-06(8-10)	SB-07(12-14)	SB-09(0-1)
		Sampling Date	3/17/2016	3/16/2016	3/16/2016	3/16/2016	3/17/2016	3/18/2016	3/18/2016
		Start Depth (in Feet)	12	3	10	10	8	12	0
		End Depth (in Feet)	14	5	11	11	10	14	1
		Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
	NYCRR 6 Part 375 Restricted-Residential Use Soil Cleanup Objectives (SCO) ug/kg	NYCRR 6 Part 375 Industrial Use Soil Cleanup Objectives (SCO) ug/kg							
PCBS									
Aroclor 1016	1000	25000	21.2 U	20.8 UJ	20.5 U	20.1 UJ	22.3 UJ	23.4 UJ	20 U
Aroclor 1221	1000	25000	21.2 U	20.8 UJ	20.5 U	20.1 UJ	22.3 UJ	23.4 UJ	20 U
Aroclor 1232	1000	25000	21.2 U	20.8 UJ	20.5 U	20.1 UJ	22.3 UJ	23.4 UJ	20 U
Aroclor 1242	1000	25000	21.2 U	20.8 UJ	20.5 U	20.1 UJ	22.3 UJ	23.4 UJ	20 U
Aroclor 1248	1000	25000	21.2 U	20.8 UJ	20.5 U	20.1 UJ	22.3 UJ	23.4 UJ	20 U
Aroclor 1254	1000	25000	21.2 U	20.8 UJ	20.5 U	20.1 UJ	22.3 UJ	23.4 UJ	20 U
Aroclor 1260	1000	25000	21.2 U	20.8 UJ	20.5 U	20.1 UJ	22.3 UJ	23.4 UJ	20 U
Aroclor-1262	1000	25000	21.2 U	20.8 UJ	20.5 U	20.1 UJ	22.3 UJ	23.4 UJ	20 U
Aroclor-1268	1000	25000	21.2 U	20.8 UJ	20.5 U	20.1 UJ	22.3 UJ	23.4 UJ	20 U
Total PCBs	1000	25000	0	0	0	0	0	0	0

Footnotes/Qualifiers:

ug/kg: Micrograms per kilogram
U: Analyzed for but not detected
BD: Blind duplicate
J: Estimated value or detection limits
J-: Estimated bias low
--: No standard

Table E-3
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
Polychlorinated Biphenyls (PCBs)

Sample ID			SB-09(2-3)	SB-09(4-5)	SB-09(7-8)	SB-10(0-1)	SB-10(2-3)	SB-10(4-5)	SB-10(4-5) BD
Sampling Date			3/18/2016	3/18/2016	3/18/2016	3/16/2016	3/18/2016	3/18/2016	3/18/2016
Start Depth (in Feet)			2	4	7	0	2	4	4
End Depth (in Feet)			3	5	8	1	3	5	5
Units			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
	NYCRR 6 Part 375 Restricted-Residential Use Soil Cleanup Objectives (SCO) ug/kg	NYCRR 6 Part 375 Industrial Use Soil Cleanup Objectives (SCO) ug/kg							
PCBS									
Aroclor 1016	1000	25000	21.8 U	20.4 UJ	20 U	18.8 U	21.4 UJ	21 U	21.7 U
Aroclor 1221	1000	25000	21.8 U	20.4 UJ	20 U	18.8 U	21.4 UJ	21 U	21.7 U
Aroclor 1232	1000	25000	21.8 U	20.4 UJ	20 U	18.8 U	21.4 UJ	21 U	21.7 U
Aroclor 1242	1000	25000	21.8 U	20.4 UJ	20 U	18.8 U	21.4 UJ	21 U	21.7 U
Aroclor 1248	1000	25000	21.8 U	20.4 UJ	20 U	18.8 U	21.4 UJ	21 U	21.7 U
Aroclor 1254	1000	25000	21.8 U	20.4 UJ	20 U	18.8 U	21.4 UJ	21 U	21.7 U
Aroclor 1260	1000	25000	21.8 U	20.4 UJ	20 U	61.6	21.4 UJ	21 U	21.7 U
Aroclor-1262	1000	25000	21.8 U	20.4 UJ	20 U	18.8 U	21.4 UJ	21 U	21.7 U
Aroclor-1268	1000	25000	21.8 U	20.4 UJ	20 U	18.8 U	21.4 UJ	21 U	21.7 U
Total PCBs	1000	25000	0	0	0	61.6	0	0	0

Footnotes/Qualifiers:

ug/kg: Micrograms per kilogram
U: Analyzed for but not detected
BD: Blind duplicate
J: Estimated value or detection limits
J-: Estimated bias low
--: No standard

D&B ENGINEERS AND ARCHITECTS, P.C.

Table E-3
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
Polychlorinated Biphenyls (PCBs)

Sample ID			SB-10(7-8)	SB-11(0-1)	SB-11(2-3)	SB-11(4-5)	SB-11(7-8)	SB-12(0-1)	SB-12(2-3)
Sampling Date			3/18/2016	3/18/2016	3/18/2016	3/18/2016	3/18/2016	3/21/2016	3/21/2016
Start Depth (in Feet)			7	0	2	4	7	0	2
End Depth (in Feet)			8	1	3	5	8	1	3
Units			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
	NYCRR 6 Part 375 Restricted-Residential Use Soil Cleanup Objectives (SCO) ug/kg	NYCRR 6 Part 375 Industrial Use Soil Cleanup Objectives (SCO) ug/kg							
PCBS									
Aroclor 1016	1000	25000	20.8 U	21.2 U	21.7 U	21.2 U	44.4 U	19.8 U	21.7 UJ
Aroclor 1221	1000	25000	20.8 U	21.2 U	21.7 U	21.2 U	44.4 U	19.8 U	21.7 UJ
Aroclor 1232	1000	25000	20.8 U	21.2 U	21.7 U	21.2 U	44.4 U	19.8 U	21.7 UJ
Aroclor 1242	1000	25000	20.8 U	21.2 U	21.7 U	21.2 U	44.4 U	19.8 U	21.7 UJ
Aroclor 1248	1000	25000	20.8 U	21.2 U	21.7 U	21.2 U	44.4 U	19.8 U	21.7 UJ
Aroclor 1254	1000	25000	20.8 U	21.2 U	21.7 U	21.2 U	44.4 U	19.8 U	21.7 UJ
Aroclor 1260	1000	25000	20.8 U	21.2 U	21.7 U	21.2 U	44.4 U	19.8 U	21.7 UJ
Aroclor-1262	1000	25000	20.8 U	21.2 U	21.7 U	21.2 U	44.4 U	19.8 U	21.7 UJ
Aroclor-1268	1000	25000	20.8 U	21.2 U	21.7 U	21.2 U	44.4 U	19.8 U	21.7 UJ
Total PCBs	1000	25000	0	0	0	0	0	0	0

Footnotes/Qualifiers:

ug/kg: Micrograms per kilogram
U: Analyzed for but not detected
BD: Blind duplicate
J: Estimated value or detection limits
J-: Estimated bias low
--: No standard

Table E-3
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
Polychlorinated Biphenyls (PCBs)

Sample ID			SB-12(5-6)	SB-13(0-1)	SB-13(2-3)	SB-13(5-6)	SB-13(5-6)BD	SB-14(0-1)	SB-14(2-3)
Sampling Date			3/21/2016	3/21/2016	3/21/2016	3/21/2016	3/21/2016	3/16/2016	3/21/2016
Start Depth (in Feet)			5	0	2	5	5	0	2
End Depth (in Feet)			6	1	3	6	6	1	3
Units			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
	NYCRR 6 Part 375 Restricted-Residential Use Soil Cleanup Objectives (SCO) ug/kg	NYCRR 6 Part 375 Industrial Use Soil Cleanup Objectives (SCO) ug/kg							
PCBS									
Aroclor 1016	1000	25000	40.6 UJ	20.2 U	23 UJ	34.5 U	31.1 UJ	18.7 U	19.2 U
Aroclor 1221	1000	25000	40.6 UJ	20.2 U	23 UJ	34.5 U	31.1 UJ	18.7 U	19.2 U
Aroclor 1232	1000	25000	40.6 UJ	20.2 U	23 UJ	34.5 U	31.1 UJ	18.7 U	19.2 U
Aroclor 1242	1000	25000	40.6 UJ	20.2 U	23 UJ	34.5 U	31.1 UJ	18.7 U	19.2 U
Aroclor 1248	1000	25000	40.6 UJ	20.2 U	23 UJ	34.5 U	31.1 UJ	18.7 U	19.2 U
Aroclor 1254	1000	25000	40.6 UJ	32	23 UJ	34.5 U	31.1 UJ	310	19.2 U
Aroclor 1260	1000	25000	40.6 UJ	20.2 U	23 UJ	34.5 U	31.1 UJ	18.7 U	19.2 U
Aroclor-1262	1000	25000	40.6 UJ	20.2 U	23 UJ	34.5 U	31.1 UJ	18.7 U	19.2 U
Aroclor-1268	1000	25000	40.6 UJ	20.2 U	23 UJ	34.5 U	31.1 UJ	18.7 U	19.2 U
Total PCBs	1000	25000	0	32	0	0	0	310	0

Footnotes/Qualifiers:

ug/kg: Micrograms per kilogram
U: Analyzed for but not detected
BD: Blind duplicate
J: Estimated value or detection limits
J-: Estimated bias low
--: No standard

Table E-3
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
Polychlorinated Biphenyls (PCBs)

Sample ID			SB-14(5-6)	SB-15(0-1)	SB-15(2-3)	SB-15(5-6)	SB-16(0-1)	SB-16(2-3)	SB-16(5-6)
Sampling Date			3/21/2016	3/18/2016	3/18/2016	3/18/2016	3/18/2016	3/18/2016	3/18/2016
Start Depth (in Feet)			5	0	2	5	0	2	5
End Depth (in Feet)			6	1	3	6	1	3	6
Units			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
	NYCRR 6 Part 375 Restricted-Residential Use Soil Cleanup Objectives (SCO) ug/kg	NYCRR 6 Part 375 Industrial Use Soil Cleanup Objectives (SCO) ug/kg							
PCBS									
Aroclor 1016	1000	25000	18.8 U	20.1 UJ	19.1 U	19.3 U	17.9 U	21 U	21.1 U
Aroclor 1221	1000	25000	18.8 U	20.1 UJ	19.1 U	19.3 U	17.9 U	21 U	21.1 U
Aroclor 1232	1000	25000	18.8 U	20.1 UJ	19.1 U	19.3 U	17.9 U	21 U	21.1 U
Aroclor 1242	1000	25000	18.8 U	20.1 UJ	19.1 U	19.3 U	17.9 U	21 U	21.1 U
Aroclor 1248	1000	25000	18.8 U	20.1 UJ	19.1 U	19.3 U	17.9 U	21 U	21.1 U
Aroclor 1254	1000	25000	18.8 U	10 J-	19.1 U	19.3 U	17.9 U	21 U	21.1 U
Aroclor 1260	1000	25000	18.8 U	20.1 UJ	19.1 U	19.3 U	17.9 U	21 U	21.1 U
Aroclor-1262	1000	25000	18.8 U	20.1 UJ	19.1 U	19.3 U	17.9 U	21 U	21.1 U
Aroclor-1268	1000	25000	18.8 U	20.1 UJ	19.1 U	19.3 U	17.9 U	21 U	21.1 U
Total PCBs	1000	25000	0	10	0	0	0	0	0

Footnotes/Qualifiers:

ug/kg:	Micrograms per kilogram
U:	Analyzed for but not detected
BD:	Blind duplicate
J:	Estimated value or detection limits
J-:	Estimated bias low
--:	No standard

D&B ENGINEERS AND ARCHITECTS, P.C.

Table E-3
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
Polychlorinated Biphenyls (PCBs)

Sample ID			SB-17(0-1)	SB-17(2-3)	SB-17(5-6)	GW-01(13-15)	GW-03(12-14)	GW-04(12-14)	GW-04(12-14)BD
Sampling Date			3/16/2016	3/18/2016	3/18/2016	3/21/2016	3/21/2016	3/23/2016	3/23/2016
Start Depth (in Feet)			0	2	5	13	12	12	12
End Depth (in Feet)			1	3	6	15	14	14	14
Units			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
	NYCRR 6 Part 375 Restricted-Residential Use Soil Cleanup Objectives (SCO) ug/kg	NYCRR 6 Part 375 Industrial Use Soil Cleanup Objectives (SCO) ug/kg							
PCBS									
Aroclor 1016	1000	25000	19.5 U	21.9 UJ	19.5 U	20.2 UJ	27.9 UJ	26.9 U	28.6 U
Aroclor 1221	1000	25000	19.5 U	21.9 UJ	19.5 U	20.2 UJ	27.9 UJ	26.9 U	28.6 U
Aroclor 1232	1000	25000	19.5 U	21.9 UJ	19.5 U	20.2 UJ	27.9 UJ	26.9 U	28.6 U
Aroclor 1242	1000	25000	19.5 U	21.9 UJ	19.5 U	20.2 UJ	27.9 UJ	26.9 U	28.6 U
Aroclor 1248	1000	25000	19.5 U	21.9 UJ	19.5 U	20.2 UJ	27.9 UJ	26.9 U	28.6 U
Aroclor 1254	1000	25000	19.5 U	21.9 UJ	19.5 U	20.2 UJ	27.9 UJ	26.9 U	28.6 U
Aroclor 1260	1000	25000	44.4	21.9 UJ	19.5 U	20.2 UJ	27.9 UJ	26.9 U	28.6 U
Aroclor-1262	1000	25000	19.5 U	21.9 UJ	19.5 U	20.2 UJ	27.9 UJ	26.9 U	28.6 U
Aroclor-1268	1000	25000	19.5 U	21.9 UJ	19.5 U	20.2 UJ	27.9 UJ	26.9 U	28.6 U
Total PCBs	1000	25000	44.4	0	0	0	0	0	0

Footnotes/Qualifiers:

ug/kg:	Micrograms per kilogram
U:	Analyzed for but not detected
BD:	Blind duplicate
J:	Estimated value or detection limits
J-:	Estimated bias low
--:	No standard

D&B ENGINEERS AND ARCHITECTS, P.C.

