KINGS PLAZA SHOPPING CENTER

5120 AVENUE U
BROOKLYN, NEW YORK

Final Engineering Report

NYSDEC BCP No. C224263

Prepared for:

Brooklyn Kings Plaza LLC
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DECEMBER 2018

CERTIFICATIONS

I, Stewart H. Abrams, am currently a registered professional engineer licensed by the State of New York, I had primary direct responsibility for implementation of the remedial program activities, and I certify that the Remedial Action Work Plan was implemented and that all construction activities were completed in substantial conformance with the Department-approved Remedial Action Work Plan.

I certify that the data submitted to the Department with this Final Engineering Report demonstrates that the remediation requirements set forth in the Remedial Action Work Plan and in all applicable statutes and regulations have been or will be achieved in accordance with the time frames, if any, established for the remedy.

I certify that all use restrictions, Institutional Controls, Engineering Controls, and/or any operation and maintenance requirements applicable to the Site are contained in an environmental easement created and recorded pursuant ECL 71-3605 and that all affected local governments, as defined in ECL 71-3603, have been notified that such easement has been recorded.

I certify that a Site Management Plan has been submitted for the continual and proper operation, maintenance, and monitoring of all Engineering Controls employed at the Site, including the proper maintenance of all remaining monitoring wells, and that such plan has been approved by Department.

I certify that all documents generated in support of this report have been submitted in accordance with the DER's electronic submission protocols and have been accepted by the Department.

I certify that all data generated in support of this report have been submitted in accordance with the Department's electronic data deliverable and have been accepted by the Department.

I certify that import of soils from off-site, including source evaluation, approval and sampling, has been performed in a manner that is consistent with the methodology defined in the RAWP.

I certify that all invasive work during the remediation and all invasive development work were conducted in accordance with dust and odor suppression methodology defined in the RAWP.

I certify that all information and statements in this certification form are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law. I, Stewart H. Abrams, of Langan Engineering Environmental, Surveying, Landscape Architecture and Geology, D.P.C. (Langan), am certifying as Owner's Designated Site Representative for the site.

Stewart H. Abrams	12/18/2018	Signature
NYS Professional Engineer #078833	Date	

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LIST OF ACRONYMS

Acronym	Definition
AMS	Air Monitoring Station
AWQS	Ambient Water Quality Standards
BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
bgs	Below Grade Surface
BTEX	Benzene, toluene, ethyl benzene, and xylenes
CAMP	Community Air Monitoring Plan
CFR	Code of Federal Regulations
cis-1,2-DCE	Cis-1,2-Dichloroethene
COC	Contaminant of Concern
CPP	Citizen Participation Plan
CQAP	Construction Quality Assurance Plan
cVOCs	Chlorinated Volatile Organic Compounds
cy	Cubic Yards
DER	Division of Environmental Remediation
DGA	Dense Grade Aggregate
DOT	Department of Transportation
DUSR	Data Usability Summary Report
ESS	Excavation Support System
FER	Final Engineering Report
GAC	Granular Activated Carbon
gpm	Gallons Per Minute
HASP	Health and Safety Plan
IC/ECs	Institutional Control and Engineering Controls
IRMs	Interim Remedial Measures
ISCO	In-Situ Chemical Oxidation
$KMnO_4$	Potassium Permanganate
lbs	Pounds
LDR	Land Disposal Restrictions
LNAPL	Light Non-Aqueous Phase Liquid
MEK	2-Butanone
mg/kg	Milligrams Per Kilogram
$NaMnO_4$	Sodium Permanganate
NYCRR	New York Codes Rules and Regulations
NYCDEP	New York City Department of Environmental Protection
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
OU	Operable Unit
PAH	Polycyclic aromatic hydrocarbon

Acronym	Definition
PCE	Tetrachloroethyene
PID	Photoionization Detector
PM	Project Manager
PPE	Personal Protective Equipment
PM10	10 microns in diameter
ppm	Parts Per Million
PVC	Polyvinyl chloride
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
QEP	Qualified Environmental Professional
RAOs	Remedial Action Objectives
RAWP	Remedial Action Work Plan
RCRA	Resource Conservation and Recovery Act
RE	Remedial Engineer
RIR	Remedial Investigation Report
SCGs	Standard, Criteria, and Guidelines
SCOs	Soil Cleanup Objectives
SMP	Site Management Plan
S/MMP	Soil/Materials Management Plan
SPDES	State Pollutant Discharge Elimination System
SRI	Supplemental Remedial Investigation
SVOCs	Semi-Volatile Organic Compound
SWPPP	Stormwater Pollution Prevention Plan
TAGM	Technical and Administrative Guidance Memorandum
TCE	Trichloroethylene
TCL/TAL	Target Compound List/Target Analyte List
TCLP	Toxicity Characteristic Leaching Procedure
TOGS	Technical and Operation Guidance Series
trans-1,2-DCE	Trans-1,2-Dichloroethene
µg/L	Micrograms Per Liter
µg/m^3	Micrograms Per Cubic Meter
USTs	Underground Storage Tanks
VC	Vinyl Chloride
VCA	Voluntary Cleanup Agreement
VCP	Voluntary Cleanup Program
VOCs	Volatile Organic Compounds

1.0 BACKGROUND AND SITE DESCRIPTION

This Final Engineering Report (FER) addresses the remediation of the 0.837-acre portion of the Kings Plaza Shopping Center parcel (hereinafter referred to as the "Site") in accordance with the New York State Department of Environmental Conservation (NYSDEC)-approved Remedial Action Work Plan (RAWP) dated 31 August 2016. The Site consists of the East 55th Street access road extending in a north-south direction from Avenue U to the shopping center's parking structure and in an east-west direction from the eastern edge of the Macy's department store to the easterly boundary line with the adjacent Lowe's Home Improvement Center. The Site is in the Borough of Brooklyn, Kings County, New York and is a portion of the Kings Plaza Shopping Center (also known as "the mall"), which encompasses approximately 31 acres and consists of three tax lots (Block 8470, Lot Nos. 50, 55, and 114) at 5102, 5120, and 5502 Avenue U in Brooklyn, New York (see Figures 1 and 2). The boundaries of the Site are fully described in Appendix A – Survey Map, Metes and Bounds.

Brooklyn Kings Plaza LLC entered into a Voluntary Cleanup Agreement (VCA) with the NYSDEC following the 2012 purchase of the Kings Plaza Shopping Center from the original volunteer (Vornado Realty Trust). The VCA compelled the Volunteer to investigate and remediate two operable units (OU-1 and OU-2) on the eastern side of Lots 50 and 55. OU-1 was 0.96 acres and encompassed the central and southern portions of the East 55th Street access road, and OU-2 was 0.22 acres and encompassed the northern portion of the East 55th Street access road (and bordered OU-1 to the north). Based on the termination of the Voluntary Cleanup Program (VCP), Brooklyn Kings Plaza LLC submitted an application to enter the Brownfield Cleanup Program (BCP) in the summer of 2017. On 22 January 2018, the Kings Plaza Shopping Center site was accepted into the BCP (Site No. C224263). The VCA between Brooklyn Kings Plaza LLC and NYSDEC was terminated and a Brownfield Cleanup Agreement (BCA) was entered into on 22 January 2018. The BCP site boundary was revised in February 2018 to exclude the southern 160-feet of East 55th Street and the entire BCP site is now one Operable Unit (OU).

The property was remediated to address source soils, reduce residual petroluem product in groundwater, prevent exposure to remaining contamination in soil, and mitigate potential soil vapor intrusion into the adjacent mall building. Following remediation, the Site will be restricted to commercial use, and the intended use post-remediation will be the current use, specifically access to the Kings Plaza Shopping Center parking garage, egress to Avenue U, and parking along East 55th Street. An electronic copy of this FER with all supporting documentation is included as Appendix B. Further details on previous investigations and remedial actions are provided in Section 3.2.

2.0 SUMMARY OF SITE REMEDY

2.1 REMEDIAL ACTION OBJECTIVES

Based on the results of the Remedial Investigation (see Section 2.2 for further details), the following Remedial Action Objectives (RAOs) were identified for this Site in the NYSDEC-approved RAWP dated 31 August 2016.

2.1.1 Groundwater RAOs

RAOs for Public Health Protection:

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.
- Prevent contact with, or inhalation of, volatiles emanating from contaminated groundwater.

RAOs for Environmental Protection:

- Restore groundwater aquifer to pre-disposal/pre-release conditions, to the extent practicable.
- Remove the source of ground and surface water contamination where practical.

2.1.2 Soil RAOs

RAOs for Public Health Protection:

- Prevent ingestion/direct contact with contaminated soil.
- Prevent inhalation of, or exposure to, contaminants volatilizing from contaminated soil or contaminated soil in particulate form.

RAOs for Environmental Protection:

- Prevent migration of contaminants that would result in groundwater or surface water contamination.

2.1.3 Soil Vapor RAOs

RAOs for Public Health Protection:

- Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into buildings at the Site.

2.2 DESCRIPTION OF SELECTED REMEDY

The Site was remediated in accordance with the NYSDEC-approved RAWP, prepared by Langan, dated 31 August 2016. Sufficient analytical data was gathered during the Supplemental Remedial Investigation (SRI) and Soil Vapor Intrusion study, conducted by Langan between 19 August 2013 and 27 March 2014, to establish site-specific soil cleanup levels and to develop a remedy for the Site. The remedy addresses fill impacted with chlorinated volatile organic compounds (cVOCs), groundwater impacted with cVOCs and petroleum compounds, and soil vapor impacted with volatile organic compounds (VOCs) and petroleum compounds. These impacts are further detailed in Section 3.2 below. Management of the residual contaminated soil and groundwater left at the Site is addressed via site-wide engineering controls, accompanying Environmental Easements (see Appendix C), and the Site Management Plan (SMP) (submitted under separate cover).

The factors considered during the selection of the remedy are those listed in 6 New York Codes Rules and Regulations (NYCRR) 375-1.8. The following were the components of the selected remedy:

1. Excavation of overburden soil exceeding Commercial Use Soil Cleanup Objectives (SCOs) listed in Table 1, to a depth of 15 to 16 feet; off-site disposal of soils exhibiting visual and olfactory indications of gross impacts within the previously delineated cVOC area (as defined in Section 3.2 below); demolition of the existing asphalt surface cover to facilitate excavation.
2. Reinstallation and maintenance of a site cover system, which consists of subgrade material (¾-inch structural fill) and 5 inches of asphalt binder or concrete sidewalk, to prevent human exposure to remaining contaminated soil/fill.
3. If encountered (as contingency plan), removal of any underground storage tanks (USTs), fuel dispensers, underground piping or other structures associated with a source of contamination; **(none encountered)**
4. Localized dewatering, if required, treated as necessary prior to discharge to the municipal sewer system; **(not necessary)**
5. Collection and analysis of post-excavation soil samples to document residual soil conditions;
6. In-situ chemical oxidation (ISCO) in the excavation area to polish residual soil and groundwater impacts;
7. Imported soil used for backfill in compliance with the RAWP and in accordance with applicable laws and regulations. Imported soil was sampled and analyzed in accordance with NYSDEC Division of Environmental Remediation (DER)-10

Section 5.4 prior to import to the Site, and met Restricted Commercial Use SCOs. Recycled concrete aggregate and imported virgin stone was not sampled.