Table E-4
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
TCL Pesticides

Sample ID			SB-03(12-14)	SB-04(3-5)	SB-05(10-11)	SB-05(10-11) BD	SB-06(8-10)	SB-07(12-14)	GW-01(13-15)
Sampling Date			3/17/2016	3/16/2016	3/16/2016	3/16/2016	3/17/2016	3/18/2016	3/21/2016
Start Depth (in Feet)			12	3	10	10	8	12	13
End Depth (in Feet)			14	5	11	11	10	14	15
Units			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
	NYCRR 6 Part 375 Restricted-Residential Use Soil Cleanup Objectives (SCO) ug/kg	NYCRR 6 Part 375 Industrial Use Soil Cleanup Objectives (SCO) ug/kg							
PESTICIDES									
4,4-DDD	13000	180000	2.1 U	2.1 U	2 U	2 U	2.2 U	2.3 U	2 U
4,4-DDE	8900	120000	2.1 U	2.1 U	2 U	2 U	2.2 U	2.3 U	2 U
4,4-DDT	7900	94000	2.1 U	2.1 U	2 U	2 U	2.2 U	2.3 U	2 U
Aldrin	97	1400	2.1 U	2.1 U	2 U	2 U	2.2 U	2.3 U	2 U
alpha-BHC	480	6800	2.1 U	2.1 U	2 U	2 U	2.2 U	2.3 U	2 U
alpha-Chlordane	4200	47000	2.1 U	2.1 U	2 U	2 U	2.2 U	2.3 U	2 U
beta-BHC	360	14000	2.1 U	2.1 U	2 U	2 U	2.2 U	2.3 U	2 U
delta-BHC	100000	1000000	2.1 U	2.1 U	2 U	2 U	2.2 U	2.3 U	2 U
Dieldrin	200	2800	2.1 U	2.1 U	2 U	2 U	2.2 U	2.3 U	2 U
Endosulfan I	24000	920000	2.1 U	2.1 U	2 U	2 U	2.2 U	2.3 U	2 U
Endosulfan II	24000	920000	2.1 U	2.1 U	2 U	2 U	2.2 U	2.3 U	2 U
Endosulfan Sulfate	24000	920000	2.1 U	2.1 U	2 U	2 U	2.2 U	2.3 U	2 U
Endrin	11000	410000	2.1 U	2.1 U	2 U	2 U	2.2 U	2.3 U	2 U
Endrin aldehyde	--	--	2.1 U	2.1 U	2 U	2 U	2.2 U	2.3 U	2 U
Endrin ketone	--	--	2.1 U	2.1 U	2 U	2 U	2.2 U	2.3 U	2 U
gamma-BHC (Lindane)	1300	23000	2.1 U	2.1 U	2 U	2 U	2.2 U	2.3 U	2 U
gamma-Chlordane	4200	47000	2.1 U	2.1 U	2 U	2 U	2.2 U	2.3 U	2 U
Heptachlor	2100	29000	2.1 U	2.1 U	2 U	2 U	2.2 U	2.3 U	2 U
Heptachlor epoxide	--	--	2.1 U	2.1 U	2 U	2 U	2.2 U	2.3 U	2 U
Methoxychlor	--	--	2.1 U	2.1 U	2 U	2 U	2.2 U	2.3 U	2 U
Toxaphene	--	--	21.2 U	20.8 U	20.5 U	20.1 U	22.3 U	23.3 U	20.2 U

Footnotes/Qualifiers:
ug/kg: Micrograms per kilogram
U: Analyzed for but not detected
BD: Blind duplicate
--: No standard

D&B Engineers and Architects, P.C.

Table E-4
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
TCL Pesticides

Sample ID			GW-03(12-14)	GW-04(12-14)	GW-04(12-14)BD
Sampling Date			3/21/2016	3/23/2016	3/23/2016
Start Depth (in Feet)			12	12	12
End Depth (in Feet)			14	14	14
Units			ug/kg	ug/kg	ug/kg
	NYCRR 6 Part 375 Restricted-Residential Use Soil Cleanup Objectives (SCO) ug/kg	NYCRR 6 Part 375 Industrial Use Soil Cleanup Objectives (SCO) ug/kg			
PESTICIDES					
4,4-DDD	13000	180000	2.8 U	2.7 U	2.9 U
4,4-DDE	8900	120000	2.8 U	2.7 U	2.9 U
4,4-DDT	7900	94000	2.8 U	2.7 U	2.9 U
Aldrin	97	1400	2.8 U	2.7 U	2.9 U
alpha-BHC	480	6800	2.8 U	2.7 U	2.9 U
alpha-Chlordane	4200	47000	2.8 U	2.7 U	2.9 U
beta-BHC	360	14000	2.8 U	2.7 U	2.9 U
delta-BHC	100000	1000000	2.8 U	2.7 U	2.9 U
Dieldrin	200	2800	2.8 U	2.7 U	2.9 U
Endosulfan I	24000	920000	2.8 U	2.7 U	2.9 U
Endosulfan II	24000	920000	2.8 U	2.7 U	2.9 U
Endosulfan Sulfate	24000	920000	2.8 U	2.7 U	2.9 U
Endrin	11000	410000	2.8 U	2.7 U	2.9 U
Endrin aldehyde	--	--	2.8 U	2.7 U	2.9 U
Endrin ketone	--	--	2.8 U	2.7 U	2.9 U
gamma-BHC (Lindane)	1300	23000	2.8 U	2.7 U	2.9 U
gamma-Chlordane	4200	47000	2.8 U	2.7 U	2.9 U
Heptachlor	2100	29000	2.8 U	2.7 U	2.9 U
Heptachlor epoxide	--	--	2.8 U	2.7 U	2.9 U
Methoxychlor	--	--	2.8 U	2.7 U	2.9 U
Toxaphene	--	--	27.9 U	26.9 U	28.6 U

Footnotes/Qualifiers:

ug/kg: Micrograms per kilogram

U: Analyzed for but not detected

BD: Blind duplicate

--: No standard

D&B ENGINEERS
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Table E-5
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
TAL Metals

Sample ID			SB-01(13-15)	SB-01(23-25)	SB-03(12-14)	SB-04(3-5)	SB-05(10-11)	SB-05(10-11)BD	SB-06(8-10)
Sampling Date			3/16/2016	3/16/2016	3/17/2016	3/16/2016	3/16/2016	3/16/2016	3/17/2016
Start Depth			13	23	12	3	10	10	8
End Depth			15	25	14	5	11	11	10
Units			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
	NYCRR 6 Part 375 Restricted-Residential Use Soil Cleanup Objectives (SCO) mg/kg	NYCRR 6 Part 375 Industrial Use Soil Cleanup Objectives (SCO) mg/kg							
Metals									
Aluminum	--	--	14000	4260	9310	2220	7560	8920	3330
Antimony	--	--	3.62 UJ	2.3 UJ	2.6 UJ	1.43 J	2.55 UJ	2.53 UJ	2.79 UJ
Arsenic	16	16	9.37	1.21	2.66	8.17	5	2.43	8.7
Barium	400	10000	24.2 J	45.8 J	22.2 J	41.5 J	24.6 J	21.9 J	24.4 J
Beryllium	72	2700	0.982	0.353	0.526	0.72	0.486	0.496	0.611
Cadmium	4.3	60	0.44 U	0.28 U	0.31 U	0.31 U	0.31 U	0.3 U	0.34 U
Calcium	--	--	2130	5640	368	9980	1340 J	309 J	5700
Chromium	180	6800	26.3	11	12.5	5.91	16.1	12.6	8.35
Cobalt	--	--	12 J	7.16 J	6.09 J	4.71 J	9.18 J	5.74 J	7.27 J
Copper	270	10000	7.81 J	12.5 J	10.7 J	106 J	13.1 J	10.7 J	35.6 J
Iron	--	--	32500	14500	16600	51000 D	17400	15500	22800
Lead	400	3900	15.1	4.11	19.5	104	25.4	29.8	***483***
Magnesium	--	--	6010	4330	2480	2350	3790	2430	1420
Manganese	2000	10000	409	262	121	302	163	102	377
Mercury	0.81	5.7	0.206 J	0.033 J	0.039 J	0.135 J	0.047 J	0.161 J	0.199 J
Nickel	310	10000	26.7	11.7	13.8	12.7	14.2	13.4	14.1
Potassium	--	--	2730 J	1810 J	524 J	199 J	827 J	504 J	366 J
Selenium	180	6800	1.45 U	0.92 U	1.04 U	1.03 U	1.02 U	1.01 U	1.12 U
Silver	180	6800	0.73 U	0.46 U	0.52 U	0.52 U	0.51 U	0.51 U	0.56 U
Sodium	--	--	19000 J	2200 J	1390 J	208 J	2400 J	1290 J	428 J
Thallium	--	--	2.9 U	1.84 U	2.08 U	2.06 U	2.04 U	2.02 U	2.23 U
Vanadium	--	--	32.5	18.5	16.2	12.9	22.8	15.1	11.8
Zinc	10000	10000	77.1 J	31 J	42.1 J	135 J	42.5 J	40.4 J	36.5 J

Footnotes/Qualifiers:

mg/kg: Milligrams per kilogram

U: Analyzed for but not detected

D: Detected in the secondary dilution

J: Estimated value or detection limits

--: No standard or not analyzed

Exceeded the Restricted-Residential Use SCO

D&B ENGINEERS AND ARCHITECTS, P.C.

Table E-5
Long Island Rail Road
Arch Street Yard RI
Subsurface Soil Samples
TAL Metals

Sample ID			SB-07(12-14)	GW-01(13-15)	GW-03(12-14)	GW-04(12-14)	GW-04(12-14)BD
Sampling Date			3/18/2016	3/21/2016	3/21/2016	3/23/2016	3/23/2016
Start Depth			12	13	12	12	12
End Depth			14	15	14	14	14
Units			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
	NYCRR 6 Part 375 Restricted-Residential Use Soil Cleanup Objectives (SCO) mg/kg	NYCRR 6 Part 375 Industrial Use Soil Cleanup Objectives (SCO) mg/kg					
Metals							
Aluminum	--	--	11000	6940	13900	11800	12000
Antimony	--	--	2.93 UJ	2.51 UJ	3.48 UJ	3.26 UJ	3.46 UJ
Arsenic	16	16	5.87	2.79	9.47	4.86	5.73
Barium	400	10000	32.3 J	22 J	24.4 J	136 J	119 J
Beryllium	72	2700	0.573	0.453	0.983	0.708	0.704
Cadmium	4.3	60	0.751	0.3 U	0.141 J	0.795	1.02
Calcium	--	--	2040 J	821	2880	696	733
Chromium	180	6800	18.8 J	10.3	24.9	23.5 J	26.1 J
Cobalt	--	--	9.91	6.67	12.5	9.7	15.5
Copper	270	10000	17.9 J	8.72	5.27	8.05 J	10.3 J
Iron	--	--	22600	15800	35700	27300	23900
Lead	400	3900	37.8	13	14.5	11.9	12
Magnesium	--	--	3400 J	2220	5610	3070 J	3290 J
Manganese	2000	10000	262 J	211 J	433 J	293 J	290 J
Mercury	0.81	5.7	***0.949 DJ***	0.052	0.159	0.015 J	0.03
Nickel	310	10000	19.2	12.1	27.8	17	19.5
Potassium	--	--	1440	511	2530	1900	2010
Selenium	180	6800	1.17 U	1 U	1.39 U	1.3 U	1.39 U
Silver	180	6800	2.61	0.5 UJ	0.7 UJ	3.11	2.72
Sodium	--	--	6990	1700	13600	3930	4170
Thallium	--	--	2.34 U	2.01 U	2.78 U	2.61 U	2.77 U
Vanadium	--	--	24	14.9	32	27.8	28.5
Zinc	10000	10000	62.7	35.5	76.5	54.2	59.7

Footnotes/Qualifiers:

mg/kg: Milligrams per kilogram
U: Analyzed for but not detected
D: Detected in the secondary dilution
J: Estimated value or detection limits
--: No standard or not analyzed

Exceeded the Restricted-Residential Use SCO

Table E-6
Long Island Rail Road
Arch Street Yard RI
Groundwater Samples
TCL Volatile Organic Compounds

Sample ID	VB-01(15-16)	VB-01(26-27)	VB-02(5)	VB-02(12-14)	NYSDEC Class GA Standard or Guidance Value
Sampling Date	10/30/15	10/30/15	10/30/15	10/30/15	
Units	ug/l	ug/l	ug/l	ug/l	ug/l
VOLATILE COMPOUNDS					
1,1,1-Trichloroethane	200 U	100 U	1 U	1 U	5
1,1,2,2-Tetrachloroethane	200 U	100 U	1 U	1 U	5
1,1,2-Trichloroethane	200 U	100 U	1 U	1 U	1
1,1,2-Trichlorotrifluoroethane	200 U	100 U	1 U	1 U	5
1,1-Dichloroethane	200 U	100 U	1 U	1 U	5
1,1-Dichloroethene	200 U	100 U	1 U	1 U	5
1,2,3-Trichlorobenzene	200 U	100 U	1 U	1 U	5
1,2,4-Trichlorobenzene	200 U	100 U	1 U	1 U	5
1,2-Dibromo-3-Chloropropane	200 U	100 U	1 U	1 U	0.04
1,2-Dibromoethane	200 U	100 U	1 U	1 U	0.0006
1,2-Dichlorobenzene	200 U	100 U	1 U	1 U	3
1,2-Dichloroethane	200 U	100 U	1 U	1 U	0.6
1,2-Dichloropropane	200 U	100 U	1 U	1 U	1
1,3-Dichlorobenzene	200 U	100 U	1 U	1 U	3
1,4-Dichlorobenzene	200 U	100 U	1 U	1 U	3
1,4-Dioxane	20000 U	10000 U	100 U	100 U	--
2-Hexanone	1000 U	500 U	5 U	5 U	50
Acetone	1000 U	500 U	5 U	5 U	50
Benzene	200 U	100 U	1 U	1 U	1
Bromochloromethane	200 U	100 U	1 U	1 U	5
Bromodichloromethane	200 U	100 U	1 U	1 U	50
Bromoform	200 U	100 U	1 U	1 U	50
Bromomethane	200 U	100 U	1 U	1 U	5
Carbon Disulfide	200 U	100 U	1 U	1 U	60
Carbon Tetrachloride	200 U	100 U	1 U	1 U	5
Chlorobenzene	200 U	100 U	1 U	1 U	5
Chloroethane	200 U	100 U	1 U	1 U	5
Chloroform	200 U	100 U	1 U	1 U	7
Chloromethane	200 U	100 U	1 U	1 U	5
Cis-1,2-Dichloroethylene	***6900***	***1800***	***36***	1.2	5
Cis-1,3-Dichloropropene	200 U	100 U	1 U	1 U	0.4
Cyclohexane	200 U	100 U	1 U	1 U	--
Dibromochloromethane	200 U	100 U	1 U	1 U	50
Dichlorodifluoromethane	200 U	100 U	1 U	1 U	5
Ethylbenzene	200 U	100 U	1 U	1 U	5
Isopropylbenzene	200 U	100 U	1 U	1 U	5
m,p-Xylene	400 U	200 U	2 U	2 U	5
Methyl Ethyl Ketone	1000 U	500 U	5 U	5 U	50
Methyl Isobutyl Ketone	1000 U	500 U	5 U	5 U	--
Methylene Chloride	200 U	100 U	1 U	1 U	5
Methyl Acetate	200 U	100 U	1 U	1 U	--
Methylcyclohexane	200 U	100 U	1 U	1 U	--
O-Xylene	200 U	100 U	1 U	1 U	5
Styrene	200 U	100 U	1 U	1 U	5
Tert-Butyl Methyl Ether	200 U	100 U	1.6	1.6	10
Tetrachloroethylene	***17600***	***4500***	0.71 J	1.5	5
Toluene	200 U	100 U	1 U	1 U	5
Trans-1,2-Dichloroethene	200 U	100 U	2.5	1 U	5
Trans-1,3-Dichloropropene	200 U	100 U	1 U	1 U	0.4
Trichloroethylene	***1000***	***1100***	2.2	0.93 J	5
Trichlorofluoromethane	200 U	100 U	1 U	1 U	5
Vinyl Chloride	***4900***	***560***	***17.9***	1 U	2
Total Volatile Compounds	30400	7960	61	5.2	--