8. Development and implementation of plans (summarized in Section 4.1 below) for the protection of on-site workers, community, and environment during remediation and construction activities;
9. Installation of an active soil vapor mitigation system beneath the sidewalk along the western side of East 55th Street to mitigate residual soil vapor;
10. Monitoring for soil vapor intrusion in adjacent occupied buildings owned by the Volunteer performed during and after the treatment phase;
11. Monitored natural attenuation sampling for impacted groundwater;
12. Implementation of a passive oil recovery program in select site monitoring wells, utilizing oil absorbent socks;
13. Management and maintenance of the existing site cover system consisting of asphalt pavement and sidewalks;
14. Implementation of long-term Institutional Controls (ICs) in the form of an Environmental Easement and SMP;
    a. Execution and recording of an Environmental Easement to restrict land use and prevent future exposure to any contamination remaining at the Site.
    b. Development and implementation of a SMP for long-term management of remaining contamination as required by the Environmental Easement, which includes plans for: (1) ICs and Engineering Controls (ECs), (2) monitoring, (3) operation and maintenance, and (4) reporting.
15. Periodic certification of the IC/ECs listed above.

Remedial activities at the Site commenced on 17 April 2017 and were completed on 12 July 2017. Ongoing activities include:

- Implementation of a passive oil recovery program in select Site monitoring wells, utilizing oil absorbent socks to address residual light non-aqueous phase liquid (LNAPL);
- Monitoring for vacuum in the soil vapor mitigation system to be performed following the treatment phase;
    - Vacuum monitoring has been conducted quarterly in July, September, and December 2017, and July 2018; additionally, vacuum monitoring was periodically performed during the intrusive activities associated with installation of a new elevated switchgear platform at the Site. Vacuum readings ranging from -0.052 to -3.1 have been confirmed during all events.
- Monitored natural attenuation sampling for impacted groundwater;

- Management and maintenance of the existing Site cover system consisting of asphalt pavement and concrete sidewalks to address remaining contaminants in soil; and,
- Implementation of long-term ICs in the form of an Environmental Easement and SMP.

3.0 INTERIM REMEDIAL MEASURES, OPERABLE UNITS AND REMEDIAL CONTRACTS

Prior to the approval of the RAWP dated 31 August 2016, remediation activities at the Site were being conducted in accordance with the former VCA No. A2-0403-9911 dated 26 February 2001; and two amendments dated 18 November 2009 and 29 January 2014. The information and certifications made in the August 2016 RAWP were relied upon to prepare this report and certify that the remediation requirements for the Site have been met. Previous environmental reports summarized in the RAWP include the following (see Appendix D):

Contamination Assessment/Site Investigation, prepared by IVI Environmental, Inc. (IVI), July 1997;

Remedial Investigation Report (RIR)/RAWP for the Former Presto Plastics Facility OU-2, prepared by IVI, 19 April 2000;

RIR Addendum and RAWP Addendum, prepared by Excel Environmental Resources, Inc. (Excel), September 2004;

Emergency Action Interim Remedial Measures (IRMs) Report, prepared by Excel, August 2007;

Remedial Action Progress Report – Kings Plaza Shopping Center (OU-1), prepared by Excel, July 2008;

Interim Remedial Action Report In-Situ Groundwater Remediation at MW-39 (OU-1), prepared by Excel, August 2008;

Draft RAWP, prepared by Excel, June 2010;

Phase I Environmental Site Assessment of the Kings Plaza Shopping Center, prepared by Certified Environments, Inc., July 2012; and,

SRI Report for OU-1 at Kings Plaza Shopping Center, prepared by Langan Engineering, Environmental, Surveying, and Landscape Architecture, D.P.C. (Langan), 23 May 2014.

3.1 OPERABLE UNITS

OU-1 encompassed the central and southern portions of the East 55th Street mall access road, and was bound by OU-2 to the north, Mill Basin to the south, the mall building to the west, and the Lowe's building to the east. Impacts at OU-1 consisted of residual

LNAPL associated with a historical release of #2 fuel oil from USTs, and cVOCs previously identified in groundwater at monitoring well MW-39 in the southern portion of OU-1.

OU-2 was 0.22 acres and encompassed the northern portion of the East 55th Street access road, and was bound by Avenue U to the north, OU-1 to the south, the mall building to the west, and the Lowe's building to the east. Impacts at OU-2 resulted from fill material meeting the NYSDEC definition of historic fill.

As summarized in Section 1.0, OU-1 and OU-2 were originally investigated and remediated under the former VCA. IRMs completed prior to issuance of the RAWP are summarized in Section 3.2 below.

3.2 INTERIM REMEDIAL MEASURES CONDUCTED BETWEEN 2005 AND 2012

The following section summarizes the IRMs conducted at the Site from June 2005 to November 2012 in accordance with the reports prepared by Excel listed in Section 3.0 above.

3.2.1 OU-1 Fuel Oil Releases

Petroleum impacts at OU-1 resulted from a release of #2 fuel oil from multiple historic 15,000-gallon USTs that were previously along East 55th Street on the northeast side near the Macy's tenant space. Fuel oil was discovered in groundwater monitoring wells during the July 1997 Contamination Assessment/Site Investigation completed by IVI Environmental, Inc. (IVI). This study led to the remediation and removal of six 15,000-gallon USTs in this area, and enrollment of the Site into the VCP in 2001. Approximately 750 tons of impacted soil was removed and disposed of off-site; however, some impact was left in place due to the proximity to the mall structure. Four new 15,000-gallon USTs were installed in the previous tank graves in 2000, and a high vacuum dual phase extraction system was constructed to address residual free product on the water table.

In 2006, a second fuel oil release occurred when the newly installed UST system failed (NYSDEC Spill No. 06-03800). These USTs were removed along with approximately 3,850 tons of petroleum-impacted soil and 35,000 gallons of groundwater/LNAPL emulsion.

Remedial activities associated with the VCP were conducted by Excel on behalf of Vornado, between July 2006 and November 2012. These remedial activities consisted of bi-weekly dual phase vacuum extraction of LNAPL and associated water from impacted monitoring wells. According to available records, approximately 15,694 gallons of LNAPL

and water were recovered from wells within OU-1 between 2006 and 2012. The individual volumes of recovered LNAPL and water are unknown.

3.2.2 OU-1 Chlorinated Solvent Release

IVI first reported cVOCs in groundwater in their July 1997 Contamination Assessment/Site Investigation report. Concentrations of cVOCs, including cis-1,2-dichloroethene (cis-1,2-DCE) and vinyl chloride (VC), exceeded the NYSDEC Division of Water Technical and Operation Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards (AWQS) for Class GA groundwater in one monitoring well, MW-1, in the southern portion of OU-1.

In 2003 and 2004, one or more cVOCs, including tetrachloroethylene (PCE) and several of its daughter products, were reportedly identified in groundwater above NYSDEC TOGS 1.1.1 AWQS in five monitoring wells (MW-1, MW-11, MW-20, MW-37, and MW-39) in OU-1 (Excel, September 2004). The highest concentrations of cVOCs were observed in MW-39 (results dated 11 August 2004):

- PCE – 11,000 micrograms per liter (µg/L)
- Trichloroethylene (TCE) – 6,800 µg/L
- cis-1,2-DCE – 13,000 µg/L
- VC – 3,200 µg/L

In June 2003, Excel conducted an additional subsurface investigation, which included 14 soil borings, to delineate the source of cVOCs in shallow soil near MW-39. The detected concentration of TCE was above the Technical and Administrative Guidance Memorandum (TAGM) Recommended SCO, the applicable standard at the time of the investigation, in one soil boring (39-4) at a concentration of 3.2 milligrams per kilogram (mg/kg). Excel concluded that there was no evidence of "top-down" discharge and no indication that the cVOC impacts were associated with recent mall operations.

In June 2005, in accordance with the NYSDEC-approved RIR Addendum and RAWP Addendum dated September 2004, Excel injected RegenOx™, a chemical oxidation product, in five borings near MW-39 at depths ranging between 15 to 18 feet, which correspond to the top of the confining clay layer (Excel, August 2008). A second chemical oxidation injection event was conducted in August 2005 and RegenOx™ was injected in 14 borings near MW-39. Excel conducted seven rounds of groundwater sampling following the injections to monitor for the natural attenuation of cVOCs. The results of groundwater samples collected in March 2006 (last sampling event) reportedly indicated that concentrations of TCE (780 µg/L) and PCE (3,100 µg/L) decreased in MW-39; however, daughter products, including cis-1,2-DCE increased (26,000 µg/L) compared to

pre-injection levels. Excel interrupted the ISCO of cVOC-impacted soil and groundwater after the second oil spill occurred within OU-1 (March 2006) due to the presence of LNAPL near MW-39, which would have preferentially oxidized the spilled petroleum product rather than the dissolved cVOCs.

Based on the groundwater data following the injections, Excel concluded that the RegenOx™ treatment was effective at initially reducing the cVOC concentrations. Excel recommended re-evaluation of the groundwater quality in the area of the cVOC hot spot following completion of remediation of the fuel oil release detailed above. Therefore, remedial activities related to the chlorinated solvent release were not conducted between 2006 and 2012, at which time the property was sold to Macerich.

3.2.3 OU-2 Historical Fill

According to the July 2012 Phase I Environmental Site Assessment of the Kings Plaza Shopping Center by Certified Environments Inc., the Presto Plastics Products Company, Inc. and its successors occupied OU-2 from the early 1940s until the mid-1960s, and reportedly stored hazardous chemicals in USTs. According to the 29 July 1997 Contamination Assessment/Site Investigation report by IVI, approximately 20 railroad tankers (50 feet long by 10 feet wide) used for storage of petroleum and/or chemical storage were uncovered and removed from the Site in 1969. The tankers were reportedly buried in the vicinity of the Macy's building and East 55th Street. IVI and Excel conducted numerous subsurface investigations throughout the Site between 1997 and 2003. These investigations were documented in multiple reports summarized in the RIR for the Former Presto Plastics Facility, OU-2, prepared by Excel and dated 19 April 2000. Based on the results of the investigations:

- Historical fill, which exceeded NYSDEC TAGM (and exceeds current Part 375 reuse criteria) levels for SVOCs, specifically polycyclic aromatic hydrocarbons (PAHs), and meets the NYSDEC definition of historic fill, was identified under OU-2 up to approximately 10 feet below grade surface (bgs); and,
- Groundwater slightly exceeded NYSDEC Division of Water TOGS 1.1.1 AWQS and guidance values for Class GA water for SVOCs at OU-2.

A Remedial Action Workplan for Former Presto Plastics (OU-2) prepared by Excel, May 2005 (on file at the NYSDEC), included maintenance of the existing site cover and implementation of institutional controls. Those activities are documented in this FER.

4.0 DESCRIPTION OF REMEDIAL ACTIONS PERFORMED

Remedial activities completed at the Site were conducted in accordance with the NYSDEC-approved RAWP for OU-1 at the Kings Plaza Shopping Center site (31 August 2016). All deviations from the RAWP are noted in Section 4.10 below.

4.1 GOVERNING DOCUMENTS

4.1.1 Site-Specific Health and Safety Plan

All remedial work performed under this Remedial Action was in compliance with Federal, State, and local requirements, including site and worker safety requirements mandated by the Federal Occupational Safety and Health Administration. The site-specific Health and Safety Plan (HASP) was complied with for all remedial and invasive work performed at the Site.

The Remedial Engineer (RE) prepared a site-specific HASP, which is included as Appendix D of the RAWP. The HASP applied to all remedial and construction-related work on-site. The HASP provides a mechanism for establishing safe on-site working conditions, safety organization, procedures, and personal protective equipment (PPE) requirements. The HASP meets the requirements of 29 Code of Federal Regulations (CFR) 1910 and 29 CFR 1926 (which includes 29 CFR 1910.120 and 29 CFR 1926.65). The HASP includes, but is not limited to, the following components listed below:

- Organization and identification of key personnel;
- Training requirements;
- Medical surveillance requirements;
- List of site hazards;
- Excavation safety;
- Work zone descriptions;
- PPE requirements;
- Decontamination requirements;
- Standard operating procedures;
- Protective measure plan;
- Community Air Monitoring Plan (CAMP); and,
- Material Safety Data Sheets.