Footnotes/Qualifiers:

ug/l: Micrograms per liter

--: No standard or not analyzed

U: Analyzed for but not detected

D: Detected in the secondary dilution

J: Estimated value

BD: Blind duplicate

Exceeded Class GA value

Table E-6
Long Island Rail Road
Arch Street Yard RI
Groundwater Samples
TCL Volatile Organic Compounds

Sample ID	GW-01	GW-02S	GW-02D	GW-03	NYSDEC Class GA
Sampling Date	4/7/2016	4/7/2016	4/7/2016	4/7/2016	Standard
					or Guidance Value
Units	ug/l	ug/l	ug/l	ug/l	ug/l
VOLATILE COMPOUNDS					
1,1,1-Trichloroethane	1 U	1 U	1 U	1 U	5
1,1,2,2-Tetrachloroethane	1 U	1 U	1 U	1 U	5
1,1,2-Trichloroethane	1 U	1 U	1 U	1 U	1
1,1,2-Trichlorotrifluoroethane	1 U	1 U	1 U	1 U	5
1,1-Dichloroethane	1 U	1 U	1 U	1 U	5
1,1-Dichloroethene	1 U	3.9	***23.6***	1 U	5
1,2,3-Trichlorobenzene	1 U	1 U	1 U	1 U	5
1,2,4-Trichlorobenzene	1 U	1 U	1 U	1 U	5
1,2-Dibromo-3-Chloropropane	1 U	1 U	1 U	1 U	0.04
1,2-Dibromoethane	1 U	1 U	1 U	1 U	0.0006
1,2-Dichlorobenzene	1 U	1 U	1 U	1 U	3
1,2-Dichloroethane	1 U	1 U	1 U	1 U	0.6
1,2-Dichloropropane	1 U	1 U	1 U	1 U	1
1,3-Dichlorobenzene	1 U	1 U	1 U	1 U	3
1,4-Dichlorobenzene	1 U	1 U	1 U	1 U	3
1,4-Dioxane	--	--	--	--	--
2-Hexanone	5 U	5 U	5 U	5 U	50
Acetone	5 U	2.9 J	4.8 J	5 U	50
Benzene	1 U	1 U	0.38 J	1 U	1
Bromochloromethane	1 U	1 U	1 U	1 U	5
Bromodichloromethane	1 U	1 U	1 U	1 U	50
Bromoform	1 U	1 U	1 U	1 U	50
Bromomethane	1 U	1 U	1 U	1 U	5
Carbon Disulfide	1 U	1 U	1 U	1 U	60
Carbon Tetrachloride	1 U	1 U	1 U	1 U	5
Chlorobenzene	1 U	1 U	1 U	1 U	5
Chloroethane	1 U	1 U	1 U	1 U	5
Chloroform	1 U	1 U	1 U	1 U	7
Chloromethane	1 U	1 U	1 U	1 U	5
Cis-1,2-Dichloroethylene	1 U	***1700 D***	***8100 D***	1 U	5
Cis-1,3-Dichloropropene	1 U	1 U	1 U	1 U	0.4
Cyclohexane	1 U	1 U	1 U	1 U	--
Dibromochloromethane	1 U	1 U	1 U	1 U	50
Dichlorodifluoromethane	1 U	1 U	1 U	1 U	5
Ethylbenzene	1 U	1 U	1 U	1 U	5
Isopropylbenzene	1 U	1 U	1 U	1 U	5
m,p-Xylene	2 U	2 U	2 U	2 U	5
Methyl Ethyl Ketone	5 U	5 U	5 U	5 U	50
Methyl Isobutyl Ketone	5 U	5 U	5 U	5 U	--
Methylene Chloride	1 U	1 U	1 U	1 U	5
Methyl Acetate	1 U	1 U	1 U	1 U	--
Methylcyclohexane	1 U	1 U	1 U	1 U	--
O-Xylene	1 U	1 U	1 U	1 U	5
Styrene	1 U	1 U	1 U	1 U	5
Tert-Butyl Methyl Ether	2.2	1 U	1 U	0.36 J	10
Tetrachloroethylene	1 U	***69.4 J***	***5900 DJ***	1 U	5
Toluene	1 U	1 U	0.38 J	1 U	5
Trans-1,2-Dichloroethene	1 U	***27.5***	***68.7***	1 U	5
Trans-1,3-Dichloropropene	1 U	1 U	1 U	1 U	0.4
Trichloroethylene	1 U	***25.3***	***1400 D***	1 U	5
Trichlorofluoromethane	1 U	1 U	1 U	1 U	5
Vinyl Chloride	1 U	***1500 D***	***5300 D***	1 U	2
Total Volatile Compounds	2.2	3329	20798	0.36	--

Footnotes/Qualifiers:

ug/l: Micrograms per liter

--: No standard or not analyzed

U: Analyzed for but not detected

D: Detected in the secondary dilution

J: Estimated value

BD: Blind duplicate

Exceeded Class GA value

D&B ENGINEERS AND ARCHITECTS, P.C.

Table E-6
Long Island Rail Road
Arch Street Yard RI
Groundwater Samples
TCL Volatile Organic Compounds

Sample ID	GW-04S	GW-04D	MW-1	MW-1 BD	NYSDEC Class GA
Sampling Date	4/7/2016	4/7/2016	4/7/2016	4/7/2016	Standard
					or Guidance Value
Units	ug/l	ug/l	ug/l	ug/l	ug/l
VOLATILE COMPOUNDS					
1,1,1-Trichloroethane	1 U	1 U	1 U	1 U	5
1,1,2,2-Tetrachloroethane	1 U	1 U	1 U	1 U	5
1,1,2-Trichloroethane	1 U	1 U	1 U	1 U	1
1,1,2-Trichlorotrifluoroethane	1 U	1 U	1 U	1 U	5
1,1-Dichloroethane	1 U	1 U	1 U	1 U	5
1,1-Dichloroethene	1 U	1 U	1 U	1 U	5
1,2,3-Trichlorobenzene	1 U	1 U	1 U	1 U	5
1,2,4-Trichlorobenzene	1 U	1 U	1 U	1 U	5
1,2-Dibromo-3-Chloropropane	1 U	1 U	1 U	1 U	0.04
1,2-Dibromoethane	1 U	1 U	1 U	1 U	0.0006
1,2-Dichlorobenzene	1 U	1 U	1 U	1 U	3
1,2-Dichloroethane	1 U	1 U	1 U	1 U	0.6
1,2-Dichloropropane	1 U	1 U	1 U	1 U	1
1,3-Dichlorobenzene	1 U	1 U	1 U	1 U	3
1,4-Dichlorobenzene	1 U	1 U	1 U	1 U	3
1,4-Dioxane	--	--	--	--	--
2-Hexanone	5 U	5 U	5 U	5 U	50
Acetone	5 U	5 U	5 U	5 U	50
Benzene	1 U	1 U	1 U	1 U	1
Bromochloromethane	1 U	1 U	1 U	1 U	5
Bromodichloromethane	1 U	1 U	1 U	1 U	50
Bromoform	1 U	1 U	1 U	1 U	50
Bromomethane	1 U	1 U	1 U	1 U	5
Carbon Disulfide	1 U	1 U	1 U	1 U	60
Carbon Tetrachloride	1 U	1 U	1 U	1 U	5
Chlorobenzene	1 U	1 U	1 U	1 U	5
Chloroethane	1 U	1 U	1 U	1 U	5
Chloroform	1 U	1 U	1 U	1 U	7
Chloromethane	1 U	1 U	1 U	1 U	5
Cis-1,2-Dichloroethylene	1 U	1 U	1 U	1 U	5
Cis-1,3-Dichloropropene	1 U	1 U	1 U	1 U	0.4
Cyclohexane	1 U	1 U	1 U	1 U	--
Dibromochloromethane	1 U	1 U	1 U	1 U	50
Dichlorodifluoromethane	1 U	1 U	1 U	1 U	5
Ethylbenzene	1 U	1 U	1 U	1 U	5
Isopropylbenzene	1 U	1 U	1 U	1 U	5
m,p-Xylene	2 U	2 U	2 U	2 U	5
Methyl Ethyl Ketone	5 U	5 U	5 U	5 U	50
Methyl Isobutyl Ketone	5 U	5 U	5 U	5 U	--
Methylene Chloride	1 U	1 U	1 U	1 U	5
Methyl Acetate	1 U	1 U	1 U	1 U	--
Methylcyclohexane	1 U	1 U	1 U	1 U	--
O-Xylene	1 U	1 U	1 U	1 U	5
Styrene	1 U	1 U	1 U	1 U	5
Tert-Butyl Methyl Ether	1.7	4	***26.2***	***29.5***	10
Tetrachloroethylene	1 U	1 U	1 U	1 U	5
Toluene	1 U	0.24 J	1 U	1 U	5
Trans-1,2-Dichloroethene	1 U	1 U	1 U	1 U	5
Trans-1,3-Dichloropropene	1 U	1 U	1 U	1 U	0.4
Trichloroethylene	1 U	1 U	1 U	1 U	5
Trichlorofluoromethane	1 U	1 U	1 U	1 U	5
Vinyl Chloride	0.37 J	1 U	1 U	1 U	2
Total Volatile Compounds	2.07	4.24	26.2	29.5	--

Footnotes/Qualifiers:

ug/l: Micrograms per liter
--: No standard or not analyzed
U: Analyzed for but not detected
D: Detected in the secondary dilution
J: Estimated value

BD: Blind duplicate
Exceeded Class GA value

D&B ENGINEERS AND ARCHITECTS, P.C.

Table E-6
Long Island Rail Road
Arch Street Yard RI
Groundwater Samples
TCL Volatile Organic Compounds

Sample ID Sampling Date Units	MW-2 4/7/2016 ug/l	MW-3 4/7/2016 ug/l	TRIPBLANK 10/30/15 ug/l	TRIP BLANK 3/18/2016 ug/l	TRIP BLANK 3/23/2016 ug/l	NYSDEC Class GA Standard or Guidance Value ug/l
VOLATILE COMPOUNDS						
1,1,1-Trichloroethane	1 U	1 U	1 U	1 U	1 U	5
1,1,2,2-Tetrachloroethane	1 U	1 U	1 U	1 U	1 U	5
1,1,2-Trichloroethane	1 U	1 U	1 U	1 U	1 U	1
1,1,2-Trichlorotrifluoroethane	1 U	1 U	1 U	1 U	1 U	5
1,1-Dichloroethane	1 U	1 U	1 U	1 U	1 U	5
1,1-Dichloroethene	1 U	3.2	1 U	1 U	1 U	5
1,2,3-Trichlorobenzene	1 U	1 U	1 U	1 U	1 U	5
1,2,4-Trichlorobenzene	1 U	1 U	1 U	1 U	1 U	5
1,2-Dibromo-3-Chloropropane	1 U	1 U	1 U	1 U	1 U	0.04
1,2-Dibromoethane	1 U	1 U	1 U	1 U	1 U	0.0006
1,2-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	3
1,2-Dichloroethane	1 U	1 U	1 U	1 U	1 U	0.6
1,2-Dichloropropane	1 U	1 U	1 U	1 U	1 U	1
1,3-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	3
1,4-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	3
1,4-Dioxane	--	--	100 U	--	--	--
2-Hexanone	5 U	5 U	5 U	5 U	5 U	50
Acetone	4.1 J	1.9 J	5 U	5 U	5 U	50
Benzene	1 U	1 U	1 U	1 U	1 U	1
Bromochloromethane	1 U	1 U	1 U	1 U	1 U	5
Bromodichloromethane	1 U	1 U	1 U	1 U	1 U	50
Bromoform	1 U	1 U	1 U	1 U	1 U	50
Bromomethane	1 U	1 U	1 U	1 U	1 U	5
Carbon Disulfide	1.6	1 U	1 U	1 U	1 U	60
Carbon Tetrachloride	1 U	1 U	1 U	1 U	1 U	5
Chlorobenzene	1 U	1 U	1 U	1 U	1 U	5
Chloroethane	1 U	1 U	1 U	1 U	1 U	5
Chloroform	1 U	1 U	1 U	1 U	1 U	7
Chloromethane	1 U	1 U	1 U	1 U	1 U	5
Cis-1,2-Dichloroethylene	1 U	***510 D***	1 U	1 U	1 U	5
Cis-1,3-Dichloropropene	1 U	1 U	1 U	1 U	1 U	0.4
Cyclohexane	1 U	1 U	1 U	1 U	1 U	--
Dibromochloromethane	1 U	1 U	1 U	1 U	1 U	50
Dichlorodifluoromethane	1 U	1 U	1 U	1 U	1 U	5
Ethylbenzene	1 U	1 U	1 U	1 U	1 U	5
Isopropylbenzene	1 U	1 U	1 U	1 U	1 U	5
m,p-Xylene	2 U	2 U	2 U	2 U	2 U	5
Methyl Ethyl Ketone	5 U	5 U	5 U	5 U	5 U	50
Methyl Isobutyl Ketone	5 U	5 U	5 U	5 U	5 U	--
Methylene Chloride	1 U	1 U	1 U	1 U	1 U	5
Methyl Acetate	1 U	1 U	1 U	1 U	1 U	--
Methylcyclohexane	1 U	1 U	1 U	1 U	1 U	--
O-Xylene	1 U	1 U	1 U	1 U	1 U	5
Styrene	1 U	1 U	1 U	1 U	1 U	5
Tert-Butyl Methyl Ether	0.54 J	0.74 J	1 U	1 U	1 U	10
Tetrachloroethylene	0.5 J	***78.9 J***	1 U	1 U	1 U	5
Toluene	1 U	1 U	1 U	1 U	1 U	5
Trans-1,2-Dichloroethene	1 U	2	1 U	1 U	1 U	5
Trans-1,3-Dichloropropene	1 U	1 U	1 U	1 U	1 U	0.4
Trichloroethylene	1 U	***34.8***	1 U	1 U	1 U	5
Trichlorofluoromethane	1 U	1 U	1 U	1 U	1 U	5
Vinyl Chloride	0.31 J	***240 D***	1 U	1 U	1 U	2
Total Volatile Compounds	7.05	872	0	0	0	--

Footnotes/Qualifiers:

ug/l: Micrograms per liter

--: No standard or not analyzed

U: Analyzed for but not detected

D: Detected in the secondary dilution

J: Estimated value

BD: Blind duplicate

Exceeded Class GA value

Table E-6
Long Island Rail Road
Arch Street Yard RI
Groundwater Samples
TCL Volatile Organic Compounds

Sample ID	TRIP BLANK	FIELD BLANK	FIELD BLANK	FIELD BLANK	NYSDEC Class GA
Sampling Date	4/7/2016	3/18/2016	3/23/2016	4/7/2016	Standard or Guidance Value
Units	ug/l	ug/l	ug/l	ug/l	ug/l
VOLATILE COMPOUNDS					
1,1,1-Trichloroethane	1 U	1 U	1 U	1 U	5
1,1,2,2-Tetrachloroethane	1 U	1 U	1 U	1 U	5
1,1,2-Trichloroethane	1 U	1 U	1 U	1 U	1
1,1,2-Trichlorotrifluoroethane	1 U	1 U	1 U	1 U	5
1,1-Dichloroethane	1 U	1 U	1 U	1 U	5
1,1-Dichloroethene	1 U	1 U	1 U	1 U	5
1,2,3-Trichlorobenzene	1 U	1 U	1 U	1 U	5
1,2,4-Trichlorobenzene	1 U	1 U	1 U	1 U	5
1,2-Dibromo-3-Chloropropane	1 U	1 U	1 U	1 U	0.04
1,2-Dibromoethane	1 U	1 U	1 U	1 U	0.0006
1,2-Dichlorobenzene	1 U	1 U	1 U	1 U	3
1,2-Dichloroethane	1 U	1 U	1 U	1 U	0.6
1,2-Dichloropropane	1 U	1 U	1 U	1 U	1
1,3-Dichlorobenzene	1 U	1 U	1 U	1 U	3
1,4-Dichlorobenzene	1 U	1 U	1 U	1 U	3
1,4-Dioxane	--	--	--	--	--
2-Hexanone	5 U	5 U	5 U	5 U	50
Acetone	5 U	5 U	5 U	5 U	50
Benzene	1 U	1 U	1 U	1 U	1
Bromochloromethane	1 U	1 U	1 U	1 U	5
Bromodichloromethane	1 U	1 U	1 U	1 U	50
Bromoform	1 U	1 U	1 U	1 U	50
Bromomethane	1 U	1 U	1 U	1 U	5
Carbon Disulfide	1 U	1 U	1 U	1 U	60
Carbon Tetrachloride	1 U	1 U	1 U	1 U	5
Chlorobenzene	1 U	1 U	1 U	1 U	5
Chloroethane	1 U	1 U	1 U	1 U	5
Chloroform	1 U	1 U	1 U	1 U	7
Chloromethane	1 U	1 U	1 U	1 U	5
Cis-1,2-Dichloroethylene	1 U	1 U	1 U	1 U	5
Cis-1,3-Dichloropropene	1 U	1 U	1 U	1 U	0.4
Cyclohexane	1 U	1 U	1 U	1 U	--
Dibromochloromethane	1 U	1 U	1 U	1 U	50
Dichlorodifluoromethane	1 U	1 U	1 U	1 U	5
Ethylbenzene	1 U	1 U	1 U	1 U	5
Isopropylbenzene	1 U	1 U	1 U	1 U	5
m,p-Xylene	2 U	2 U	2 U	2 U	5
Methyl Ethyl Ketone	5 U	5 U	5 U	5 U	50
Methyl Isobutyl Ketone	5 U	5 U	5 U	5 U	--
Methylene Chloride	1 U	1.8	1 U	1 U	5
Methyl Acetate	1 U	1 U	1 U	1 U	--
Methylcyclohexane	1 U	1 U	1 U	1 U	--
O-Xylene	1 U	1 U	1 U	1 U	5
Styrene	1 U	1 U	1 U	1 U	5
Tert-Butyl Methyl Ether	1 U	1 U	1 U	1 U	10
Tetrachloroethylene	1 U	1 U	1 U	1 U	5
Toluene	1 U	1 U	1 U	1 U	5
Trans-1,2-Dichloroethene	1 U	1 U	1 U	1 U	5
Trans-1,3-Dichloropropene	1 U	1 U	1 U	1 U	0.4
Trichloroethylene	1 U	1 U	1 U	1 U	5
Trichlorofluoromethane	1 U	1 U	1 U	1 U	5
Vinyl Chloride	1 U	1 U	1 U	1 U	2
Total Volatile Compounds	0	1.8	0	0	--

Footnotes/Qualifiers:

ug/l: Micrograms per liter

--: No standard or not analyzed

U: Analyzed for but not detected

D: Detected in the secondary dilution

J: Estimated value

BD: Blind duplicate

🟩 ***Exceeded Class GA value***

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Table E-7
Long Island Rail Road
Arch Street Yard RI
Groundwater Samples
TCL Semivolatile Organic Compounds

Sample ID	GW-01	GW-02S	GW-02D	GW-03	GW-04S	GW-04D	NYSDEC Class GA Standard or Guidance Value
Sampling Date	4/7/2016	4/7/2016	4/7/2016	4/7/2016	4/7/2016	4/7/2016	
Units	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
SEMIVOLATILE COMPOUNDS							
1,2,4,5-Tetrachlorobenzene	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	5
1,4-Dioxane	10.1 UJ	10 UJ	10.1 UJ	10.2 UJ	10.2 UJ	10.1 UJ	--
2,3,4,6-Tetrachlorophenol	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	--
2,4,5-Trichlorophenol	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	1
2,4,6-Trichlorophenol	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	1
2,4-Dichlorophenol	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	5
2,4-Dimethylphenol	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	50
2,4-Dinitrophenol	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	10
2,4-Dinitrotoluene	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	5
2,6-Dinitrotoluene	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	5
2-Chloronaphthalene	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	10
2-Chlorophenol	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	1
2-Methylnaphthalene	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	--
2-Methylphenol	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	1
2-Nitroaniline	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	5
2-Nitrophenol	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	1
3,3-Dichlorobenzidine	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	5
3-Nitroaniline	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	5
3+4-Methylphenols	10.1 UJ	10 UJ	10.1 UJ	10.2 UJ	10.2 UJ	10.1 UJ	1
4,6-Dinitro-2-methylphenol	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	1
4-Bromophenyl-phenylether	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	--
4-Chloro-3-methylphenol	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	1
4-Chloroaniline	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	5
4-Chlorophenylphenyl ether	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	--
4-Nitroaniline	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	5
4-Nitrophenol	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	1
Acenaphthene	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	20
Acenaphthylene	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	--
Acetophenone	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	--
Anthracene	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	50
Atrazine	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	7.5
Benzaldehyde	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	--
Benzo(a)anthracene	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	0.002
Benzo(a)pyrene	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	ND
Benzo(b)fluoranthene	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	0.002
Benzo(ghi)perylene	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	--
Benzo(k)fluoranthene	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	0.002
Benzyl butyl phthalate	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	50
Biphenyl	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	5
Bis(2-chloroethoxy)methane	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	5
Bis(2-chloroethyl)ether	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	1
Bis(2-chloroisopropyl)ether	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	--
Bis(2-ethylhexyl)phthalate (BEHP)	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	5
Caprolactam	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	--
Carbazole	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	--
Chrysene	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	0.002
Dibenzo(a,h)anthracene	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	--
Dibenzofuran	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	--
Diethyl phthalate	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	50
Dimethyl phthalate	15.3 J-	10 U	4.9 J	2.6 J	10.2 U	2.9 J	50
Di-n-butyl phthalate	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	50
Di-n-octyl phthalate	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	50
Fluoranthene	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	50
Fluorene	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	50
Hexachlorobenzene	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	0.04

See next page for Footnotes/Qualifers.

Table E-7
Long Island Rail Road
Arch Street Yard RI
Groundwater Samples
TCL Semivolatile Organic Compounds

Sample ID Sampling Date Units	GW-01 4/7/2016 ug/l	GW-02S 4/7/2016 ug/l	GW-02D 4/7/2016 ug/l	GW-03 4/7/2016 ug/l	GW-04S 4/7/2016 ug/l	GW-04D 4/7/2016 ug/l	NYSDEC Class GA Standard or Guidance Value ug/l
COMPOUNDS CONTINUED							
Hexachlorobutadiene	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	0.5
Hexachlorocyclopentadiene	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	5
Hexachloroethane	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	5
Indeno(1,2,3-cd)pyrene	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	0.002
Isophorone	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	50
Naphthalene	10.1 UJ	10 U	10.1 U	4.5 J	10.2 U	10.1 U	10
Nitrobenzene	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	0.4
N-Nitroso-di-n-propylamine	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	--
N-Nitrosodiphenylamine	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	50
Pentachlorophenol	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	1
Phenanthrene	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	50
Phenol	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	1
Pyrene	10.1 UJ	10 U	10.1 U	10.2 U	10.2 U	10.1 U	50
Total Semivolatile Compounds	15.3	0	4.9	7.1	0	2.9	--

Footnotes/Qualifiers:

ug/l:	Micrograms per liter
--:	No standard
U:	Analyzed for but not detected
J:	Estimated value
J-:	Estimated bias low
BD:	Blind duplicate

Table E-7
Long Island Rail Road
Arch Street Yard RI
Groundwater Samples
TCL Semivolatile Organic Compounds

Sample ID	MW-1	MW-1 BD	MW-2	MW-3	FIELD BLANK	FIELD BLANK	FIELD BLANK	NYSDEC Class GA
Sampling Date	4/7/2016	4/7/2016	4/7/2016	4/7/2016	3/18/2016	3/23/2016	4/7/2016	Standard or Guidance Value
Units	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
SEMIVOLATILE COMPOUNDS								
1,2,4,5-Tetrachlorobenzene	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	5
1,4-Dioxane	10.1 UJ	10.3 UJ	10.1 UJ	10.2 UJ	10 UJ	10.2 UJ	10 UJ	--
2,3,4,6-Tetrachlorophenol	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	--
2,4,5-Trichlorophenol	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	1
2,4,6-Trichlorophenol	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	1
2,4-Dichlorophenol	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	5
2,4-Dimethylphenol	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	50
2,4-Dinitrophenol	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	10
2,4-Dinitrotoluene	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	5
2,6-Dinitrotoluene	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	5
2-Chloronaphthalene	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	10
2-Chlorophenol	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	1
2-Methylnaphthalene	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	--
2-Methylphenol	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	1
2-Nitroaniline	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	5
2-Nitrophenol	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	1
3,3-Dichlorobenzidine	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	5
3-Nitroaniline	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	5
3+4-Methylphenols	10.1 UJ	10.3 UJ	10.1 UJ	10.2 UJ	10 UJ	10.2 UJ	10 UJ	1
4,6-Dinitro-2-methylphenol	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	1
4-Bromophenyl-phenylether	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	--
4-Chloro-3-methylphenol	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	1
4-Chloroaniline	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	5
4-Chlorophenylphenyl ether	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	--
4-Nitroaniline	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	5
4-Nitrophenol	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	1
Acenaphthene	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	20
Acenaphthylene	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	--
Acetophenone	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	--
Anthracene	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	50
Atrazine	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	7.5
Benzaldehyde	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	--
Benzo(a)anthracene	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	0.002
Benzo(a)pyrene	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	ND
Benzo(b)fluoranthene	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	0.002
Benzo(ghi)perylene	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	--
Benzo(k)fluoranthene	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	0.002
Benzyl butyl phthalate	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	50
Biphenyl	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	5
Bis(2-chloroethoxy)methane	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	5
Bis(2-chloroethyl)ether	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	1
Bis(2-chloroisopropyl)ether	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	--
Bis(2-ethylhexyl)phthalate (BEHP)	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	5
Caprolactam	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	--
Carbazole	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	--
Chrysene	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	0.002
Dibenzo(a,h)anthracene	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	--
Dibenzofuran	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	--
Diethyl phthalate	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	50
Dimethyl phthalate	10.1 U	10.3 U	3.5 J	10.2 U	10 U	10.2 U	10 U	50
Di-n-butyl phthalate	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	50
Di-n-octyl phthalate	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	50
Fluoranthene	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	50
Fluorene	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	50
Hexachlorobenzene	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	0.04

See next page for Footnotes/Qualifers.

Table E-7
Long Island Rail Road
Arch Street Yard RI
Groundwater Samples
TCL Semivolatile Organic Compounds

Sample ID	MW-1	MW-1 BD	MW-2	MW-3	FIELD BLANK	FIELD BLANK	FIELD BLANK	NYSDEC Class GA
Sampling Date	4/7/2016	4/7/2016	4/7/2016	4/7/2016	3/18/2016	3/23/2016	4/7/2016	Standard or Guidance Value
Units	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
COMPOUNDS CONTINUED								
Hexachlorobutadiene	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	0.5
Hexachlorocyclopentadiene	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	5
Hexachloroethane	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	5
Indeno(1,2,3-cd)pyrene	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	0.002
Isophorone	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	50
Naphthalene	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	10
Nitrobenzene	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	0.4
N-Nitroso-di-n-propylamine	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	--
N-Nitrosodiphenylamine	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	50
Pentachlorophenol	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	1
Phenanthrene	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	50
Phenol	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	1
Pyrene	10.1 U	10.3 U	10.1 U	10.2 U	10 U	10.2 U	10 U	50
Total Semivolatile Compounds	0	0	3.5	0	0	0	0	--

Footnotes/Qualifiers:

ug/l: Micrograms per liter
--: No standard
U: Analyzed for but not detected
J: Estimated value
J-: Estimated bias low
BD: Blind duplicate

Table E-8
Long Island Rail Road
Arch Street Yard RI
Groundwater Samples
TCL Pesticides and Polychlorinated Biphenyls (PCBs)

Sample ID	GW-02D	MW-3	FIELD BLANK	FIELD BLANK	FIELD BLANK	NYSDEC Class GA
Sampling Date	4/7/2016	4/7/2016	3/18/2016	3/21/2016	3/23/2016	Standard
Dilution Factor						or Guidance Value
Units	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
PESTICIDES						
Aldrin	0.05 U	0.05 U	0.05 U	--	0.05 U	ND
alpha BHC	0.05 U	0.05 U	0.05 U	--	0.05 U	0.01
alpha Endosulfan	0.05 U	0.05 U	0.05 U	--	0.05 U	--
alpha-Chlordane	0.05 U	0.05 U	0.05 U	--	0.05 U	0.05
beta-BHC	0.05 U	0.05 U	0.05 U	--	0.05 U	0.04
beta-Endosulfan	0.05 U	0.05 U	0.05 U	--	0.05 U	--
beta-Chlordane	0.05 U	0.05 U	0.05 U	--	0.05 U	0.05
delta-BHC	0.05 U	0.05 U	0.05 U	--	0.05 U	0.04
Dieldrin	0.05 U	0.05 U	0.05 U	--	0.05 U	0.004
Endosulfan sulfate	0.05 U	0.05 U	0.05 U	--	0.05 U	--
Endrin	0.05 U	0.05 U	0.05 U	--	0.05 U	ND
Endrin aldehyde	0.05 U	0.05 U	0.05 U	--	0.05 U	5
Endrin ketone	0.05 U	0.05 U	0.05 U	--	0.05 U	5
gamma-BHC (Lindane)	0.05 U	0.05 U	0.05 U	--	0.05 U	0.05
Heptachlor	0.05 U	0.05 U	0.05 U	--	0.05 U	0.04
Heptachlor epoxide	0.05 U	0.05 U	0.05 U	--	0.05 U	0.03
Methoxychlor	0.05 U	0.05 U	0.05 U	--	0.05 U	35
P,P'-DDD	0.05 U	0.05 U	0.05 U	--	0.05 U	0.3
P,P'-DDE	0.05 U	0.05 U	0.05 U	--	0.05 U	0.2
P,P'-DDT	0.05 U	0.05 U	0.05 U	--	0.05 U	0.2
Toxaphene	0.51 U	0.5 U	0.51 U	--	0.52 U	0.06
PCBS						
Aroclor-1016	0.52 U	0.52 U	0.51 U	0.52 U	0.51 U	0.09
Aroclor-1221	0.52 U	0.52 U	0.51 U	0.52 U	0.51 U	0.09
Aroclor-1232	0.52 U	0.52 U	0.51 U	0.52 U	0.51 U	0.09
Aroclor-1242	0.52 U	0.52 U	0.51 U	0.52 U	0.51 U	0.09
Aroclor-1248	0.52 U	0.52 U	0.51 U	0.52 U	0.51 U	0.09
Aroclor-1254	0.52 U	0.52 U	0.51 U	0.52 U	0.51 U	0.09
Aroclor-1260	0.52 U	0.52 U	0.51 U	0.52 U	0.51 U	0.09
Aroclor-1262	--	--	0.51 U	0.52 U	0.51 U	0.09
Aroclor-1268	--	--	0.51 U	0.52 U	0.51 U	0.09
Total PCBs	0	0	0	0	0	0.09