The Volunteer and associated parties preparing the remedial documents submitted to the State and those who performed the construction work, were completely responsible for the preparation of an appropriate HASP and for the appropriate performance of work

according to that plan and applicable laws. The HASP pertains to all remedial and invasive work performed at the Site until the issuance of a Certificate of Completion.

4.1.2 Quality Assurance Project Plan

A Quality Assurance Project Plan (QAPP) was included as Appendix E of the RAWP, approved by the NYSDEC. The QAPP describes the specific policies, objectives, organization, functional activities, and quality assurance/quality control (QA/QC) activities designed to achieve the project data quality objectives.

4.1.3 Construction Quality Assurance Plan

The Construction Quality Assurance Plan (CQAP) managed performance of the Remedial Action tasks through designed and documented QA/QC methodologies applied in the field and in the lab. The CQAP provided a detailed description of the observation and testing activities that were used to monitor construction quality and confirm that remedial construction was in conformance with the remediation objectives and specifications.

The RE prepared a CQAP that describes the quality control components employed so that the proposed remedy accomplished the remedial goals, remedial action objectives, and was completed in accordance with the design specifications. Because the remedy was accomplished through excavation and restoration, the contractor and construction manager had the primary responsibility to provide construction quality. The engineering personnel involved in implementation of the CQAP and procedures that were carried out by the remedial engineering team are identified below.

The Qualified Environmental Professional (QEP) and RE directly supervised field engineers, scientists, and geologists that were on-site during remedial action to monitor particulates and organic vapor in accordance with the CAMP. Weekly reports were submitted to the NYSDEC and included the CAMP results with action level exceedances underlined.

The QEP and RE directly supervised field engineers, scientists, and geologists that met with the Construction Superintendent on a daily basis to discuss the plans for that day and schedule upcoming activities. The field engineers, scientists, and geologists documented all remedial activities in daily reports submitted in a timely manner to the NYSDEC project managers. Daily reports were forwarded to the Field Team Leader on a daily basis and to the Project Manager and the RE on a weekly basis.

The QEP and RE directly supervised field engineers, scientists, and geologists that screened the excavation with a photoionization detector (PID) during intrusive activities. All readings were noted in the record. Elevated readings were reported to the NYSDEC in the daily reports. The field engineers, scientists, and geologists collected the excavation endpoint samples in accordance with the NYSDEC DER-10 Guidance.

A photo log was kept to document remediation activities by still photos (Appendix E). The photo log was used to record activities recorded in the daily and monthly reports (Appendix F).

The project field book was used to document all sampling activities and how they corresponded to the RAWP. All observations, field and/or laboratory tests were recorded in the project field book or on separate logs. Recorded field observations were in the form of notes, charts, sketches, and/or photographs.

The Field Team Leader maintained the project field book and all original field paperwork during the performance of work. The Project Manager maintains the field paperwork after completion and will maintain all submittal document files.

4.1.4 Soil/Materials Management Plan

The RE prepared a Soil/Materials Management Plan (S/MMP), which includes detailed plans for managing all soils/materials that were disturbed at the Site, including excavation, handling, storage, transport, and disposal. It also includes controls that were applied to these efforts to facilitate effective, nuisance-free performance in compliance with all applicable Federal, State, and local laws and regulations.

This section presents the approach to managing, disposing, and reuse of soil, fill, and debris excavated from the Site. This plan was based on the knowledge of site conditions at the time of writing the RAWP, and was supplemented with the additional data collected during remediation. A field engineer under the direction of the RE and QEP monitored and documented the handling and transport of contaminated material removed from the Site for disposal as a regulated solid waste. A field engineer under the direction of the RE and QEP assisted the remedial contractor in identifying impacted materials during excavation, determining materials suitable for direct load out versus temporary on-site stockpiling, selection of samples for waste characterization, and determining the proper off-site disposal facility. Separate stockpile areas were constructed as needed for the various materials excavated or generated, with the intent to most efficiently manage and characterize the materials and to avoid commingling impacted materials with non-impacted soil.

Fluids Management

Collection and pretreatment of contaminated groundwater was anticipated for remedial excavations. AKRF, Inc. (AKRF) was contracted by AWT Environmental Services (AWT) of Sayreville, NJ to facilitate sewer and discharge approvals for the proposed construction dewatering during remediation activities. Construction dewatering of groundwater was expected to be required to facilitate remedial excavation work.

On 20 January 2017, AWT conducted a dewatering pilot test at monitoring well MW-39, pumping groundwater from on-site monitoring wells through a pilot scale treatment system consisting of a settling tank, particulate filter, and a granular activated carbon (GAC) filter. Test results indicated that construction dewatering could be conducted at an approximate flow rate of 10 gallons per minute (gpm). Following treatment, water from the pilot test was containerized in 55-gallon drums for waste characterization and off-site disposal.

During the pilot test, AKRF collected a sample of the dewatering fluids from the pilot scale treatment system influent port (DW-INF, prior to particulate filtration), the post-particulate filter port (DW-PPF, following particulate treatment), and at the effluent port (DW-PCF, following GAC treatment). All samples were analyzed for New York City Department of Environmental Protection (NYCDEP) dewatering permit parameters. The groundwater samples were analyzed by TestAmerica, Inc. (TestAmerica) of Edison, New Jersey, a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program certified analytical laboratory.

The treatment system influent sample contained the following VOCs: PCE, PCE-breakdown compounds (including TCE, cis- and trans-1,2-dichlorethene [trans-1,2-DCE], and VC), and the petroleum-related compounds benzene and toluene. SVOCs (2-methylnaphthalene, bis(2-ethylhexyl)phthalate, and naphthalene) and various metals, including lead and zinc, were also detected in the influent sample. VOCs, SVOCs, and metals concentrations in the post-particulate filter samples remained comparable to the influent concentrations. None of the VOCs or SVOCs detected in the influent and post-particulate filter samples were detected in the effluent (post-GAC) sample. Metals were detected in the effluent sample (post-GAC) at lower concentrations compared to the influent and intermediate samples. Acetone was also detected in the effluent sample at a concentration of 51 µg/L. However, as acetone is a common laboratory contaminant and was not detected in either of the remaining samples, it is likely that the detection in the effluent sample is not representative of the dewatering treatment system effluent water quality.

Based on the observed groundwater flow from monitoring well MW-39 and throughout the pilot scale test, construction dewatering was expected to occur at a total discharge rate of approximately 10,000 gallons per day, not to exceed a maximum instantaneous flow rate of 25 gpm, to existing separate storm sewers on 55th Street. The Site is in an area of separate sewer systems connecting to a municipal separate storm sewer system outfall. Based on NYCDEP sewer maps, the sewer manhole terminates either at a separate storm water outfall, or a privately owned direct drainage outfall on the eastern portion of the Site. All dewatering system effluent liquids were to be sampled and monitored in accordance with NYSDEC requirements.

Based on these conclusions, AKRF prepared a State Pollutant Discharge Elimination System (SPDES) Permit Equivalent application. Groundwater was expected to be treated using the following elements in series: three influent tanks for primary solid settlement, duplex bag filters, and two carbon filters, prior to discharge. Langan submitted a request for a SPDES Permit equivalency on 20 March 2017 to facilitate the implementation of the RAWP at the Site. Approval was granted by the NYSDEC on 24 March 2017 (see Appendix G) and the requirements and obligations of the permit were administered through the DER under the VCA.

The full-scale construction dewatering treatment system was comprised of 18,000-gallon and 21,000-gallon settling tanks operated in series, followed by duplex particulate bag filters, and two 1,000-pound GAC filters operated in series, with digital flow meters prior to discharge. The system was installed on-site during mobilization activities on 17 April 2017. During remedial construction, groundwater infiltration was kept to a minimum through the use of an excavation support system (ESS) and naturally occurring clay layer below the water table. Calciment drying agent was applied to stabilize wet material prior to transport and off-site disposal. At no time during remediation activities were pumpable quantities of groundwater encountered and the treatment system was removed from Site on 2 May 2017 subsequent to backfilling activities.

Stockpile Methods

Soil stockpile areas, when needed for the different soil materials, were constructed for staging of site soil, pending loading or characterization testing. Separate stockpile areas were constructed to avoid commingling materials of differing waste types. All stockpile areas met the following minimum requirements:

- The excavated soil was placed onto a minimum thickness of 10-mil low-permeability liner sufficient in strength and thickness to prevent puncture during

use; separate stockpiles were created where material types were different (e.g., petroleum-impacted material stockpiled in a contaminated soil area).

- Equipment and procedures were used during placement and removal of the soil to minimize the potential to jeopardize the integrity of the liner.
- Stockpiles were covered with minimum 6-mil plastic sheeting or tarps securely anchored to the ground. Stockpiles were routinely inspected and broken sheeting covers were promptly replaced.
- Stockpiles were covered upon reaching their capacity of approximately 1,000 cubic yards (cy) until ready for loading.
- Active stockpiles were covered at the end of each workday.
- Each stockpile area was encircled with silt fence and hay bales, as needed, to contain and filter particulates from any rainwater that drained off the soils, and to mitigate the potential for surface water run-off.
- The stockpile areas were inspected daily and noted deficiencies were promptly addressed.

Materials Excavation and Load Out

The field engineer under the direct supervision of the RE and QEP oversaw all invasive work and the excavation and load-out of all excavated material. The Volunteer and its contractors were solely responsible for safe execution of all invasive and other work performed under the RAWP.

The presence of utilities and easements on the Site was investigated by the RE. Utilities were marked prior to remediation and excavations were limited so as to not damage existing utilities. It was determined that no risk or impediment to the planned work was posed by known utilities or easements on the Site.

The Volunteer and associated parties preparing the remedial documents submitted to the State, and parties performing this work, were completely responsible for the safe performance of all invasive work, the structural integrity of excavations, and for structures that were affected by excavations (such as building foundations and bridge footings).

Materials Transport Off-Site

All transport of materials was performed by licensed haulers in accordance with appropriate Federal, State, and local laws and regulations, including 6 NYCRR Part 364. Haulers were appropriately licensed and trucks properly placarded. Material transported by trucks exiting the Site was secured with tight-fitting covers. Loose-fitting canvas-type truck covers were prohibited. If loads contained wet material capable of producing free

liquid, truck liners were used. Trucks hauling historical fill were not lined unless the material exhibited free liquids or was grossly impacted.

Materials Disposal Off-Site

All soil/fill/solid waste excavated and removed from the Site was handled, transported and disposed in accordance with all Federal, State (including 6 NYCRR Part 360), and local laws and regulations. Unregulated off-site management of materials from this Site is prohibited without formal NYSDEC approval.

Langan submitted a Contained-In Determination for cVOC-Impacted Soil memo to NYSDEC, dated 5 April 2017 (see Appendix H). The memo summarizes waste characterization activities performed prior to remediation. NYSDEC confirmed that soils generated during remediation did not need to be handled as hazardous waste in a letter dated 13 April 2017.

Material that does not meet Unrestricted SCOs is prohibited from being taken to a New York State recycling facility (6 NYCRR Part 360-16 Registration Facility).

The following documentation was obtained and reported by the RE for the disposal location used in this project, SSI-Metro12 Facility (operated by SoilSafe) at 300 Salt Meadow Road in Carteret, NJ, to fully demonstrate and document that the disposal of material derived from the Site conforms to all applicable laws:

(1) A Material Characterization Report for the SSI-Metro12 Facility describing the material to be disposed and requesting formal written acceptance of the material. The application stated that material to be disposed is contaminated material generated at an environmental remediation site in New York State. The application provided the project identity and the name and phone number of the RE. The application included, as an attachment, a summary of all chemical data for the material being transported (including site characterization data); and,
(2) A letter from the SSI-Metro12 Facility stating it reviewed the application and approved 3,000 tons of soil for disposal. These documents are included as Appendix I.

Documentation associated with disposal of all material also includes records and approvals for receipt of the material. A Bill of Lading system was used for off-site movement of nonhazardous wastes and contaminated soils. This information is also included in Appendix I. The total export from the Site was 1,729.55 tons from 19 April to 12 July 2017. A summary of the quantities of impacted material removed from the Site is

provided in Table 2 and Appendix I.