Footnotes/Qualifiers:

ug/l: Micrograms per liter
--: No standard or not analyzed
U: Analyzed for but not detected
ND: Compound exceeds if detected

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Table E-9
Long Island Rail Road
Arch Street Yard RI
Groundwater Samples
TAL Metals

Sample ID	**GW-02D**	**MW-3**	**FIELD BLANK**	**FIELD BLANK**	**NYSDEC Class GA Standard or Guidance Value**
Sampling Date	**4/7/2016**	**4/7/2016**	**3/18/2016**	**3/23/2016**	
Units	**ug/l**	**ug/l**	**ug/l**	**ug/l**	**ug/l**
METALS					
Aluminum	211	72.7	8.32 J	15.2 J	--
Antimony	25 U	25 U	25 U	25 U	3
Arsenic	6.13 J	4.63 J	10 U	10 U	25
Barium	158	101	50 U	50 U	1000
Beryllium	3 U	3 U	3 U	3 U	3
Cadmium	3 U	3 U	3 U	3 U	5
Calcium	36100	92500	1000 U	133 J	--
Chromium	2.3 J	4.04 J	5 U	5 U	50
Cobalt	15 U	15 U	15 U	15 U	--
Copper	10 U	10 U	10 U	10 U	200
Iron	***11100***	***4860***	50 U	50 U	300
Lead	4.97 J	6 U	6 U	6 U	25
Magnesium	2770	5850	1000 U	1000 U	35000
Manganese	***357***	148	10 U	10 U	300
Mercury	0.2 U	0.2 U	0.2 U	0.2 U	0.7
Nickel	20 U	20 U	20 U	20 U	100
Potassium	9850	4840	1000 U	1000 U	--
Selenium	10 U	10 U	10 U	10 U	10
Silver	5 U	5 U	5 U	5 U	50
Sodium	***1770000 D***	***201000***	1000 U	92.8 J	20000
Thallium	20 U	20 U	20 U	20 U	0.5
Vanadium	20 U	20 U	20 U	20 U	--
Zinc	6.81 J	20 U	20 U	12.7 J	2000

Footnotes/Qualifiers:
ug/l: Micrograms per liter
--: Not analyzed or no standard
U: Analyzed for but not detected
J: Estimated value or limit
Exceeded Class GA value

Table E-10
Long Island Rail Road
Arch Street Yard RI
Summary of Ambient Air Analytical Results
Volatile Organic Compounds

Sample ID	AA-01	IA-01	NYSDOH Air Guideline Value ug/m3
Sampling Date	8/17/16	08/17/16	
Location	outdoor	indoor office area	
Units	ug/m3	ug/m3	
1,1,1-Trichloroethane (TCA)	0.16 U	0.16 U	--
1,1,2,2-Tetrachloroethane	3.43 U	3.43 U	--
1,1,2-Trichloroethane	2.73 U	2.73 U	--
1,1,2-Trichlorotrifluoroethane	3.83 U	3.83 U	--
1,1-Dichloroethane	2.02 U	2.02 U	--
1,1-Dichloroethene	1.98 U	1.98 U	--
1,2,4-Trichlorobenzene	3.71 U	3.71 U	--
1,2,4-Trimethylbenzene	0.98 J	1.57 J	--
1,2-Dibromoethane	3.84 U	3.84 U	--
1,2-Dichlorobenzene	3.01 U	3.01 U	--
1,2-Dichloroethane	2.02 U	2.02 U	--
1,2-Dichloropropane	2.31 U	2.31 U	--
1,3,5-Trimethylbenzene	2.46 U	0.49 J	--
1,3-Butadiene	1.11 U	1.11 U	--
1,3-Dichlorobenzene	3.01 U	3.01 U	--
1,4-Dichlorobenzene	3.01 U	3.01 U	--
1,4-Dioxane	1.8 U	1.8 U	--
2,2,4-Trimethylpentane	0.7 J	1.03 J	--
2-Butanone	1.12 J	1.68	--
2-Chlorotoluene	2.59 U	2.59 U	--
4-Ethyltoluene	2.46 U	0.59 J	--
4-Methyl-2-Pentanone	2.05 U	2.05 U	--
Acetone	7.6	22.8	--
Allyl Chloride	1.57 U	1.57 U	--
Benzene	0.45 J	0.64 J	--
Bromodichloromethane	3.35 U	3.35 U	--
Bromoethene	2.19 U	2.19 U	--
Bromoform	5.17 U	5.17 U	--
Bromomethane	1.94 U	1.94 U	--
Carbon Disulfide	1.56 U	1.56 U	--
Carbon Tetrachloride	0.44	0.38	--
Chlorobenzene	2.3 U	2.3 U	--
Chloroethane	1.32 U	1.32 U	--
Chloroform	2.44 U	2.44 U	--
Chloromethane	0.93 J	1.01 J	--
cis-1,2-Dichloroethylene	1.98 U	1.98 U	--
cis-1,3-Dichloropropene	2.27 U	2.27 U	--
Cyclohexane	1.72 U	0.48 J	--
Dibromochloromethane	4.26 U	4.26 U	--
Dichlorodifluoromethane	0.79 J	0.79 J	--
Dichlorotetrafluoroethane	3.49 UJ	3.49 UJ	--
Ethylbenzene	1.04 J	1.95 J	--
Heptane	0.49 J	0.98 J	--
Hexachloro-1,3-Butadiene	5.33 U	5.33 U	--
Hexane	1.76 U	1.73 J	--
m,p-Xylenes	3.47 J	5.65	--
Methyl Methacrylate	2.05 U	2.05 U	--
Methyl tert-Butyl Ether (MTBE)	1.8 U	1.8 U	--

See next page for qualfiers and notes.

Table E-10
Long Island Rail Road
Arch Street Yard RI
Summary of Ambient Air Analytical Results
Volatile Organic Compounds

Sample ID Sampling Date Location Units	AA-01 8/17/16 outdoor ug/m3	IA-01 08/17/16 indoor office area ug/m3	NYSDOH Air Guideline Value ug/m3
Methylene Chloride	1.11 UB	1.42 UB	60
Naphthalene	2.62 UJ	2.62 UJ	--
o-Xylene	1.17 J	1.87 J	--
Styrene	2.13 U	0.81 J	--
t-1,3-Dichloropropene	2.27 U	2.27 U	--
tert-Butyl alcohol	1.52 U	1.52 U	--
Tetrachloroethylene (PCE)	2.17	0.61	30
Tetrahydrofuran	1.47 U	1.47 U	--
Toluene	6.03	12.1	--
trans-1,2-Dichloroethene	1.98 U	1.98 U	--
Trichloroethylene (TCE)	0.16 U	0.16 U	2
Trichlorofluoromethane	1.18 J	1.35 J	--
Vinyl Chloride	0.08 U	0.08 U	--

Qualifiers:
U: Analyzed but not detected
J: Estimated value
UB: Qualified as non detect based on method blanks

Notes:
ug/m3: Micrograms per cubic meter
-- : No guideline value

Table E-11
Long Island Rail Road
Arch Street Yard RI
Summary of Soil Vapor Analytical Results
Volatile Organic Compounds

Sample ID	SV-01	SV-02	SV-03	SV-04	SV-05	SV-06	NYSDOH Air Guideline Value ug/m3
Sampling Date	08/17/16	08/17/16	08/17/16	08/17/16	08/17/16	08/17/16	
Sample depth top	2.2'	3.9'	4.3'	3.9'	4'	--	
Sample depth bottom	2.7'	4.4'	4.8'	4.4'	4.5'	--	
Location	outside	outside	outside	outside	outside	sub-slab	
Units	ug/m3	ug/m3	ug/m3	ug/m3	ug/m3	ug/m3	
1,1,1-Trichloroethane (TCA)	1.42	7.64	0.16	1.04	7.09	0.16 U	--
1,1,2,2-Tetrachloroethane	3.43 U	3.43 U	3.43 U	3.43 U	3.43 U	3.43 U	--
1,1,2-Trichloroethane	2.73 U	2.73 U	2.73 U	2.73 U	2.73 U	2.73 U	--
1,1,2-Trichlorotrifluoroethane	3.83 U	0.92 J	2.15 J	3.83 U	0.92 J	0.69 J	--
1,1-Dichloroethane	2.02 U	2.02 U	2.02 U	0.89 J	3.36	0.97 J	--
1,1-Dichloroethene	65 JD	49.6	1.98 U	1.43 J	2.02	1.98 U	--
1,2,4-Trichlorobenzene	3.71 U	3.71 U	3.71 U	3.71 U	3.71 U	3.71 U	--
1,2,4-Trimethylbenzene	25.6	35.4	1.52 J	29.5	34.4	20.2	--
1,2-Dibromoethane	3.84 U	3.84 U	3.84 U	3.84 U	3.84 U	3.84 U	--
1,2-Dichlorobenzene	3.01 U	3.01 U	3.01 U	3.01 U	3.01 U	3.01 U	--
1,2-Dichloroethane	2.02 U	2.02 U	2.79	23.9	2.02 U	2.02 U	--
1,2-Dichloropropane	2.31 U	2.31 U	2.31 U	2.31 U	2.31 U	2.31 U	--
1,3,5-Trimethylbenzene	8.36	13.3	0.74 J	10.8	14.3	7.37	--
1,3-Butadiene	1.11 U	1.11 U	1.11 U	1.11 U	1.11 U	1.11 U	--
1,3-Dichlorobenzene	3.01 U	3.01 U	3.01 U	3.01 U	3.01 U	3.01 U	--
1,4-Dichlorobenzene	2.4 J	3.01 U	3.01 U	3.01 U	3.01 U	3.01 U	--
1,4-Dioxane	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	--
2,2,4-Trimethylpentane	121 D	2.34 U	2.29 J	9.34	23.8	9.34	--
2-Butanone	20.9	530 D	129 D	412 D	501 D	142 D	--
2-Chlorotoluene	2.59 U	2.59 U	2.59 U	2.59 U	2.59 U	2.59 U	--
4-Ethyltoluene	8.36	12.8	1.13 J	10.8	12.8	7.37	--
4-Methyl-2-Pentanone	2.05 U	2.05 U	3.81	6.15	2.05 U	2.05 U	--
Acetone	1.19 U	261 D	68.4 D	136 D	153 D	1.19 U	--
Allyl Chloride	1.57 U	1.57 U	1.57 U	1.57 U	1.57 U	1.57 U	--
Benzene	14.7	47.9	5.43	20.8	47.6 D	90.1 D	--
Bromodichloromethane	3.35 U	3.35 U	3.35 U	3.35 U	3.35 U	3.35 U	--
Bromoethene	2.19 U	2.19 U	2.19 U	2.19 U	2.19 U	2.19 U	--
Bromoform	5.17 U	5.17 U	5.17 U	5.17 U	5.17 U	5.17 U	--
Bromomethane	1.94 U	1.94 U	1.94 U	1.94 U	1.94 U	1.94 U	--
Carbon Disulfide	37.4 JD	62.3 JD	12.8	31.8	72.9 D	59.5 D	--
Carbon Tetrachloride	1.07	0.94	0.38	0.88	0.82	0.25	--
Chlorobenzene	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	--
Chloroethane	1.32 U	10.6	1.32 U	1.21 J	1.27 J	0.87 J	--
Chloroform	16.6	54.7	2.83	26.9	19	3.86	--
Chloromethane	1.22	2.07	1.32	1.42	1.3	1.16	--
cis-1,2-Dichloroethylene	261 D	2894 D	1.43 J	46.4	36.1	3.29	--
cis-1,3-Dichloropropene	2.27 U	2.27 U	2.27 U	2.27 U	2.27 U	2.27 U	--
Cyclohexane	86.7 D	149 D	10.3	44.1	91.6 D	171 D	--
Dibromochloromethane	4.26 U	4.26 U	4.26 U	4.26 U	4.26 U	4.26 U	--
Dichlorodifluoromethane	4.3 J	1.09 J	1.24 J	0.74 J	1.34 J	3.91 J	--
Dichlorotetrafluoroethane	3.49 UJ	3.49 UJ	3.49 UJ	3.49 UJ	3.49 UJ	3.49 UJ	--
Ethylbenzene	8.25	17.4	6.95	16.1	19.1	12.2	--
Heptane	12.3	22.1	4.1	18.4	48	32.8	--
Hexachloro-1,3-Butadiene	5.33 U	5.33 U	5.33 U	5.33 U	5.33 U	5.33 U	--
Hexane	19.4	26.4	7.05	18.3	51.1 D	58.9 D	--
m,p-Xylenes	32.6	58.6	20	53.9	59.5	41.3	--
Methyl Methacrylate	2.05 U	2.05 U	2.05 U	2.05 U	2.05 U	2.05 U	--
Methyl tert-Butyl Ether (MTBE)	167 D	1.8 U	1.8 U	1.8 U	43.3 JD	1.8 U	--

See next page for qualfiers and notes.

Table E-11
Long Island Rail Road
Arch Street Yard RI
Summary of Soil Vapor Analytical Results
Volatile Organic Compounds

Sample ID	SV-01	SV-02	SV-03	SV-04	SV-05	SV-06	NYSDOH Air Guideline Value ug/m3
Sampling Date	08/17/16	08/17/16	08/17/16	08/17/16	08/17/16	08/17/16	
Sample depth top	2.2'	3.9'	4.3'	3.9'	4'	--	
Sample depth bottom	2.7'	4.4'	4.8'	4.4'	4.5'	--	
Location	outside	outside	outside	outside	outside	sub-slab	
Units	ug/m3	ug/m3	ug/m3	ug/m3	ug/m3	ug/m3	
Methylene Chloride	2.85 UB	3.82 UB	11.8	7.3	12.2	5.91	60
Naphthalene	8.91 J	13.1 J	2.62 UJ	8.39 J	5.77 J	2.83 J	--
o-Xylene	16.5	30.4	7.38	26.5	30.8	23.5	--
Styrene	49.4	77.9 D	8.09	71.5 D	39.2 JD	46	--
t-1,3-Dichloropropene	2.27 U	2.27 U	2.27 U	2.27 U	2.27 U	2.27 U	--
tert-Butyl alcohol	1.64	10.9	8.49	7.58	54.6 D	6.97	--
Tetrachloroethylene (PCE)	***317 D***	***881 D***	7.46	***58.3***	***120 D***	23.1	30
Tetrahydrofuran	4.13	10.3	1.74	7.96	9.44	6.78	--
Toluene	23.7	45.2 JD	32.4	54.6	53.1	81 D	--
trans-1,2-Dichloroethene	193 D	911 D	0.95 J	8.33	15.5	1.23 J	--
Trichloroethylene (TCE)	***223 D***	***859 D***	***2.04***	***28.5***	***50.5***	***5***	2
Trichlorofluoromethane	11.8	5.28	2.3 J	14	175 D	1.74 J	--
Vinyl Chloride	562 D	511 D	0.41	24.3	6.9	0.51	--

Qualifiers:

U:	Analyzed but not detected
J:	Estimated value
UB:	Qualified as non detect based on method blanks
D:	Reported from secondary dilution

Exceeds NYSDOH Air Guideline Values

Notes:

ug/m3: Micrograms per cubic meter

-- : No guideline value

Table E-12
Long Island Rail Road
Arch Street Yard RI
Heating Season
Summary of Air Sample Analytical Results
Volatile Organic Compounds

Sample ID	AA-01(R)	IA-01(R)	SV-06(R)	NYSDOH Air Guideline Value ug/m3
Sampling Date	2/22/17	02/22/17	02/22/17	
Location	outdoor	indoor office area	sub-slab	
Units	ug/m3	ug/m3	ug/m3	
1,1,1-Trichloroethane (TCA)	0.16 U	0.16 U	0.16 U	--
1,1,2,2-Tetrachloroethane	3.43 U	3.43 U	3.43 U	--
1,1,2-Trichloroethane	2.73 U	2.73 U	2.73 U	--
1,1,2-Trichlorotrifluoroethane	3.83 U	3.83 U	3.83 U	--
1,1-Dichloroethane	2.02 U	2.02 U	2.02 U	--
1,1-Dichloroethene	1.98 U	1.98 U	1.98 U	--
1,2,4-Trichlorobenzene	3.71 U	3.71 U	3.71 U	--
1,2,4-Trimethylbenzene	2.46 U	0.79 J	1.72 J	--
1,2-Dibromoethane	3.84 U	3.84 U	3.84 U	--
1,2-Dichlorobenzene	3.01 U	3.01 U	3.01 U	--
1,2-Dichloroethane	2.02 U	2.02 U	2.02 U	--
1,2-Dichloropropane	2.31 U	2.31 U	2.31 U	--
1,3,5-Trimethylbenzene	2.46 U	2.46 U	0.69 J	--
1,3-Butadiene	1.11 U	1.11 U	1.11 U	--
1,3-Dichlorobenzene	3.01 U	3.01 U	3.01 U	--
1,4-Dichlorobenzene	3.01 U	3.01 U	3.01 U	--
1,4-Dioxane	1.8 U	1.8 U	1.8 U	--
2,2,4-Trimethylpentane	0.61 J	1.17 J	0.98 J	--
2-Butanone	1.53	1.47	16.8	--
2-Chlorotoluene	2.59 U	2.59 U	2.59 U	--
4-Ethyltoluene	2.46 U	2.46 U	2.46 U	--
4-Methyl-2-Pentanone	2.05 U	2.05 U	4.92	--
Acetone	14.2	19.5	237 D	--
Allyl Chloride	1.57 U	1.57 U	1.57 U	--
Benzene	1.09 J	1.57 J	1.82	--
Bromodichloromethane	3.35 U	3.35 U	1.14 J	--
Bromoethene	2.19 U	2.19 U	2.19 U	--
Bromoform	5.17 U	5.17 U	5.17 U	--
Bromomethane	0.62 J	0.54 J	0.78 J	--
Carbon Disulfide	1.56 U	1.56 U	6.54	--
Carbon Tetrachloride	0.31	0.38	0.19 U	--
Chlorobenzene	2.3 U	2.3 U	2.3 U	--
Chloroethane	1.32 U	1.32 U	1.32 U	--
Chloroform	2.44 U	2.44 U	12.2	--
Chloromethane	1.36	1.12	1.3	--
cis-1,2-Dichloroethylene	1.98 U	1.98 U	1.98 U	--
cis-1,3-Dichloropropene	2.27 U	2.27 U	2.27 U	--
Cyclohexane	1.72 U	1.38 J	28.9	--
Dibromochloromethane	4.26 U	4.26 U	4.26 U	--
Dichlorodifluoromethane	1.04 J	1.04 J	2.82 J	--
Dichlorotetrafluoroethane	3.49 U	3.49 U	3.49 U	--
Ethyl benzene	2.17 U	0.74 J	0.61 J	--
Heptane	2.05 U	0.94 J	2.05 U	--
Hexachloro-1,3-Butadiene	5.33 U	5.33 U	5.33 U	--
Hexane	2.19	4.23	4.23	--
m,p-Xylene	1.3 J	2.61 J	1.78 J	--
Methyl Methacrylate	2.05 U	2.05 U	2.05 U	--
Methyl tert-Butyl Ether (MTBE)	1.8 U	1.8 U	1.8 U	--

See next page for qualfiers and notes.

Table E-12
Long Island Rail Road
Arch Street Yard RI
Heating Season
Summary of Air Sample Analytical Results
Volatile Organic Compounds

Sample ID Sampling Date Location Units	AA-01(R) 2/22/17 outdoor ug/m3	IA-01(R) 02/22/17 indoor office area ug/m3	SV-06(R) 02/22/17 sub-slab ug/m3	NYSDOH Air Guideline Value ug/m3
Methylene Chloride	4.17	5.91	6.95	60
Naphthalene	2.62 U	2.62 U	2.62 U	--
o-Xylene	0.48 J	0.83 J	0.91 J	--
Styrene	2.13 U	0.72 J	3.24	--
t-1,3-Dichloropropene	2.27 U	2.27 U	2.27 U	--
tert-Butyl alcohol	1.52 U	1.52 U	1.52 U	--
Tetrachloroethylene (PCE)	4.34	2.85	2.58	30
Tetrahydrofuran	1.47 U	1.47 U	5.6	--
Toluene	4.52	7.16	3.73	--
trans-1,2-Dichloroethene	1.98 U	1.98 U	1.98 U	--
Trichloroethylene (TCE)	0.16 U	0.16 U	0.16 U	2
Trichlorofluoromethane	1.52 J	1.24 J	1.4 J	--
Vinyl Chloride	0.08 U	0.08 U	0.08 U	--

Qualifiers:

U: Analyzed but not detected

J: Estimated value

D: Reported from secondary dilution

Notes:

ug/m3: Micrograms per cubic meter

-- : No guideline value

APPENDIX F

INDOOR AIR QUALITY QUESTIONNAIRE
AND BUILDING INVENTORY

OSR – 3

NEW YORK STATE DEPARTMENT OF HEALTH
INDOOR AIR QUALITY QUESTIONNAIRE AND BUILDING INVENTORY
CENTER FOR ENVIRONMENTAL HEALTH

This form must be completed for each residence involved in indoor air testing.

Preparer's Name Gloria Russo Date/Time Prepared 8/17/16

Preparer's Affiliation LIRR Corp Safety Phone No. 347-494-6034

Purpose of Investigation Soil vapor sampling for chlorinated solvents.

1. OCCUPANT:

Interviewed: Y / N

Last Name: Kalista First Name: Tony

Address: Hdq. there

County: Queens

Home Phone: — Office Phone: —

Number of Occupants/persons at this location 4 Age of Occupants Adults

2. OWNER OR LANDLORD: (Check if same as occupant ___)

Interviewed: Y [✓ N]

Last Name: ____________ First Name: ____________

Address: ____________

County: ____________

Home Phone: ____________ Office Phone: ____________

3. BUILDING CHARACTERISTICS

Type of Building: (Circle appropriate response)

Residential School Commercial/Multi-use
[✓ Industrial] Church Other: ____________

If the property is residential, type? (Circle appropriate response)

Ranch
Raised Ranch
Cape Cod
Duplex
Modular

2-Family
Split Level
Contemporary
Apartment House
Log Home

3-Family
Colonial
Mobile Home
Townhouses/Condos
Other:______________

If multiple units, how many? ________

If the property is commercial, type?

Business Type(s) Railroad

Does it include residences (i.e., multi-use)? Y / [✓ N]   If yes, how many? ______

Other characteristics:

Number of floors 1   Building age______

Is the building insulated? Y / [✓ N]   How air tight? Tight / [✓ Average] / Not Tight

4. AIRFLOW N/A

Use air current tubes or tracer smoke to evaluate airflow patterns and qualitatively describe:

Airflow between floors

Airflow near source

Outdoor air infiltration

Infiltration into air ducts

5. BASEMENT AND CONSTRUCTION CHARACTERISTICS (Circle all that apply)

a. Above grade construction: wood frame [✓ concrete] stone brick

b. ~~Basement~~ type: full crawlspace slab other ________

c. ~~Basement~~ floor: concrete dirt stone other ________

d. ~~Basement~~ floor: uncovered covered covered with ____________

e. Concrete floor: [✓ unsealed] sealed sealed with ____________

f. Foundation walls: poured [✓ block] stone [✓ other] corrugated metal

g. Foundation walls: unsealed sealed sealed with ____________

h. The ~~basement~~ is: wet damp dry moldy

i. The ~~basement~~ is: finished unfinished partially finished

j. Sump ~~present~~? Y / N

k. Water ~~in~~ sump? Y / N / not applicable

Basement/Lowest level depth below grade: 0 (feet)

Identify potential soil vapor entry points and approximate size (e.g., cracks, utility ports, drains)

Multiple slab cracks, drains/plumbing in bathrooms

6. HEATING, VENTING and AIR CONDITIONING (Circle all that apply)

Type of heating system(s) used in this building: (circle all that apply – note primary)

[✓ Hot air circulation] Heat pump Hot water baseboard
Space Heaters Stream radiation Radiant floor
[✓ Electric baseboard] Wood stove Outdoor wood boiler Other ________

The primary type of fuel used is:

Natural Gas Fuel Oil Kerosene
[✓ Electric] Propane Solar
Wood Coal

Domestic hot water tank fueled by: ____________________

Boiler/furnace located in: Basement Outdoors Main Floor [✓ Other] Ceiling

Air conditioning: Central Air [✓ Window units] Open Windows None

Are there air distribution ducts present? [✓ Y] / N But not active/utilized

Describe the supply and cold air return ductwork, and its condition where visible, including whether there is a cold air return and the tightness of duct joints. Indicate the locations on the floor plan diagram.

____

____

____

____

7. OCCUPANCY

Is ~~basement/lowest~~ level occupied? Full-time Occasionally Seldom Almost Never

Level	**General Use of Each Floor (e.g., familyroom, bedroom, laundry, workshop, storage)**
~~Basement~~	
[✓ 1st Floor]	Storage space; garage doors & office areas
~~2nd Floor~~	
~~3rd Floor~~	
~~4th Floor~~	

8. FACTORS THAT MAY INFLUENCE INDOOR AIR QUALITY

a. Is there an attached garage? Y / [✓ N]

b. Does the garage have a separate heating unit? Y / N / [✓ NA]

c. Are petroleum-powered machines or vehicles stored in the garage (e.g., lawnmower, atv, car) Y / N / [✓ NA] Please specify__________

d. Has the building ever had a fire? Y / [✓ N] When?__________

e. Is a kerosene or unvented gas space heater present? Y / [✓ N] Where?__________

f. Is there a workshop or hobby/craft area? [✓ Y] / N Where & Type? Throughout building

g. Is there smoking in the building? Y / [✓ N] How frequently?__________

h. Have cleaning products been used recently? Y / N When & Type?__________

i. Have cosmetic products been used recently? Y / [✓ N] When & Type?__________

j. Has painting/staining been done in the last 6 months? Y / [✓ N] Where & When? ____________

k. Is there new carpet, drapes or other textiles? Y / [✓ N] Where & When? ____________

l. Have air fresheners been used recently? [✓ Y] / N When & Type? Bathrooms

m. Is there a kitchen exhaust fan? Y / [✓ N] If yes, where vented? ____________

n. Is there a bathroom exhaust fan? Y / [✓ N] If yes, where vented? ____________

o. Is there a clothes dryer? Y / [✓ N] If yes, is it vented outside? Y / N

p. Has there been a pesticide application? Y / [✓ N] When & Type? ____________

Are there odors in the building? Y / [✓ N]
If yes, please describe: ____

Do any of the building occupants use solvents at work? Y / [✓ N]
(e.g., chemical manufacturing or laboratory, auto mechanic or auto body shop, painting, fuel oil delivery, boiler mechanic, pesticide application, cosmetologist

If yes, what types of solvents are used? ____________________________________

If yes, are their clothes washed at work? Y / N

Do any of the building occupants regularly use or work at a dry-cleaning service? (Circle appropriate response)

Yes, use dry-cleaning regularly (weekly)
Yes, use dry-cleaning infrequently (monthly or less)
Yes, work at a dry-cleaning service
[✓ No]
Unknown

Is there a radon mitigation system for the building/structure? Y / [✓ N] Date of Installation: ____________
Is the system active or passive? Active/Passive

9. WATER AND SEWAGE

Water Supply: [✓ Public Water] Drilled Well Driven Well Dug Well Other: _______

Sewage Disposal: [✓ Public Sewer] Septic Tank Leach Field Dry Well Other: _______

10. RELOCATION INFORMATION (for oil spill residential emergency)

a. Provide reasons why relocation is recommended: ______________________________

b. Residents choose to: remain in home relocate to friends/family relocate to hotel/motel

c. Responsibility for costs associated with reimbursement explained? Y / N

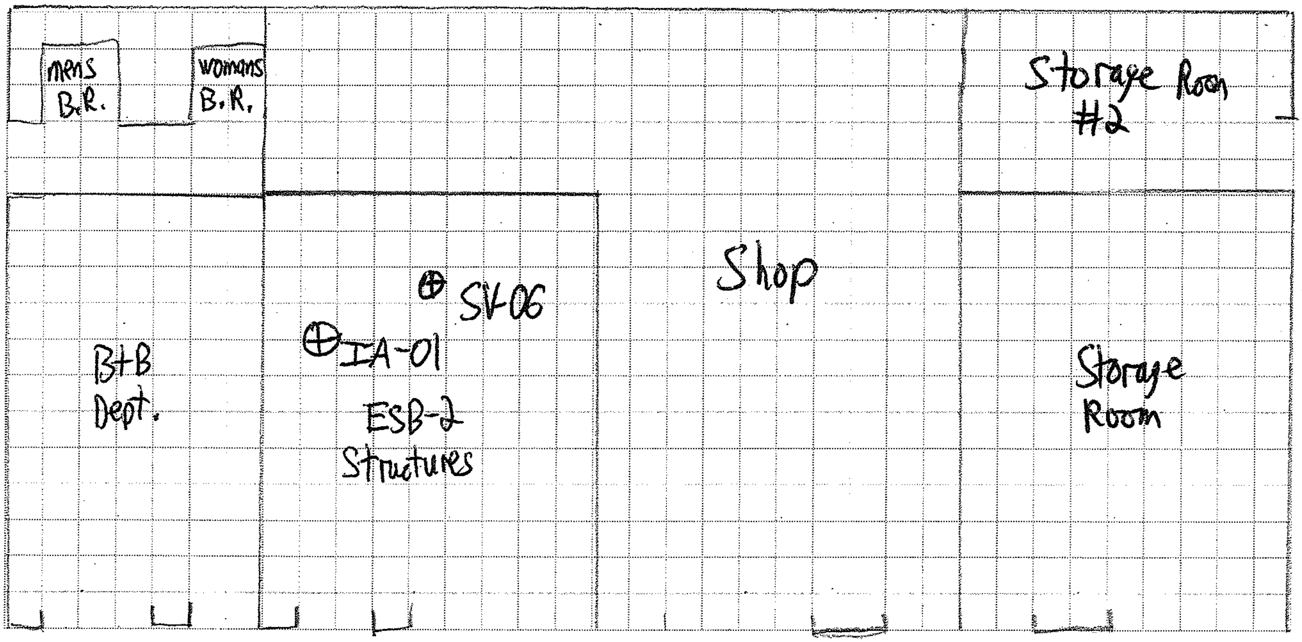
d. Relocation package provided and explained to residents? Y / N

11. FLOOR PLANS

Draw a plan view sketch of the basement and first floor of the building. Indicate air sampling locations, possible indoor air pollution sources and PID meter readings. If the building does not have a basement, please note.