Waste characterization was performed for off-site disposal in a manner suitable to the receiving facility and in conformance with applicable permits. Sampling and analytical methods, sampling frequency, analytical results and QA/QC are reported in Section 4.3.1.

Materials Reuse On-Site

Soil excavated from the remedial area during remedial activities was not reused on-site as backfill. All excavated material from the remedial area was shipped off-site as nonhazardous waste for disposal at a pre-approved facility. During installation of the soil vapor mitigation system, excess overburden soil generated during trenching was used for backfilling and subgrade leveling activities. The excess overburden soil was used as backfill in the same area it was generated from and was at no point relocated to other areas of the Site or stockpiled outside of the trenching area. Reused soil was nonhazardous and met the lower of 6 NYCRR 375-6(b) Unrestricted Use or Protection of Groundwater SCOs or protection of Ecological Resources, whichever one has a lower limit, in accordance with 6 NYCRR Part 375 Table 375-6.8(b) Restricted Use SCOs; and in accordance with the predetermined beneficial use determination listed in 6 NYCRR § 360-1.15(b). Soil removed during implementation of the remedy was not reused as backfill for subsurface utility lines. Reuse of soil was coordinated in advance with the NYSDEC case manager. Material deemed unfit for reuse was transported for off-site disposal.

Backfill from Off-Site Sources

Stone material proposed for import onto the Site was certified as free of any hazardous materials or contamination and is considered to be clean virgin material approved by the RE and NYSDEC Project Manager (PM). Material from industrial sites, spill sites, other environmental remediation sites or other potentially contaminated sites was not imported to the Site.

Materials imported to the Site for use as backfill met the requirements of Appendix 5 (Allowable Constituent Levels for Imported Fill or Soil) in the NYSDEC's guidance document DER-10. Before stone was brought onto the Site, the site Contractor supplied the RE with the name, location, a brief history, and certified virgin source letters originating at the proposed site or facility for review and approval. No imported soils were allowed onto the Site before they were approved by the RE and NYSDEC PM. The fill was free of organic matter, wood, trash, etc., which cannot be properly compacted. The clean fill was compacted following standard construction requirements (to at least 95% of the maximum dry density as determined by Standard Proctor compaction test, (American

Society for Testing and Materials D698). The fill gradation and surface slope was such that it is free draining.

Any stone brought onto the Site was certified clean from a virgin quarry by Maddox Materials, LLC and consisted of dense grade aggregate (DGA) and ¾-inch stone (further details in Section 4.5.1). Solid waste was not imported onto the Site. Trucks entering or leaving the Site with import/export soils and stone were securely covered with tight fitting covers.

4.1.5 Stormwater Pollution Prevention Plan (SWPPP)

Erosion and sediment controls were implemented in conformance with requirements presented in the New York State Guidelines for Urban Erosion and Sediment Control. A SWPPP was not necessary because the project disturbed less than an acre, and stormwater discharge was to a combined sewer, in accordance with the New York City generic SPDES permit.

4.1.6 Community Air Monitoring Plan

Community air monitoring was conducted in compliance with the NYSDOH Generic CAMP outlined below and included in the HASP (Appendix D of the RAWP).

The CAMP included real-time monitoring for VOCs and particulates at the upwind and downwind perimeter, and within the work zone of the designated work area when certain activities were in progress. Continuous monitoring was required for all ground intrusive activities. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting and trenching, and the installation of soil borings or monitoring wells. Periodic monitoring for VOCs was required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. "Periodic" monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well bailing/purging, and taking a reading prior to leaving a sample location.

CAMP monitoring for VOCs levels was conducted with PIDs, and monitoring for dust/particulates was conducted with particulate sensors equipped with filters to detect particulates less than 10 microns in diameter (PM10). Monitoring for particulates and odors was conducted during all ground intrusive activities by the RE's field engineer. The work zone is defined as the general area in which machinery is operating in support of remediation activities. A portable PID was used to monitor the work zone and for periodic

monitoring for VOCs during activities such as soil and groundwater sampling. The site perimeter was visually monitored for fugitive dust emissions.

The following actions would be taken, if triggered, based on VOC levels measured:

- If total VOC levels exceeded 5 parts per million (ppm) above background for the 15-minute average at the perimeter, work activities were temporarily halted and monitoring continued. If levels readily decreased (per instantaneous readings) below 5 ppm above background, work activities would resume with continued monitoring.
- If total VOC levels at the downwind perimeter of the hot zone persisted at levels in excess of 5 ppm above background but less than 25 ppm, work activities were halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities would resume provided that the total organic vapor level 200 feet downwind of the hot zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less – but in no case less than 20 feet – was below 5 ppm above background for the 15-minute average.
- If the total VOC level was above 25 ppm at the perimeter of the hot zone, activities were shut down.

The following actions would be taken, if triggered, based on visual dust observations:

- If the downwind particulate level was 100 micrograms per cubic meter (µg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust was observed leaving the work area, then dust suppression was employed. Work may continue with dust suppression techniques provided that downwind PM10 levels did not exceed 150 µg/m^3 above the background level and provided that no visible dust was migrating from the work area.
- If, after implementation of dust suppression techniques, downwind PM10 levels were greater than 150 µg/m^3 above the background level, work was stopped and a re-evaluation of activities initiated. Work could resume provided that dust suppression measures and other controls were successful in reducing the downwind PM10 concentration to within 150 µg/m^3 of the upwind level and in preventing visible dust migration.

Exceedances observed in the CAMP were reported to NYSDEC PMs and included in the daily reports. The CAMP results and response actions are provided in Section 4.2.5.

4.1.7 Contractor's Site Operations Plans

The RE reviewed all plans and submittals for this remedial project (i.e., those listed above plus contractor and subcontractor submittals) and confirmed that they are in compliance with the RAWP. All remedial documents were submitted to NYSDEC and NYSDOH in a timely manner and prior to the start of work.

4.1.8 Community Acceptance

A 45-day public comment period and Citizen Participation Plan (CPP) were not required to complete this work under the VCP (BCA was not yet signed). Langan and NYSDEC prepared a Remediation Fact Sheet that was sent to local elected officials and the community board members prior to the start of remedial activities.

Following the transition of the Site from the VCP to the BCP, Langan prepared a CPP in accordance with the requirements of Environmental Conservation Law §27-1417 and 6 NYCRR §§375-1.10 and 375-3.10. This CPP covers procedures and requirements for community participation in the future, if needed.

4.2 REMEDIAL PROGRAM ELEMENTS

4.2.1 Contractors and Consultants

The Volunteer contracted with AWT to act as the Remediation Contractor. Langan was retained as the RE. Mr. John Plante, Professional Engineer of Langan, is the RE of record and is certifying the FER. AWT implemented the remedial activities at the Site. AWT is a Remediation Contractor and has experience at contaminated urban sites. The Remediation Contractor maintained a full staff and complement of equipment to conduct remedial excavation activities.

4.2.2 Site Preparation

A pre-construction meeting was held with NYSDEC and all contractors on 22 March 2017. Prior to commencing the major earthworks, the Remediation Contractor completed mobilization and site preparation for remedial activities on 17 April 2017. Descriptions of mobilization and site preparation activities are provided below.

- Identified the location of all aboveground and underground utilities (e.g., power, gas, water, sewer, telephone), equipment, and structures (as necessary to implement the remediation);
- Mobilized necessary remediation personnel, equipment, and materials to the Site;

- Constructed one or more stabilized construction entrances consisting of nonhazardous material capped with a gravel roadway at or near the site exit, which took into consideration the site setting and perimeter;
- Constructed an equipment decontamination area for trucks, equipment, and personnel that came into contact with impacted materials during remedial activities;
- Installed erosion and sedimentation control measures; and,
- Installed temporary fencing or other temporary barriers to limit unauthorized access to areas where remediation activities were conducted.

Non-agency permits relating to the remediation project are provided in Appendix G. Documentation of agency approvals required by the RAWP is included in Appendix H.

A NYSDEC-approved project sign was erected at the project entrance and remained in place during all phases of the Remedial Action from 17 April to 12 July 2017.

4.2.3 General Site Controls

Site Security

The work area perimeter was secured with gated, signed, construction fencing with points of entry in accordance with New York City Department of Buildings and New York City Department of Transportation (DOT) permits and requirements. The purpose of the fencing was to limit site access to authorized personnel, protect pedestrians from site activities, and maintain site security.

Emergency access/egress routes for Macy's and the mall were set up along the East 55th Street sidewalk.

Job Site Record Keeping

The RE documented the work of the Remediation Contractor and all subcontractors involved in all aspects of remedial construction, including soil excavation, stockpiling, characterization, removal and disposal, air monitoring, import of backfill material, and management of waste transport and disposal. The RE was responsible for all appropriate communication with NYSDEC and NYSDOH.

Erosion and Sedimentation Controls

Based on the size of the Site and the planned excavation, select common erosion and sedimentation control practices were necessary. Best Management Practices (BMP) for

soil erosion was selected to minimize erosion and sedimentation off-site from the start of the remediation to the completion of development. Stormwater pollution prevention and erosion control measures included:

- Installation of inlet protections in site drainage basins;
- Maintenance of the perimeter security fencing; and,
- Maintenance and cleaning of site roadways.

Equipment Decontamination and Residual Waste Management

The contractor maintained a portable decontamination area/truck wash at the site entrance/exit (mall entrance on East 55th Street) for construction vehicle use. The location of the decontamination area/truck wash was mobile to accommodate the contractor's sequencing of work; however, the location did not move from the site entrance/exit during remediation. The contractor had the ability to collect wastewater for off-site disposal or treatment and discharge if generated during decontamination activities. The design considered adequate space to decontaminate site equipment and vehicles, and sloping and liners to facilitate collection of wastewater. Decontamination using wash water was not necessary at any time during site remediation.

The contractor maintained the decontamination area/truck wash throughout the duration of site work. During demobilization, the area was deconstructed by the Remediation Contractor and used materials were disposed of as required.

Miscellaneous wastes generated during remedial activities including general refuse, used construction equipment and excess material, perimeter and temporary fencing, used disposable sampling equipment, and PPE were managed and disposed as non-hazardous solid waste.

Soil Screening Results

Visual, olfactory, and PID soil screening and assessment was performed by the field engineer under the direct supervision of the RE and QEP during all remedial hot spot excavations. Soil screening was performed regardless of when the invasive work was done and included all excavation and invasive work performed during the remedy.

Field screening for evidence of contamination was performed by the field engineer under the direct supervision of the RE and QEP. Resumés were provided for all personnel responsible for field screening (i.e. those representing the RE) of invasive work for known or unknown contaminant sources during remediation work.

Field screening was conducted during the removal of all slabs, surface cover, subsurface structures, and general invasive soil excavation work. Langan continuously inspected and field screened fill and soil for petroleum or solvent odors, staining and VOCs using a PID. Readings were obtained from soil contained within the excavator bucket and directly from the excavation sidewalls and bottom.

Elevated PID readings (20 to 90 ppm) were observed during excavation of cVOC-impacted soils below the water table, approximately 6 to 10 feet bgs. No other elevated PID readings (i.e., above background levels) were detected throughout the Site.

Stockpile Methods

Soil stockpile areas were constructed for staging of site soil pending off-site disposal, characterization testing, or reuse as backfill material. Separate stockpile areas were constructed to avoid commingling imported clean stone and any overburden material excavated during remedial activities. Impacted soil that was excavated from the cVOC area was live-loaded into tri-axle dump trucks for transportation and off-site disposal. At no time during remediation activities was impacted soil stockpiled on-site.