Basement: N/A

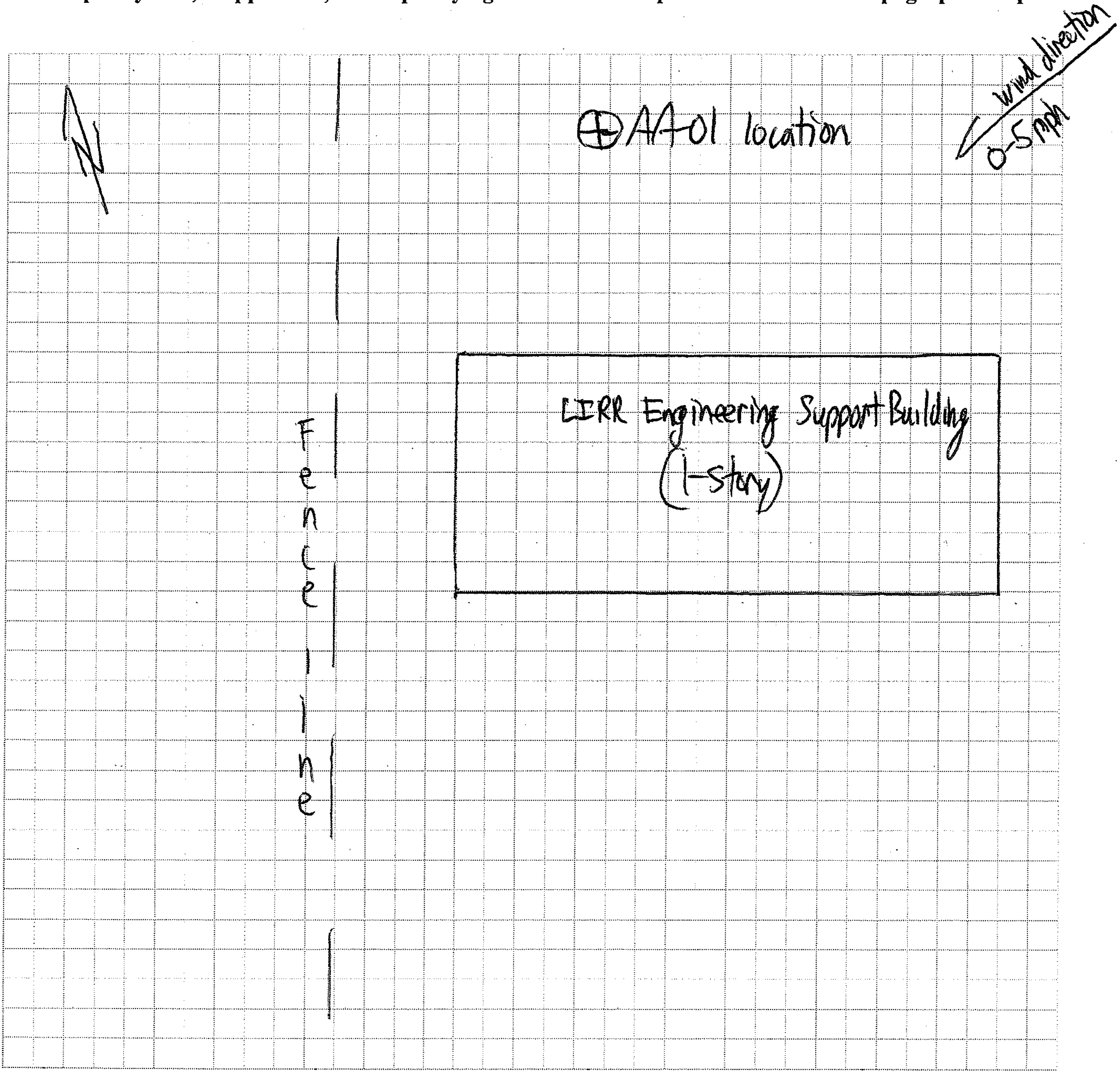
First Floor:



12. OUTDOOR PLOT

Draw a sketch of the area surrounding the building being sampled. If applicable, provide information on spill locations, potential air contamination sources (industries, gas stations, repair shops, landfills, etc.), outdoor air sampling location(s) and PID meter readings.

Also indicate compass direction, wind direction and speed during sampling, the locations of the well and septic system, if applicable, and a qualifying statement to help locate the site on a topographic map.



13. PRODUCT INVENTORY FORM

Make & Model of field instrument used: ppb RAE

List specific products found in the residence that have the potential to affect indoor air quality.

Location	Product Description	Size (units)	Condition*	Chemical Ingredients	Field Instrument Reading (units)	Photo** Y / N
B+B Depot	ABC Kidde Fire Ext.	20lbs	UO		83ppb	Y
ESB-2	CRC 3-36 Lube	11ozs	U	petro. distillates, carbon dioxide	85ppb	Y
	ABC Kidde Fire Ext.	20lbs	UO		80ppb	Y
	Rainbow insect repel.	6ozs	U (12 units)	DEET	90ppb	Y
↓	Sika pro-select sealant	29ozs	UO	Disodecyl phtalates, titanium dioxide xylene, ethylbenzene	80ppb	Y
Shop	ABC Kidde Fire Ext.	20lbs	UO		19ppb	Y
	Poulan Pro snow blowers	2units	U	Gasoline	25ppb	Y
	Westinghouse generator	1unit	U	Gasoline	48ppb	Y
	CRC 3-36 Lube	11ozs	U (6units)	petro. distilates, carbon dioxide	80ppb	Y
	CRC Tie-off	12oz	U/UO (3 items)	methanol, carbon dioxide, propylene glycol	80ppb	Y
	Corotec WB-63 primer	5gal	U (2-units)		80ppb	Y
	Hercules gear cutting oil	1gal	U	Lube oil, olefin sulfide	50ppb	Y
	Inst-X floor/patio coating	3gal	U (2-items)	Acrylic polymer, titanium dioxide, nephelene syenite, kaolin	87ppb	Y
	Benjamin Moore latex marking	2gal	U	calcium carbonate, acrylic polymer, titanium dioxide, ethylene glycol	83ppb	Y
	General Coatings floor enamel	1gal	U	titanium dioxide, propane-1,3 2,2,4-trimethyl-1,3 pentane diol	80ppb	Y
				monoisobutyrate, calcium carbonate		
	SherwinWilliams semigloss	1gal	U	mineral spirits, ethyl benzene	80ppb	Y
	Motormedic starting fluid	11oz	U	Heptane, diethyl ether, petro. oil carbon dioxide	80ppb	Y
↓	Rainbow insect repellent	12oz	U (5-items)	DEET	79ppb	Y

* Describe the condition of the product containers as **Unopened (UO), Used (U),** or **Deteriorated (D)**

** Photographs of the **front and back** of product containers can replace the handwritten list of chemical ingredients. However, the photographs must be of good quality and ingredient labels must be legible.

13. PRODUCT INVENTORY FORM
(page #2)

Make & Model of field instrument used: ppb RAE

List specific products found in the residence that have the potential to affect indoor air quality.

Location	Product Description	Size (units)	Condition*	Chemical Ingredients	Field Instrument Reading (units)	Photo ** Y / N
Shop (continued)	CRC wasp + hornet	14oz	U	Tetramethrin, phenothin	84 ppb	Y
	Racor diesel additive	16 oz	U (2-items)	petro. distillates	80ppb	Y
	gasoline containers	10gal	U (3-units)		383ppb	Y
	Sikaflex 1a construction sealant	10.1oz	U/UO (10-units)	Titanium dioxide, xylene, ethylbenzene, aromatic polyisocyanates,	91ppb	Y
				4,4 methylene diphene diisocyanates		
Storage Room	Shermin willams industrial enamel	120 oz	U (7 items)	mineral spirits, soya. alk. polymers, ethylbenzene	103 ppb	Y
	sherwin willons semigloss	120 oz	U (2-items)	same as above, plus nepletene syerete, mineral spirits	100 ppb	Y
	CPD Elastimort	6gal.	U		100 ppb	Y
	Devran 229H acrylic semigloss	6qts.	U (2-items)	Ethylbenzene, 2-heptone, 2-propanol, acetate, formaldhyde, phenol,	100 ppb	Y
				hexanol, acetate, titanium dioxide		
	Shermin willams DTM acrylic	6qts.	U (6-items)	acrylic polymer, 2-2 methoxethoxy -ethanol, trimethyl pentanediol	99 ppb	Y
				isobutyrate,		
	130 Henry floor tile adhesive	5gal	U (3-items)	Asphitt (H_2S), rosin	111 ppb	Y
	Homweld latex bonding agent	5gal	U	Vynyl acetate copolymer	100ppb	Y
	Sonoguard basecoat	5gal	U (6-items)	Stoddard solvent, toluene-2,4diisocyate toluene-2-6-diisocyanate	191 ppb	Y
	Kidde ABC fire Ext.	20lbs	UO (13-items)		89ppb	Y
Storage Room #2	Kidde ABC fire ext.	20lbs.	UO		80 ppb	Y

* Describe the condition of the product containers as **Unopened (UO), Used (U),** or **Deteriorated (D)**
** Photographs of the **front and back** of product containers can replace the handwritten list of chemical ingredients. However, the photographs must be of good quality and ingredient labels must be legible.

OSR – 3

NEW YORK STATE DEPARTMENT OF HEALTH
INDOOR AIR QUALITY QUESTIONNAIRE AND BUILDING INVENTORY
CENTER FOR ENVIRONMENTAL HEALTH

This form must be completed for each residence involved in indoor air testing.

Preparer's Name Gloria Russo Date/Time Prepared 2/22/17

Preparer's Affiliation LFRR Corp Safety Phone No. 347-494-6034

Purpose of Investigation Soil vapor sampling for chlorinated solvents

1. OCCUPANT:

Interviewed: Y / N

Last Name: ____________ First Name: ____________

Address: ________________________

County: ________

Home Phone: ________ Office Phone: ________

Number of Occupants/persons at this location ____ Age of Occupants ________

2. OWNER OR LANDLORD: (Check if same as occupant ___)

Interviewed: Y [✓ N]

Last Name: ____________ First Name: ____________

Address: ________________________

County: ________

Home Phone: ________ Office Phone: ________

3. BUILDING CHARACTERISTICS

Type of Building: (Circle appropriate response)

Residential School Commercial/Multi-use

[✓ Industrial] Church Other: ________

If the property is residential, type? (Circle appropriate response)

Ranch
Raised Ranch
Cape Cod
Duplex
Modular
2-Family
Split Level
Contemporary
Apartment House
Log Home
3-Family
Colonial
Mobile Home
Townhouses/Condos
Other:_______________

If multiple units, how many? ________

If the property is commercial, type?

Business Type(s) Railroad

Does it include residences (i.e., multi-use)? Y / [✓ N] If yes, how many? ______

Other characteristics:

Number of floors 1

Building age______

Is the building insulated? Y / [✓ N]

How air tight? Tight / [✓ Average] / Not Tight

4. AIRFLOW

N/A

Use air current tubes or tracer smoke to evaluate airflow patterns and qualitatively describe:

Airflow between floors

Airflow near source

Outdoor air infiltration

Infiltration into air ducts

5. BASEMENT AND CONSTRUCTION CHARACTERISTICS (Circle all that apply)

a. Above grade construction: wood frame [✓ concrete] stone brick

b. Basement type: full crawlspace slab other ________

c. Basement floor: concrete dirt stone other ________

d. Basement floor: uncovered covered covered with ______________

e. Concrete floor: [✓ unsealed] sealed sealed with ______________

f. Foundation walls: poured [✓ block] stone [✓ other] corrugated metal

g. Foundation walls: unsealed sealed sealed with ______________

h. The basement is: wet damp dry moldy

i. The basement is: finished unfinished partially finished

j. Sump present? Y / N

k. Water in sump? Y / N / not applicable

Basement/Lowest level depth below grade: 0 (feet)

Identify potential soil vapor entry points and approximate size (e.g., cracks, utility ports, drains)

Multiple slab cracks, drains/plumbing in bathrooms

6. HEATING, VENTING and AIR CONDITIONING (Circle all that apply)

Type of heating system(s) used in this building: (circle all that apply – note primary)

[✓ Hot air circulation] Heat pump Hot water baseboard
Space Heaters Stream radiation Radiant floor
[✓ Electric baseboard] Wood stove Outdoor wood boiler Other __________

The primary type of fuel used is:

Natural Gas Fuel Oil Kerosene
[✓ Electric] Propane Solar
Wood Coal

Domestic hot water tank fueled by: ______________________

Boiler/furnace located in: Basement Outdoors Main Floor [✓ Other] Ceiling

Air conditioning: Central Air [✓ Window units] Open Windows None

Are there air distribution ducts present? [✓ Y] / N But not utilized

Describe the supply and cold air return ductwork, and its condition where visible, including whether there is a cold air return and the tightness of duct joints. Indicate the locations on the floor plan diagram.

7. OCCUPANCY

Is basement/~~lowest~~ level occupied? Full-time Occasionally Seldom Almost Never

Level	**General Use of Each Floor (e.g., familyroom, bedroom, laundry, workshop, storage)**
~~Basement~~	
[✓ 1st Floor]	Storage area, garage doors and office areas
~~2nd Floor~~	
~~3rd Floor~~	
~~4th Floor~~	

8. FACTORS THAT MAY INFLUENCE INDOOR AIR QUALITY

a. Is there an attached garage? Y / [✓ N]

b. Does the garage have a separate heating unit? Y / N / [✓ NA]

c. Are petroleum-powered machines or vehicles stored in the garage (e.g., lawnmower, atv, car) Y / N / [✓ NA] Please specify________________

d. Has the building ever had a fire? Y [✓ N] When?________________

e. Is a kerosene or unvented gas space heater present? Y [✓ N] Where?________________

f. Is there a workshop or hobby/craft area? [✓ Y] / N Where & Type? Throughout building

g. Is there smoking in the building? Y / [✓ N] How frequently?________________

h. Have cleaning products been used recently? Y / [✓ N] When & Type?________________

i. Have cosmetic products been used recently? Y / [✓ N] When & Type?________________

j. Has painting/staining been done in the last 6 months? Y / [✓ N] Where & When? ______

k. Is there new carpet, drapes or other textiles? Y / [✓ N] Where & When? ______

l. Have air fresheners been used recently? [✓ Y] / N When & Type? Bathrooms

m. Is there a kitchen exhaust fan? Y / [✓ N] If yes, where vented? ______

n. Is there a bathroom exhaust fan? Y / [✓ N] If yes, where vented? ______

o. Is there a clothes dryer? Y / [✓ N] If yes, is it vented outside? Y / N

p. Has there been a pesticide application? Y / [✓ N] When & Type? ______

Are there odors in the building? Y / [✓ N]
If yes, please describe: ______

Do any of the building occupants use solvents at work? Y / [✓ N]
(e.g., chemical manufacturing or laboratory, auto mechanic or auto body shop, painting, fuel oil delivery, boiler mechanic, pesticide application, cosmetologist

If yes, what types of solvents are used? ______

If yes, are their clothes washed at work? Y / N

Do any of the building occupants regularly use or work at a dry-cleaning service? (Circle appropriate response)

Yes, use dry-cleaning regularly (weekly)
Yes, use dry-cleaning infrequently (monthly or less)
Yes, work at a dry-cleaning service
[✓ No]
Unknown

Is there a radon mitigation system for the building/structure? Y / [✓ N] Date of Installation: ______
Is the system active or passive? Active/Passive

9. WATER AND SEWAGE

Water Supply: [✓ Public Water] Drilled Well Driven Well Dug Well Other: ______

Sewage Disposal: [✓ Public Sewer] Septic Tank Leach Field Dry Well Other: ______

10. RELOCATION INFORMATION (for oil spill residential emergency)

a. Provide reasons why relocation is recommended: ______

b. Residents choose to: remain in home relocate to friends/family relocate to hotel/motel

c. Responsibility for costs associated with reimbursement explained? Y / N

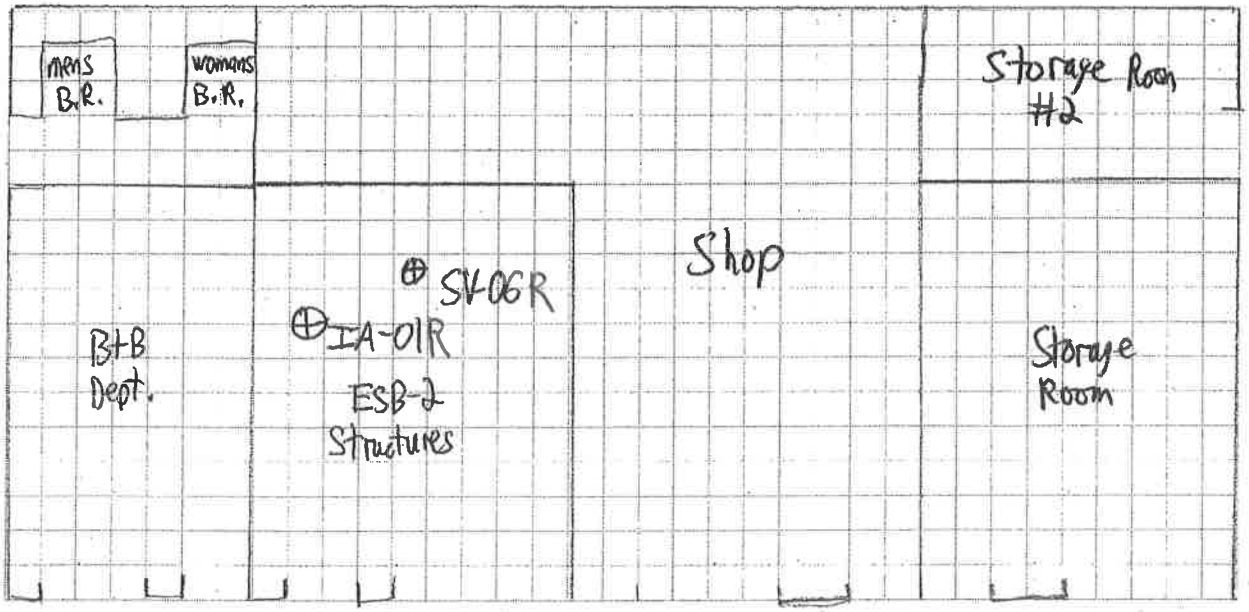
d. Relocation package provided and explained to residents? Y / N

11. FLOOR PLANS

Draw a plan view sketch of the basement and first floor of the building. Indicate air sampling locations, possible indoor air pollution sources and PID meter readings. If the building does not have a basement, please note.

Basement: N/A

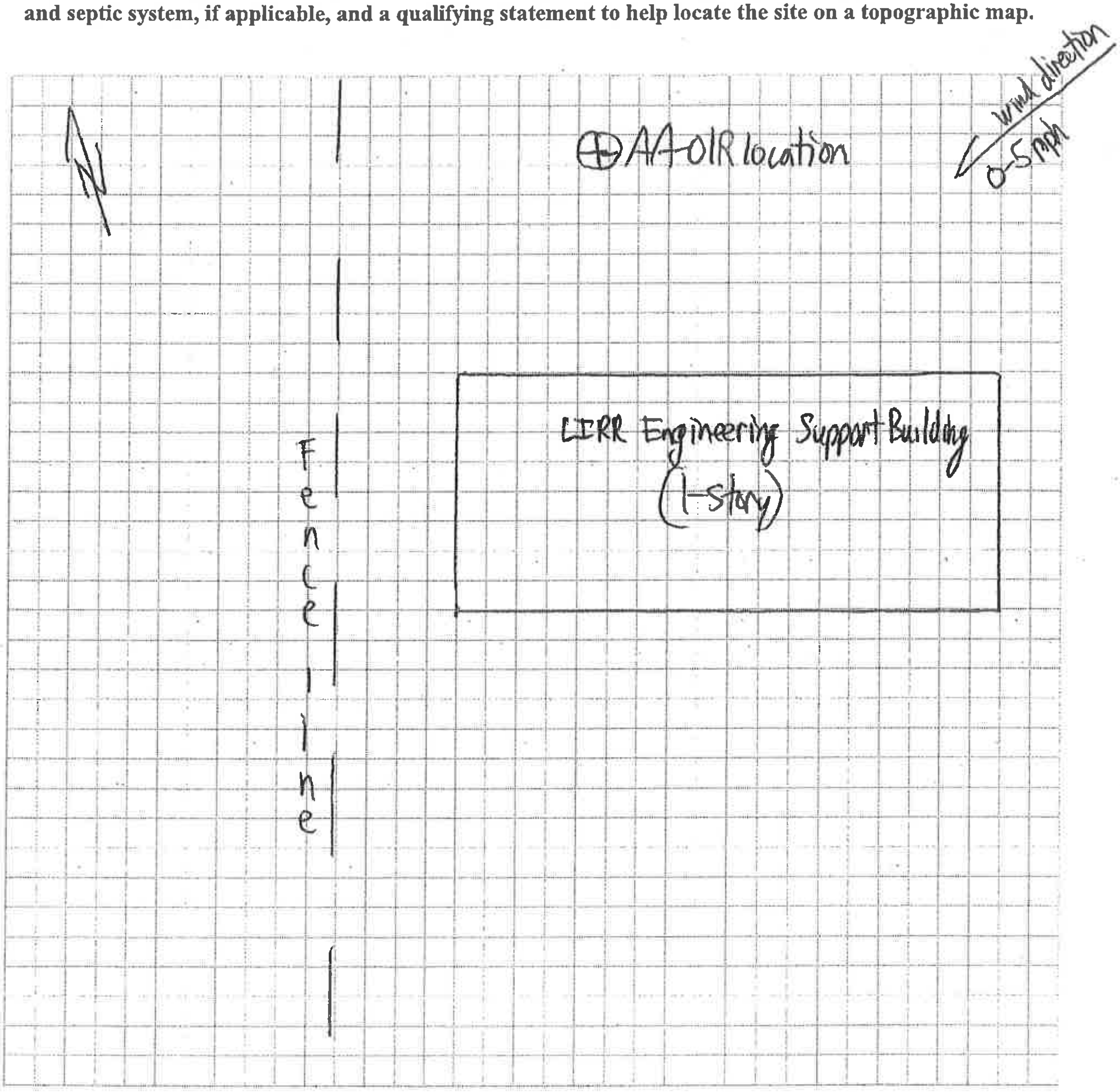
First Floor:



12. OUTDOOR PLOT

Draw a sketch of the area surrounding the building being sampled. If applicable, provide information on spill locations, potential air contamination sources (industries, gas stations, repair shops, landfills, etc.), outdoor air sampling location(s) and PID meter readings.

Also indicate compass direction, wind direction and speed during sampling, the locations of the well and septic system, if applicable, and a qualifying statement to help locate the site on a topographic map.



13. PRODUCT INVENTORY FORM

Make & Model of field instrument used: ppb RAE

List specific products found in the residence that have the potential to affect indoor air quality.

Location	Product Description	Size (units)	Condition*	Chemical Ingredients	Field Instrument Reading (units)	Photo ** Y / N
B+B Depot	ABC Kidde Fire Ext.	20 lbs (2)	UO		21	Y
BSB-2	ABC Kidde Fire Ext.	20lbs	UO		33	Y
	Sika pro-select sealant	29ozs	UO	DI sodecyl phtalates, titanium dioxide xylene, ethyl benzene	53	Y
Shop	ABC Kidde Fire Ext.	20lbs	UO		27	Y
	Westinghouse generator	1unit	U	gasoline	152	Y
	CRC Ice-off	12oz	10 Items UO	methanol, carbon dioxide, propylene, glycol	107	Y
	Corotec U 1063 Primer	5gal	U(2units)		110	Y
	Hercules gear oil	1gal	U	Lube oil, olefin sulfide	89	Y
	Inst-x floor-patio coating	3gal	U(2 Items)	Acrylic polymer, titanium dioxide, nephelene, syenite, kaolin	139	Y
	Ben-moore latex marking	2gal	U	Acrylic polymer, titanium dioxide ethylene glycol	160	Y
	General Coatings floor enamel	1gal	U	Titanium dioxide, propane-1,2 224-trimethyl-1,3 pentane	127	Y
				Monoisobutyrate, calcium carbonate		
	Motormedic Starting fluid	11ozs	U	Heptane, diethyl ether, Petro. oil	129	Y
	Gasoline Containers	10gal	U (3units)		182	Y
	Sika 1A construct. sealant	10ozs	(10-units) U/UO	titanium dioxide, xylene, ethylbenzene aromatic polyisocyanates	161	Y

* Describe the condition of the product containers as **Unopened (UO), Used (U),** or **Deteriorated (D)**
** Photographs of the **front and back** of product containers can replace the handwritten list of chemical ingredients. However, the photographs must be of good quality and ingredient labels must be legible.

~~8~~ 9

13. PRODUCT INVENTORY FORM (page #2)

Make & Model of field instrument used: ppb RAE

List specific products found in the residence that have the potential to affect indoor air quality.

Location	Product Description	Size (units)	Condition*	Chemical Ingredients	Field Instrument Reading (units)	Photo ** Y / N
Storage	Sherwin williams industrial enamel	120ozs	(7 Items) U/UO	mineral spirits, soya.alk. polymers, ethylbenzene	106	Y
Room	shermin willams semigloss	120ozs	U (2 items)	same as above, plus: nephelene, syrenete,	172	Y
	CPD Elastimont.	6gal.	U		109	Y
	Devran 224H Acryliz semigloss	6qts.	U (2 Items)	Ethylbenzene, 2-heptone, 2propanol acetate, formaldhyde, phenol	156	Y
				hexanol, acetate, titanium dioxide		
	Shermin Willams DTM acryliz	6qts.	U (6 Items)	Acryliz polymer, 2-2 methoxyethoxy, -ethanol, trimethylpentandiol	141	Y
				Isobutyrate		
	130 Henry floor tile adhesive	5gal	U (3-Items)	Asphalt (H_2S), rosin	152	Y
	Homweld latex bonding agent	5gal	U	vynyl acetate copolymer	129	Y
	Sonoguard Basecoat	5gal	U (6 Items)	Stoddard solvent, toluene	129	Y
				2-4 diisocate, toluene-2-6 diisocyanate	129	
	Kidde ABC Fire Ext.	20lbs	UO (10 Items)		132	Y
	Castrol Multi-White grease	5gal	U		129	Y
Storage room	Kidde ABC Fire Ext.	20lbs	U		108	Y
#2						

* Describe the condition of the product containers as **Unopened (UO), Used (U),** or **Deteriorated (D)**
** Photographs of the **front and back** of product containers can replace the handwritten list of chemical ingredients. However, the photographs must be of good quality and ingredient labels must be legible.

APPENDIX G

WASTE MANIFESTS

969628-16

2398516

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator ID Number: N Y R 0 0 0 1 1 1 0 3 9

2. Page 1 of 2

3. Emergency Response Phone: 347-494-6927

4. Manifest Tracking Number 006612993 FLE

5. Generator's Name and Mailing Address

LONG ISLAND RAIL ROAD
146-01 ARCHER AVENUE, MAIL CODE 1428 (F&A BLDG.)
JAMAICA NY 11435

Generator's Phone: 3 4 7 4 9 4 - 6 9 2 7

Generator's Site Address (if different than mailing address)

LIRR - ARCH STREET YARD
46-30 21ST STREET
LONG ISLAND CITY NY 11101

6. Transporter 1 Company Name: ISLAND PUMP & TANK CORP.

U.S. EPA ID Number: N Y R 0 0 0 1 9 1 7 2 6

7. Transporter 2 Company Name: Disposal Consultant Services LLC

U.S. EPA ID Number: NJR000063677

8. Designated Facility Name and Site Address

NORTHLAND ENVIRONMENTAL
275 ALLENS AVENUE
PROVIDENCE RI 02905

Facility's Phone: 401 781-6340

U.S. EPA ID Number: R I D 0 4 0 0 9 8 3 5 2

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes			
X	1. NA3082, HAZARDOUS WASTE, LIQUID, N.O.S. (VINYL CHLORIDE), 9, PGIII (RQ: D043)	0 0 4	DM	01837	P	D043	B ✗		
	2.								
	3.								
	4.								

14. Special Handling Instructions and Additional Information

1)(E) ERG#171 768622

Plate #234005
HAZ 412548

15. **GENERATOR'S/OFFEROR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name: x Kathleen Green

Signature: Kate

Month 05 Day 10 Year 16

16. International Shipments ☐ Import to U.S. ☐ Export from U.S.

Port of entry/exit:

Transporter signature (for exports only):

Date leaving U.S.:

17. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: ASH TO

Signature:

Month 5 Day 10 Year 16

Transporter 2 Printed/Typed Name: Bill Seaman

Signature: Bill Seaman

Month 5 Day 18 Year 16

18. Discrepancy

18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

18b. Alternate Facility (or Generator)

U.S. EPA ID Number

Facility's Phone:

18c. Signature of Alternate Facility (or Generator)

Month Day Year

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)

1. H141
2.
3.
4.

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a

Printed/Typed Name: Beth Arnold

Signature: Beth Arnold

Month 5 Day 25 Year 16

EPA Form 8700-22 (Rev. 3-05) Previous editions are obsolete.

DESIGNATED FACILITY TO GENERATOR

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST (Continuation Sheet)	21. Generator ID Number NYCE8QG	22. Page 2	**23. Manifest Tracking Number** 3 006612998FLE

24. Generator's Name LONG ISLAND RAILROAD

25. Transporter 3 Company Name REPUBLIC ENV SYS (TRANS GROUP) LLC U.S. EPA ID Number PAD982661381

26. Transporter ______ Company Name U.S. EPA ID Number

GENERATOR

27a. HM	27b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	28. Containers No.	Type	29. Total Quantity	30. Unit Wt./Vol.	31. Waste Codes		

32. Special Handling Instructions and Additional Information

TRANSPORTER

33. Transporter 3 Acknowledgment of Receipt of Materials

Printed/Typed Name Anthony K Porter Signature Month 5 Day 24 Year 16

34. Transporter ______ Acknowledgment of Receipt of Materials

Printed/Typed Name Signature Month Day Year

DESIGNATED FACILITY

35. Discrepancy

36. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)

EPA Form 8700-22A (Rev. 3-05) Previous editions are obsolete.

DESIGNATED FACILITY TO GENERATOR