Monitoring Well Repair and Abandonment

During remediation activities Langan gauged wells within East 55th Street for petroleum product thickness to begin finalizing the petroleum extraction well locations. Approximately 30 gallons of oil and water was removed from select wells within East 55th Street where measurable product was identified. The vacuumed wells were re-gauged to measure recharge of groundwater and petroleum product prior to finalizing the final extraction well locations. Product extraction wells, consisting of 4-inch polyvinyl chloride (PVC) wells 15 feet deep, were installed in East 55th Street. Damaged monitoring wells within East 55th Street were abandoned or repaired in accordance with the NYSDEC-approved Groundwater Monitoring Plan and the CP-43 Groundwater Monitoring Well Decommissioning Policy as requested by NYSDEC.

Problems Encountered

There were no problems encountered.

4.2.4 Nuisance controls

Dust, odor, and nuisance control was accomplished by the Remediation Contractor as described in this section. All invasive work performed during the remediation and all invasive development work were conducted in accordance with dust and odor suppression methodology defined in the RAWP.

Truck Wash and Egress Housekeeping

During site remediation, continuity was achieved between the truck wash and the egress path by placing the truck wash system right before the egress path of the Site. Egress points for truck and equipment transport were kept clean of dirt and other materials during site remediation, so that trucks were decontaminated prior to departure from the Site. The RE was responsible for documenting if any outbound trucks were washed at the truck wash before leaving the Site until the remedial construction was complete. Locations where vehicles entered or exited the Site were inspected daily for evidence of off-site sediment tracking.

Decontamination using wash water was not necessary at any time during site remediation. Tri-axle trucks were live loaded from the excavation area while staged on poly sheeting to prevent tracking of contaminated soil to the entrance/exit point.

The RE was responsible for documenting that all egress points for truck and equipment transport from the Site were clean of dirt and other materials derived during site remediation. Cleaning of East 55th Street was performed as needed to maintain a clean condition with respect to site-derived materials.

Dust Control

The field engineer, under the supervision of the RE and QEP, monitored the remediation and construction activities for dust generation and the need for dust suppression. Nuisance dust was controlled with mitigation measures as required (e.g., use of water hoses and covering stockpiled soil with tarps). Preventative measures for dust generation included:

- Hauling material in properly tarped/covered containers;
- Restricting on-site vehicle speeds;
- Maintaining site entrances and roadways, and the truck wash area;
- Spraying water on backfilled areas during compaction; and,
- Covering soil stockpiles.

Odor Control

Implementation of all odor controls, including the halt of work, was the responsibility of the Volunteer's RE and application of odor controls was the responsibility of the Remediation Contractor.

If necessary, the following means were available to prevent on- and off-site nuisances, including: (a) limiting the area of open excavations; (b) shrouding open excavations with tarps and other covers (if necessary); and (c) using foams or drying agents to cover exposed odorous soils. If odors developed and could not be otherwise controlled, additional means to eliminate odor nuisances included: (d) direct load-out of soils to trucks for off-site disposal; (e) use of chemical odorants in spray or misting systems; and, (f) use of staff to monitor odors in surrounding neighborhoods.

The field engineer, under the supervision of the RE and QEP, monitored the remediation activities for odor generation. Odors were noted during excavation of the cVOC hot spot area. Application of the calciment drying agent to saturated soils mitigated the majority of odors and impacted soils were live-loaded to covered tri-axle trucks for off-site disposal, eliminating odor build-up.

Truck Routing

Trucks entered the Site using Avenue U. All trucks loaded with site materials exited the vicinity of the Site using the intersection of East 55th Street and Avenue U. A truck route to and from the Site from the nearest major highway (Shore Parkway) was selected as the most appropriate route and takes into account:

(a) Limiting transport through residential areas and past sensitive sites;
(b) Use of city mapped truck routes;
(c) Prohibiting off-site queuing of trucks entering the facility;
(d) Limiting total distance to major highways;
(e) Promoting safety in access to highways;
(f) Overall safety in transport; and,
(g) Community input [where necessary].

Trucks were prohibited from stopping and idling in the neighborhood outside the Site. To the extent possible, queuing of trucks was performed on-site in order to minimize off-site disturbance.

Responding to Complaints

No complaints were filed throughout remedial activities.

4.2.5 CAMP results

The CAMP was implemented in accordance with the approved RAWP for the duration of remedial activities to protect the health and safety of site workers and the surrounding community, and to address potential nuisance dust and/or odors. Implementation of the CAMP was accomplished at each air monitoring station (AMS) using TSI Model 8530 DustTraks to monitor for particulates and MiniRAE 3000 PIDs to monitor for VOCs.

Air monitoring for particulates and VOC data began at the Site on 18 April 2017 and continued until 6 July 2017. As defined in the RAWP, the particulate action level at the Site was set at 150 µg/m^3 above background. PIDs were monitored on a continuous basis during remediation activities and 15-minute running averages were calculated from the data recorded in each respective PID. Averages were compared to the action levels prescribed in the CAMP. The DustTrak alarm limits were set to alert personnel of instantaneous spikes (i.e., particulate/dust concentrations in excess of the action level of 150 µg/m^3) and the PID alarm limits were set to alert for VOC concentrations in excess of the action level of 5 ppm. There were no exceedances of VOC action levels during site remediation activities. The following action level exceedances for dust were identified during remedial construction activities:

- Two exceedances of the downwind AMS were identified at approximately 10:40 and 11:15 AM on 21 April 2017. The exceedances occurred during the addition of calciment, a drying agent, to the southern excavation. Application of calciment was temporarily suspended to allow DustTrak readings to fall below the threshold value and visible dust was not observed migrating off-site.
- An exceedance of the downwind AMS was identified at approximately 8:15 AM on 22 April 2017. The exceedance occurred during backfilling of the southern excavation and was caused by dust from the clean crushed stone. Backfilling was temporarily suspended to allow DustTrak readings to fall below the threshold value and water was applied to backfill. Visible dust was not observed migrating off-site.
- Due to calibration issues, exceedances of the dust action levels at the downwind AMS were recorded at approximately 8:00 and 8:45 AM on 3 May 2017. The equipment was restarted and calibrated, and functioned normally for the remainder of the work day. Visible dust was not observed migrating off-site.

- Exceedances of the dust action levels at the downwind AMS were recorded at approximately 1:45 and 3:30 PM on 3 May 2017 during site cleanup and sweeping activities. Sweeping was ceased until visible dust was observed to dissipate. Wind direction was from the north to south, away from East 55th Street and Avenue U. Visible dust was not observed leaving the Site.
- Exceedances of the dust action levels at the downwind AMS were recorded at approximately 8:00 AM and 12:10 PM on 30 June 2017 during street sweeping and clean backfill compacting activities in the area of the vapor mitigation system. Sweeping was ceased until visible dust was observed to dissipate. Water was applied to the backfilled area prior to compacting. Visible dust was not observed leaving the Site.

No additional remote alarms or action levels were triggered during Langan's perimeter air monitoring. Additionally, Langan conducted work zone air monitoring with a PID. VOC and dust concentrations were below applicable action levels within the work zone. Copies of all field data sheets relating to the CAMP are provided in electronic format in Appendix J, and AMS locations are shown on Figure 3.

4.2.6 Reporting

Progress Reports

Daily and monthly progress reports were submitted to NYSDEC and NYSDOH by electronic media during remedial activities. The progress reports generally included a description of the following:

- Specific remedial activities conducted during the reporting period and those anticipated for the next reporting period;
- Description of approved modifications to the work scope and/or schedule;
- Sampling results received following internal data review and validation, as applicable; and,
- Update of schedule including percentage of project completion, unresolved delays encountered or anticipated that could affect the future schedule, and efforts made to mitigate such delays.

Unanticipated conditions were promptly communicated to NYSDEC and NYSDOH PMs. Necessary modifications to the work scope and additional remedial plans developed to address specific conditions encountered were communicated verbally and via e-mail with NYSDEC and NYSDOH. In addition, during implementation of the Remedial Action, an on-

site meeting was held with NYSDEC on 22 March 2017 and attended by Macerich, AWT, and Langan.

All daily and monthly reports are included in electronic format in Appendix F. The digital photo log required by the RAWP is included in electronic format in Appendix E.

4.3 CONTAMINATED MATERIALS REMOVAL

Soil was excavated to the extents defined herein. Soil and materials management on-site and off-site was conducted in accordance with the S/MMP as described above and in the NYSDEC-approved RAWP. The Remedial Action included the removal of cVOC-impacted source soils and SVOC- and petroleum-impacted historic fill. In a letter dated 13 April 2017, NYSDEC acknowledged receipt of the Contained-In Determination for cVOC-Impacted Soil memo, dated 5 April 2017, prepared by Langan (see Appendix H), and NYSDEC confirmed that soils generated during remediation did not need to be handled as hazardous waste.

The Remediation Contractor, under the supervision of the RE, divided the site material into categories depending on known or suspected levels of the contaminants of concern (COCs). The categories of material were separately managed to 1) avoid commingling of contaminated and potentially contaminated material with apparently clean material, and 2) handle and characterize material for on-site reuse or off-site disposal at an approved facility. The categories are as follows:

- Contaminated, Non-hazardous Material – This material refers to historical fill and native materials that contain contaminants and was not reused on-site. This material was excavated throughout the Site to between 15 and 16 feet bgs as part of the remedy.
- Petroleum-Impacted, Non-hazardous Material – This material refers to petroleum-impacted historic fill or native material, associated with the historical releases of #2 fuel oil that contains contaminants, and was not reused on-site. Grossly-impacted material with free product that may be a source to groundwater contamination was excavated where possible as part of the remedy.
- Hazardous Material – If determined hazardous during waste characterization sampling, this material would include soil with hazardous levels of cVOCs. This material was not anticipated based on the Remedial Investigation data and was not encountered during site remediation activities.

The Remediation Contractor arranged for transportation and off-site disposal of all material types in accordance with applicable Federal, State, and local regulations. Langan provided

third-party oversight and review of all transportation and disposal arrangements made by the Remediation Contractor.

Residual contaminated soil and groundwater was left in place. Management of the residual contaminated media left at the Site is addressed via EC/ICs in the form of asphalt cap and Environmental Easement/SMP (see Figures 4A through 4C).

A list of the SCOs for the COCs for this project is provided in Table 1. The location of areas where excavations and backfilling were performed is shown on Figure 5.

A total of 1,729.55-tons of material was excavated and disposed of off-site. Table 2 shows the total quantities of each category of material removed from the Site and the disposal locations. A summary of post-excavation soil samples at the hot spots and associated analytical results are summarized in Table 3A.

A detailed exported materials tracking spreadsheet, manifests and bills of lading (in electronic format), and waste transport permits including facility names and license numbers are provided as Appendix I.

4.3.1 Soil

Contaminated, Non-Hazardous Material

Hot spot excavation was completed in the vicinity of MW-39 to remove material impacted with cVOCs. Excavation into the smear zone and groundwater table to remove grossly-impacted material, as defined in 6NYCRR Part 375-1.2(u), was conducted as necessary and to the extent practical. The depth of excavation for the MW-39 area was advanced to the confining clay layer, approximately 15 to 16 feet. Excavation of source soils in the vicinity of MW-39 required shoring of a 6-inch diameter natural gas line and electrical conduits, which run through the area. The remedial ESS was designed by AWT's geotechnical engineer subsequent to approval of the RAWP. The hot spot excavation was divided into southern and northern portions as described below and as shown on Figure 6:

- Between 19 and 21 April 2017, 665 tons of impacted material was excavated from the southern portion of the remedial excavation area. The southern portion of the excavation area was advanced to 15 feet bgs.
- Between 25 and 28 April 2017, 955.51 tons of impacted material was excavated from the northern portion of the remedial excavation area. The northern portion of the excavation area was advanced to 16 feet bgs.

Per NYSDEC DER policy, documentation soil sample collection was completed from the excavation base at a frequency of one sample per 900 square feet of floor area and one sidewall sample for every 30 linear feet around the excavation site perimeter. After all materials were excavated, a total of 12 confirmatory end point samples were collected (plus required QA/QC samples) from the hot spot excavation (results summarized in Section 4.4). Documentation soil samples were analyzed for the combined Part 375 and Target Compound List/Target Analyte List (TCL/TAL) listed VOCs. A summary of the endpoint analytical data can be viewed in Table 3A and Figure 6.

Following sample collection, each portion of the overall excavation was backfilled to approximately 6 feet bgs with clean crushed stone (DGA) and compacted by tamping with the excavator bucket. The clean stone was covered with filter fabric and backfilling was completed with clean structural fill (¾-inch stone) to approximately 1 foot bgs. The clean fill was compacted with a plate compactor and tested with a nuclear densometer to ensure minimum 95% compaction. Prior to installation of the 5-inch thick asphalt cap system (detailed in Section 4.7.1), the excavation area was backfilled to subgrade elevation (approximately 5 inches below required development grade) with the clean structural fill.

Materials excavated for installation of the soil vapor mitigation system were generally used to backfill system trenches. No evidence of gross-impacts was observed. Excess material not used as backfill was loaded into on-site 25-cy roll-off containers with other non-hazardous waste generated during remediation activities (i.e. asphalt, crushed concrete, dust from street sweeping, etc.).

The original site grade was restored following the completion of remediation activities. The remedial excavation extents and backfill areas are shown on Figure 5.

4.3.1.1 Disposal Details

Waste Characterization Soil Sampling

As part of the pre-remediation activities, the soils in the vicinity of MW-39 were characterized in accordance with typical delineation procedures and proposed off-site disposal facility sampling requirements. The cVOC-impacted area was divided into five sampling cells with five borings advanced in each sampling cell to about 12 feet bgs.

Twenty (20) grab samples were collected between 5 and 12 feet bgs from 20 borings in cells A through D. Five grab samples from each cell were analyzed for extractable

petroleum hydrocarbons and one of the five grab samples from each cell was also analyzed for TCL/TAL VOCs. Grab samples from cell E were not individually analyzed.

Additional analyses were performed on composite samples for disposal facility requirements. Composite samples were created by combining grab samples from each respective cell (A through D) and were analyzed for toxicity characteristic leaching procedure (TCLP) VOCs, SVOCs, polychlorinated biphenyls, pesticides, total metals, TCLP metals, and Resource Conservation and Recovery Act (RCRA) characteristics. Grab samples from the five borings in cell E were combined into one composite sample and analyzed for VOCs and TCLP VOCs.

Laboratory analytical results were compared to the NYSDEC Part 376 Land Disposal Restrictions (LDR) Treatment Standards for Hazardous Wastes. VOCs were not detected above their respective Part 376 LDRs. The maximum PCE and TCE concentrations were detected in sample E-COMP (2.2 mg/kg and 0.1 mg/kg, respectively), which was collected from an area where cVOC concentrations were detected highest during previous sampling (August 2013 Langan sample SB06). A summary of the samples collected and analyses performed is included as Tables 4A and 4B and the laboratory-provided analytical data packages are included in Appendix K.

A comparison of the composite sample TCLP results to 6 NYCRR Part 371.3(e) Maximum Concentration of Contaminants for the Toxicity Characteristic indicate that soil collected from each cell is considered non-hazardous waste. SVOCs identified in the composite samples from cell B and C were detected above the LDRs; however, these compounds were detected at concentrations below 10 times the 40 CFR §268.48 Universal Treatment Standards and do not change the primary designation as a non-hazardous waste. In addition, these concentrations are below the respective off-site disposal facility non-hazardous acceptance threshold.

Table 2 shows the total quantities of each category of material removed from the Site and the disposal locations. A summary of the samples collected to characterize the waste, and associated analytical results are summarized on Tables 4A and 4B.

Letters from applicants to disposal facility owners, acceptance letters from disposal facility owners, and manifests and bills of lading (in electronic format) are attached in Appendix I.

Time Frames

Excavated material from the cVOC hot spot was loaded and transported for off-site

disposal from 19 to 28 April 2017. Other contaminated, non-hazardous material generated was transported for off-site disposal on 23 through 30 June 2017 and 7 through 12 July 2017.

Total Quantities Removed

A total of 1,729.55 tons of non-hazardous contaminated soil was transported off-site by permitted haulers to SSI-Metro12 Facility.

4.3.2 In-Situ Chemical Oxidation or Reduction

Several underground utilities, including a gas line and electrical conduits, run through the Site treatment area. Remedial excavation was completed to the north and south of the crossing utilities to between 15 and 16 feet bgs. The presence of these underground utilities limited excavation in the immediate area of the utilities. ISCO was implemented to treat residual contaminants in soil and groundwater. A chemical oxidant was applied to destroy the contaminants in place.

The type and amount of chemical oxidant needed to reduce concentrations of cVOC contaminants at the Site to below SCO criteria were determined through a treatability study performed by Terra Systems, Inc. The bench-scale treatability study consisted of:

- Characterization of clean soil and groundwater collected from the Site to determine background oxidant demand; and,
- Characterization of contaminated soil and groundwater collected from the hot spot area to determine the oxidant demand and treatment efficiency.

The treatability study determined that the application of potassium permanganate ($KMnO_4$) (5% by weight of the permanganate) resulted in the complete destruction of the chlorinated ethenes. This loading is equivalent to approximately 0.78 pounds of $KMnO_4$ per cubic foot of the aquifer assuming 25% porosity. A delivery solution of $KMnO_4$ solution of 5% by weight would require multiple delivery events. Therefore, a 40% solution was selected for the unexcavated utility area to allow for a single application event. These chemical oxidants have shown effectiveness at reducing cVOC impacts to soil and groundwater

The in-situ remedial application focused on the floor of the southern excavation in the area of the former MW-39 monitoring well, where documentation sample results indicated cVOC exceedances present, and in the area where excavation was limited by the presence of the crossing underground utility infrastructure. Between 26 and 30 June

2017, ISCO injections were completed in accordance with the ISCO Work Plan (provided to NYSDEC on 11 May 2017) and the ISCO Injection Plan and clarifications (provided to NYSDEC on 16 May 2017). A total of 945 pounds (lbs) of $KMnO_4$ was delivered by auguring to the southern excavation floor and placing a heavy slurry at the bottom of the excavation. A total of 12,000 lbs of sodium permanganate ($NaMnO_4$) was delivered as a 40% solution by direct push injection methods in the area of the crossing utilities. Figure 7 shows injection and slurry placement locations.

Groundwater was monitored in the vicinity of the injection area using temporary piezometers. The purpose of the monitoring was to ensure that chemicals would not damage utilities in the area and to ensure that chemical was being delivered to the entire treatment zone. No issues were encountered.

Groundwater monitoring to assess the effectiveness of injections will be completed following NYSDEC approval of the SMP (submitted under separate cover).

4.3.3 Contaminated Groundwater

Non-RCRA Non-DOT Liquids

Contaminated groundwater with dissolved phase cVOC- and petroleum-impacts was generated during the pumping test conducted by AWT in preparation for applying for a discharge permit (as described in Section 4.1.4 – Fluids Management) and containerized in a 55-gallon steel drum. Additionally, AWT mobilized a vacuum truck to the Site on 18 April 2017 to remove oil (LNAPL) and water from wells within East 55th Street as part of plans to finalize petroleum extraction well locations. Approximately 30 gallons of oily water was generated and containerized in a 55-gallon steel drum.

4.3.3.1 Disposal Details

Time Frames

The drummed contaminated groundwater was transported for off-site disposal on 12 July 2017.

Total Quantities Removed

Two drums (approximately 110 gallons) were transported off-site by permitted haulers to Cycle Chem, Inc. at 217 South First Street in Elizabeth, NJ. Manifests are attached in Appendix I.

4.4 REMEDIAL PERFORMANCE/DOCUMENTATION SAMPLING

4.4.1 Soil

Per the RAWP, confirmatory soil sampling was completed from the excavation base at a frequency of one sample per 900 square feet of excavation bottom and one sidewall sample for every 30 linear feet around the excavation perimeter. Based on these criteria, four base endpoint samples and eight sidewall samples were collected at the cVOC hot spot, plus required QA/QC samples.

As mentioned in Section 4.3.2 above, several underground utilities run through the hot spot area. Remedial excavation was completed to the north and south of the crossing utilities to between 15 and 16 feet bgs. The presence of these underground utilities limited the excavation, which necessitated leaving impacts in place. A table and figure summarizing all end-point sampling is included as Table 3A and on Figure 6, and all exceedances of NYSDEC Part 375 Unrestricted Use and Restricted Use Commercial SCOs are highlighted. The following is a summary of exceedances for each portion of the hot spot excavation.

Northern Excavation

Six samples (North-NW-Corner, North-NE-Corner-MS/MSD, North-SE-Corner, North-SW-Corner, North-BW-Bottom 1, and North-BE-Bottom 2) were collected from the northern excavation at 16 feet below grade on 28 and 27 April 2017.

The VOC acetone was detected in sample ID North-NW-Corner, 16 feet below grade in the northwest corner, exceeding the Unrestricted Use SCOs. No other VOCs were detected at concentrations above NYSDEC Part 375 criteria. Acetone is not a constituent of concern for the Site and it is possible that this hit is due to laboratory contamination.

Southern Excavation

Six samples (South-SE-Corner, South-NW-Corner, South-NE-Corner, South-Bottom1, and South-Bottom2) plus a duplicate (DUP-1-4.21.17) were collected from the southern excavation at 15 feet below grade on 21 April 2017.

One or more of the following VOC compounds exceeded Unrestricted Use SCOs in all six of the samples: 1,1-dichloroethane, 1,1-dichloroethylene, 1,2-dichloroethane, 1,4-dioxane, 2-butanone (MEK), acetone, benzene, cis-1,2-DCE, methylene chloride, PCE, trans-1,2-DCE, TCE, VC, and total xylenes.

PCE was detected in the northeast corner sample (South-NE-Corner) and the bottom sample from the northern half of the excavation (South-Bottom2) at concentrations of 300 and 310 mg/kg, respectively, exceeding the Restricted Use Commercial SCO of 150 mg/kg.

Data Usability Summary Reports (DUSRs) were prepared for all data generated in this remedial performance evaluation program. These DUSRs are included in Appendix L, and associated raw data is provided electronically in Appendix K.

4.4.2 Groundwater

On 5 and 7 December 2018, Langan completed post-remediation groundwater sampling in accordance with the NYSDEC-approved Groundwater Monitoring Plan. The groundwater sampling was completed to evaluate the effectiveness of the in-situ chemical oxidation injection event described above in Section 4.3.2. Groundwater analytical results are included in Tables 3B and 3C, and are shown on Figure 8. Laboratory analytical reports are included in Appendix K. Low flow sampling forms are included in Appendix M. The following summarizes the results of post-remediation groundwater sampling:

VOCs were detected at concentrations exceeding NYSDEC TOGS Standards and Guidance Values in two of six groundwater monitoring wells sampled (LMW-2 and PEW-1).

- cVOCs, specifically PCE and TCE, were detected at PEW-1 (formerly MW-39) within the source area, at concentrations of 155 and 145 µg/L, respectively. Based on these results, the concentrations of PCE and TCE have been reduced by 93% in the source area since the pre-remediation groundwater monitoring event conducted in March 2014.
- Total VOCs within the source area (PEW-1) are still elevated (4,497.46 µg/L); however, the compounds identified here are mostly daughter products of cVOC reduction and total VOCs have been reduced by 62% in the source area since the pre-remediation groundwater monitoring event conducted in March 2014.
- VOCs detected at concentrations exceeding NYSDEC TOGS Standards at LMW-2, down-gradient of the treatment area, include benzene (4.72 µg/L), cis-1,2-dichloroethene (298 µg/L), and trans-1,2-dichloroethene (6.15 µg/L).
    - With the exception of benzene, these VOCs are daughter products of cVOC reduction.

- Benzene was previously detected in LMW-2 during the pre-remediation groundwater monitoring event conducted in March 2014 at a concentration of 6.6 µg/L.

VOCs were detected at the remaining four wells at concentrations well below all NYSDEC TOGS Standards and Guidance Values.

Monitored natural attenuation (MNA) parameters sampled during the December 2018 sampling event support continued degradation of VOCs at the source area; however, additional sampling is required before a trend can be established. Laboratory analytical results of MNA parameters are included in Table 3B.

- Oxygen reduction potential (ORP) down-gradient of the treatment area is negative, which is indicative of continuing degradation;
- Dissolved oxygen in the treatment area is at or close to zero, which is indicative of continuing degradation;
- Dissolved iron in the treatment area is lower than the surrounding area, which is indicative of continuing degradation; and,
- Residual concentrations of dissolved iron and total organic carbon in the treatment area indicate that there is capacity for degradation to continue.

The results of the post-remediation groundwater sampling shows significant reduction in the source area contaminants and also supports a MNA approach for residual concentrations as described in the SMP for the Site.

4.5 IMPORTED BACKFILL

Throughout the course of the remedial action, materials were imported to the Site for use as backfill in the hot spot area and around the soil vapor mitigation system, as well as being used for the site cover system outlined in the RAWP. Only virgin quarry stone was imported; per the NYSDEC-approved RAWP, imported virgin stone was not required to be sampled.

A table of all sources of imported backfill with quantities for each source is shown in Table 5, and manifests and bills of lading are included in electronic format in Appendix N. A figure showing the locations where backfill was used at the Site is shown on Figure 5.

4.5.1 Stone

Certified clean DGA and ¾-inch virgin quarry stone from Maddox Materials, LLC at 323 Main Street in Spotswood, NJ was used to backfill the hot spot area and around the soil vapor mitigation system. A total of 1,575.07 tons of this material was imported to the Site between 19 April and 29 June 2017.

4.6 CONTAMINATION REMAINING AT THE SITE

4.6.1 Soil

Table 6 and Figure 6 summarize the results of the seven soil samples remaining at the Site after completion of the Remedial Action that exceed the Track 1 (unrestricted) SCOs. Soil samples were collected from between 15 and 16 feet below grade. As detailed in Section 4.3.1 above, the hot spot area excavations were backfilled to 1 foot bgs with clean stone and a 5-inch thick asphalt cap covers the Site. The following is a summary of remaining exceedances:

- 1,1-Dichloroethane at 0.34 mg/kg above the SCO of 0.27 mg/kg;
- 1,1-Dichloroethylene at 0.34 mg/kg above the SCO of 0.33 mg/kg;
- 1,2-Dichloroethane at 0.34 mg/kg above the SCO of 0.02 mg/kg;
- 1,4-Dioxane at 6.8 mg/kg above the SCO of 0.1 mg/kg;
- MEK at 0.34 mg/kg above the SCO of 0.12 mg/kg;
- Acetone ranging from 0.054 to 0.68 mg/kg above the SCO of 0.05 mg/kg;
- Benzene at 0.34 mg/kg above the SCO of 0.06 mg/kg;
- cis-1,2-DCE ranging from 0.82 to 55 mg/kg above the SCO of 0.25 mg/kg;
- Methylene chloride at 0.68 mg/kg above the SCO of 0.05 mg/kg;
- PCE at 300 and 310 mg/kg, above the SCO of 1.3 mg/kg;
- trans-1,2-DCE ranging from 0.22 to 2 mg/kg above the SCO of 0.19 mg/kg;
- TCE at 57 and 200 mg/kg, above the SCO of 0.02 mg/kg;
- VC ranging from 0.34 to 5.4 mg/kg above the SCO of 0.02 mg/kg; and,
- Total xylenes at 1 mg/kg above the SCO of 0.26 mg/kg.

PCE exceedances also exceeded the Restricted Use Commercial SCO of 150 mg/kg. Figure 6 summarizes the results of all soil samples remaining at the Site after completion of the Remedial Action that meet the SCOs for unrestricted use of the Site.

Several underground utilities run through the hot spot area, which limited the excavation and necessitated leaving impacts in place (detailed in Section 4.3 above). Since contaminated soil, groundwater, and soil vapor remained on-site after completion of the

remedial excavation, injection of in-situ chemical oxidant (as discussed in Section 4.3.2 above) was completed as the final part of remediation, and IC/ECs are required to protect human health and the environment. These IC/ECs are described in the following sections. Long-term management of these IC/ECs and residual contamination will be performed under the SMP (approved by the NYSDEC).

4.6.2 Groundwater

As summarized in Section 4.4.2 above, VOCs were detected at concentrations exceeding NYSDEC TOGS Standards and Guidance Values in two of six groundwater monitoring wells sampled (LMW-2 and PEW-1).

- cVOCs, specifically PCE and TCE, were detected at PEW-1 (formerly MW-39) within the source area, at concentrations of 155 and 145 µg/L, respectively. Based on these results, the concentrations of PCE and TCE have been reduced by 93% in the source area since the pre-remediation groundwater monitoring event conducted in March 2014.
- Total VOCs within the source area (PEW-1) are still elevated (4,493 µg/L); however, the compounds identified here are mostly daughter products of cVOC reduction and total VOCs have been reduced by 62% in the source area since the pre-remediation groundwater monitoring event conducted in March 2014.
- VOCs detected at concentrations exceeding NYSDEC TOGS Standards at LMW-2, down-gradient of the treatment area, include benzene (4.72 µg/L), cis-1,2-dichloroethene (298 µg/L), and trans-1,2-dichloroethene (6.15 µg/L).
    - With the exception of benzene, these VOCs are daughter products of cVOC reduction.
    - Benzene was previously detected in LMW-2 during the pre-remediation groundwater monitoring event conducted in March 2014 at a concentration of 6.6 µg/L.

VOCs were detected at the remaining four wells at concentrations well below all NYSDEC TOGS Standards and Guidance Values.

Based on data, cVOC-impacts to groundwater appear to be limited to the hot spot excavation area. There were no exceedances of the AWQS up-gradient of the hot spot area in the northern portion of the Site. The presence of degradation products in groundwater indicates natural attenuation of PCE and TCE via reductive dechlorination.

LNAPL was encountered in multiple monitoring wells on the Site and approximately 27 gallons of LNAPL was removed during seven monthly extraction events (summarized in

Section 3.2.1 above). During remediation activities, Langan gauged wells within East 55th Street for petroleum product thickness to begin finalizing the petroleum extraction well locations. Approximately 30 gallons of oil and water was removed from select wells within East 55th Street where measurable product was identified. The vacuumed wells were re-gauged to measure recharge of groundwater and petroleum product prior to finalizing the final extraction well locations. Product extraction wells, consisting of 4-inch PVC wells 15 feet deep, were installed in East 55th Street in accordance with the approved Groundwater Monitoring Plan, which is shown on Figure 8. Damaged monitoring wells within East 55th Street were abandoned or repaired in accordance with the NYSDEC-approved Groundwater Monitoring Plan and the CP-43 Groundwater Monitoring Well Decommissioning Policy as requested by NYSDEC. During the November 2018 product extraction event, measureable product was identified in 3 of the 13 existing monitoring wells, ranging in thickness from 0.04 to 0.5 feet.

Groundwater analytical results are included in Tables 3B and 3C, and are shown on Figure 8. Laboratory analytical reports are included in Appendix K. Low flow sampling forms are included in Appendix M.

4.6.3 Soil Vapor

Petroleum-related VOCs including benzene (maximum 930 µg/m^3), toluene (maximum 14,000 µg/m^3), ethyl benzene (maximum 1,300 µg/m^3), and xylenes (maximum 10,400 µg/m^3) were detected in exterior soil vapor samples collected during the 2013 Remedial Investigation. The maximum concentrations of petroleum-related VOCs were identified in the eastern portion of the Site along the Lowe's building.

- PCE was identified in six of eight soil vapor samples at concentrations ranging from 280 to 17,000 µg/m^3; and,
- TCE was detected in six of eight soil vapor samples at a maximum concentration of 730 µg/m^3.

The maximum concentrations of cVOCs were identified in the southwestern portion of the Site along the mall building. PCE and TCE were also detected at elevated concentrations in select soil and groundwater samples from the corresponding boring/monitoring well locations in this area (detailed above).

Based on the results of the exterior soil vapor investigation, NYSDOH required sampling of sub-slab and indoor air in the mall building in the vicinity of identified impacts. Sub-slab vapor samples collected during the 2014 soil vapor investigation identified cVOCs at elevated concentrations below the floor slab; however, cVOCs were not detected in

indoor air samples at concentrations above NYSDOH Air Guideline Values criteria. Concentrations of PCE (maximum 2,740 µg/m^3) and TCE (maximum 104 µg/m^3) identified in sub-slab soil vapor samples collected during the interior soil vapor investigation exceed NYSDOH Vapor Intrusion Matrices; however, based on the low (PCE = 0.203 to 0.359 µg/m^3) and non-detect (1,2-dichloroethene and TCE) concentrations identified in the indoor air samples, there does not appear to be an indoor vapor intrusion issue.

Carbon tetrachloride was not detected in sub-slab soil vapor; however, it was detected in all indoor air samples at concentrations ranging from 0.453 and 0.459 µg/m^3, exceeding NYSDOH criteria. Carbon tetrachloride was also detected in the outdoor ambient air sample at a concentration of 0.453 µg/m^3. The NYSDOH Vapor Intrusion Matrices require that reasonable and practical action is taken to identify source(s) and reduce exposure. Based on the detection of carbon tetrachloride in the ambient outdoor air sample at concentrations similar to those identified indoors, and the non-detect concentrations in sub-slab soil vapor, we believe that this compound is originating from an exterior source.

Exposure to remaining soil vapor is prevented by the installation of an active soil vapor mitigation system (detailed in the following sections). Tables 7A and 7B, and Figure 9 summarize the results of all samples of soil and sub-slab vapor, and indoor and outdoor ambient air collected during the 2013/2014 remedial and soil vapor investigations that exceed the SCGs.

4.7 ENGINEERING CONTROLS

4.7.1 Soil Cap/Cover System

Exposure to remaining contamination in soil/fill at the Site is prevented by a cover system placed over the Site. This cover system is comprised of asphalt pavement and concrete sidewalks. The hot spot excavation area was backfilled to 1 foot bgs, followed by 6 inches of subgrade material and asphalt pavement, consisting of a 3-inch binder course followed by a 2-inch top course. The area outside the remedial area is currently capped with asphalt pavement, concrete sidewalks, and concrete building slab, and was not disturbed. Figures 4B and 4C show the as-built cross sections for each remedial cover type used on the Site (see Appendix O). Figure 4A shows the location of each cover type built at the Site. An Excavation Work Plan, which outlines the procedures required in the event the cover system and/or underlying residual contamination are disturbed, is provided in Appendix F of the SMP (provided under a separate cover).

4.7.2 Active Soil Vapor Mitigation System

Exposure to residual soil vapor is mitigated with the installation of an active soil vapor mitigation system. This soil vapor mitigation system is comprised of up to 400 feet of horizontal header pipe with 14 vertical well points installed to a depth of approximately 4 feet. System piping is routed to a vacuum blower with moisture separator in a weather and sound proof enclosure. The soil vapor mitigation system discharge point is above the roof line of the adjacent Lowe's building. The location of system components, a section view of system, and system details are shown on Figures 10A through 10C.

On 12 July 2017, AWT activated the soil vapor mitigation system and balanced the flow through the system by adjusting the pressure at each well point (EP-1 through EP-14) to achieve uniform pressure and flow throughout the entire system. On 27 September 2017, Langan performed a spot check of 10 well points to measure system stability. Changes in pressure ranged from 0 to 0.05 inches water column between points, which shows that the system is maintaining uniformity over time.

An Operation and Management Plan is included in the SMP and outlines the procedures to be followed for regular operation of the system. Maintenance of this soil vapor mitigation system is also described in the SMP.

4.7.3 Other Engineering Controls

The remedy for the Site did not require the construction of any other engineering control systems.

4.8 INSTITUTIONAL CONTROLS

The site remedy requires that an environmental easement be placed on the property to (1) implement, maintain and monitor the ECs; (2) prevent future exposure to remaining contamination by controlling disturbances of the subsurface contamination; and, (3) limit the use and development of the Site to commercial uses only.

The environmental easement for the Site is currently pending. Once the environmental easement is approved by NYSDEC, it will be filed and recorded with the New York City Register's Office for Kings County. The Environmental Easement renders the Site a Controlled Property. The Environmental Easement must be recorded with the New York City Register's Office for Kings County before the Certificate of Completion can be issued by NYSDEC.

4.10 DEVIATIONS FROM THE REMEDIAL ACTION WORK PLAN

The RAWP specified that due to safety concerns related to the existing gas line and building foundation some volume of cVOC-impacted soils were to be left in place. Backfill was to be blended with a chemical oxidant to polish residual or inaccessible cVOCs in soil and groundwater. However, during utility location activities performed by AWT from 15 to 18 March 2017, electrical conduits were identified crossing the excavation area. The electrical conduits run parallel to the gas line approximately 1.5 feet bgs with 4 feet between them. The locations of the electrical conduits north of the gas line increased the volume of the impacted materials to be left in place; the original estimated quantity of soil/fill to be removed from the Site was 2,500 cy (as stated in the RAWP) and the actual export amount was 1,729-tons (approximately 1,000 cy). The revised excavation areas were discussed with NYSDEC during the pre-remediation meeting on 22 March 2017. As discussed in Section 4.3.2 above, $KMnO_4$ and $NaMnO_4$ was injected/ blended/etc. to address residual cVOCs left in place.

TABLES

Table 1
Soil Cleanup Objectives (SCOs) for the Project
Kings Plaza Shopping Center
Brooklyn, New York
NYSDEC BCP No. C224263
Langan Project No.: 140080119

	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Restricted Use Commercial SCO
Volatile Organic Compounds (mg/kg)		
1,1,1-Trichloroethane	0.68	500
1,1-Dichloroethane	0.27	240
1,1-Dichloroethene	0.33	500
1,2-Dichlorobenzene	1.1	500
1,2-Dichloroethane	0.02	30
cis-1,2-Dichloroethene	0.25	500
trans-1,2-Dichloroethene	0.19	500
1,3-Dichlorobenzene	2.4	280
1,4-Dichlorobenzene	1.8	130
1,4-Dioxane	0.1	130
Acetone	0.05	500
Benzene	0.06	44
n-Butylbenzene	12	500
Carbon tetrachloride	0.76	22
Chlorobenzene	1.1	500
Chloroform	0.37	350
Ethylbenzene	1	390
Hexachlorobenzene	0.33	6
Methyl ethyl ketone	0.12	500
Methyl tert-butyl ether	0.93	500
Methylene chloride	0.05	500
n-Propylbenzene	3.9	500
sec-Butylbenzene	11	500
tert-Butylbenzene	5.9	500
Tetrachloroethene	1.3	150
Toluene	0.7	500
Trichloroethene	0.47	200
1,2,4-Trimethylbenzene	3.6	190
1,3,5-Trimethylbenzene	8.4	190
Vinyl chloride	0.02	13
Xylene (mixed)	0.26	500

NOTES:

1. New York State Department of Environmental Conservation (NYSDEC)
2. mg/kg = milligrams per kilogram

Table 2
Off-Site Soil/Waste Disposal Volumes and Facility
Kings Plaza Shopping Center
Brooklyn, New York
NYSDEC BCP No. C224263
Langan Project No.: 140080119

LANDFILL TRACKING	
Total Load Count	69
Total Export Quantity	1,729.55

Load Counter	Date Hauled	Landfill	Manifest #	Scale Ticket #	Quantity (TN)
1	4/19/2017	Soil Safe	01	12	28.02
2	4/19/2017	Soil Safe	02	16	23.8
3	4/19/2017	Soil Safe	03	34	28.1
4	4/19/2017	Soil Safe	04	35	26.55
5	4/20/2017	Soil Safe	05	15	22.58
6	4/20/2017	Soil Safe	06	10	23.37
7	4/20/2017	Soil Safe	07	14	20.93
8	4/20/2017	Soil Safe	08	17	22.46
9	4/20/2017	Soil Safe	09	18	20.64
10	4/20/2017	Soil Safe	10	19	25.8
11	4/20/2017	Soil Safe	11	36	27.34
12	4/20/2017	Soil Safe	12	37	28.8
13	4/20/2017	Soil Safe	13	38	26.13
14	4/20/2017	Soil Safe	14	40	28.02
15	4/20/2017	Soil Safe	15	41	30.17
16	4/20/2017	Soil Safe	16	42	26.73
17	4/21/2017	Soil Safe	17	32	27.85
18	4/21/2017	Soil Safe	18	30	34.92
19	4/21/2017	Soil Safe	19	31	30.1
20	4/21/2017	Soil Safe	20	34	29.7
21	4/21/2017	Soil Safe	21	41	28.54
22	4/21/2017	Soil Safe	22	94	17.93
23	4/21/2017	Soil Safe	23	95	21.05
24	4/21/2017	Soil Safe	24	96	21.11
25	4/21/2017	Soil Safe	25	98	21.45
26	4/21/2017	Soil Safe	26	97	22.91
27	4/26/2017	Soil Safe	27	13	25.58
28	4/26/2017	Soil Safe	28	14	28.48
29	4/26/2017	Soil Safe	29	16	26.53
30	4/26/2017	Soil Safe	30	17	24.52
31	4/26/2017	Soil Safe	31	18	28.26
32	4/26/2017	Soil Safe	32	20	27.99
33	4/26/2017	Soil Safe	33	19	24.74
34	4/26/2017	Soil Safe	34	38	25.61
35	4/26/2017	Soil Safe	35	39	30.85
36	4/26/2017	Soil Safe	36	40	28.9
37	4/26/2017	Soil Safe	37	41	26.17
38	4/26/2017	Soil Safe	38	44	28.39
39	4/26/2017	Soil Safe	39	43	26.34
40	4/26/2017	Soil Safe	40	45	29.67
41	4/27/2017	Soil Safe	41	1	28.65
42	4/27/2017	Soil Safe	42	3	25.86
43	4/27/2017	Soil Safe	43	2	27.71
44	4/27/2017	Soil Safe	44	5	26.25
45	4/27/2017	Soil Safe	45	6	28.38
46	4/27/2017	Soil Safe	46	7	25.94
47	4/27/2017	Soil Safe	47	8	26.52
48	4/27/2017	Soil Safe	48	9	21.69
49	4/27/2017	Soil Safe	49	10	23.98
50	4/27/2017	Soil Safe	50	11	27.24
51	4/27/2017	Soil Safe	51	12	22.61
52	4/27/2017	Soil Safe	52	14	27.09
53	4/27/2017	Soil Safe	53	13	24.37
54	4/27/2017	Soil Safe	54	15	25.43
55	4/28/2017	Soil Safe	55	1	27.52
56	4/28/2017	Soil Safe	56	2	30.08
57	4/28/2017	Soil Safe	57	3	21.3
58	4/28/2017	Soil Safe	58	4	19.92
59	4/28/2017	Soil Safe	59	6	29.52
60	4/28/2017	Soil Safe	60	7	30.76
61	4/28/2017	Soil Safe	61	8	29.4
62	4/28/2017	Soil Safe	62	9	23.26
63	6/23/2017	Soil Safe	63	12	17.32
64	6/23/2017	Soil Safe	64	94	15.27
65	6/27/2017	Soil Safe	65	4	11.43
66	6/27/2017	Soil Safe	66	92	12.69
67	6/30/2017	Soil Safe	67	4	13.87
68	7/7/2017	Soil Safe	68	1	19.87
69	7/12/2017	Soil Safe	69	1	18.59

Table 3
Remedial Performance/Documentation Sampling Results
Kings Plaza Shopping Center
Brooklyn, New York
NYSDEC BCP No. C224263
Langan Project No.: 140080119

Sample ID Sampling Date Sampling Depth (feet) Dilution Factor	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Restricted Use Commercial SCO	South-SE-Corner 4/21/2017 15 1		South-SW-Corner 4/21/2017 15 1, 100		South-NW-Corner 4/21/2017 15 1, 100		South-NE-Corner 4/21/2017 15 1, 100, 500, 2,000		South-Bottom1 4/21/2017 15 1, 200		DUP-1-4.21.17 (South-Bottom1) 4/21/2017 15 1, 200		South-Bottom2 4/21/2017 15 100, 2,000	
Volatile Organic Compounds (mg/kg)																
1,1-Dichloroethane	0.27	240	0.0044	U	0.0042	U	0.0052	U	0.0045	U	0.0037	U	0.0039	U	**0.34**	U
1,1-Dichloroethylene	0.33	500	0.0044	U	0.0042	U	0.012		0.018		0.042		0.053		**0.34**	U
1,2,4-Trimethylbenzene	3.6	190	0.0044	U	0.0042	U	0.0052	U	0.0045	U	0.0037	U	0.0039	U	0.34	U
1,2-Dichloroethane	0.02	30	0.0044	U	0.0042	U	0.0052	U	0.0045	U	0.0037	U	0.0039	U	**0.34**	U
1,3,5-Trimethylbenzene	8.4	190	0.0044	U	0.0042	U	0.0052	U	0.0045	U	0.0037	U	0.0039	U	0.34	U
1,4-Dioxane	0.1	130	0.088	U	0.084	U	0.1	U	0.09	U	0.074	U	0.078	U	**6.8**	U
2-Butanone (MEK)	0.12	500	0.015		0.02		0.0052	U	0.0045	U	0.0037	U	0.0039	U	**0.34**	U
Acetone	0.05	500	**0.054**	SCAL-E	**0.075**	SCAL-E	**0.093**	SCAL-E	**0.063**	SCAL-E	0.034	SCAL-E	0.047	SCAL-E	**0.68**	U
Benzene	0.06	44	0.019		0.039		0.0059	J	0.0045	U	0.021		0.023		**0.34**	U
Carbon disulfide	~	~	0.051	CCV-E	0.011	CCV-E	0.026	CCV-E	0.02	CCV-E	0.043	CCV-E	0.057	CCV-E	0.34	U
cis-1,2-Dichloroethylene	0.25	500	**0.82**	E	**2**	D	**18**	D	**52**	D	**55**	D	**50**	D	**36**	D
Cyclohexane	~	~	0.0044	U	0.0042	U	0.0052	U	0.0083	J	0.0037	U	0.0039	U	0.34	U
Ethyl Benzene	1	390	0.0044	U	0.0042	U	0.0052	U	0.0045	U	0.0037	U	0.0039	U	0.34	U
Methylene chloride	0.05	500	0.0088	U	0.0084	U	0.01	U	0.009	U	0.0074	U	0.0078	U	**0.68**	U
Naphthalene	12	500	NA		NA		NA		NA		NA		NA		NA	
o-Xylene	~	~	0.0044	U	0.0042	U	0.0052	U	0.0045	U	0.0037	U	0.0039	U	0.34	U
p- & m- Xylenes	~	~	0.0088	U	0.0084	U	0.01	U	0.009	U	0.0074	U	0.0078	U	0.68	U
Tetrachloroethylene	1.3	150	0.015		0.0042	U	0.0058	J	**300**	D	0.18		0.27		**310**	D
Toluene	0.7	500	0.016		0.0042	U	0.0052	U	0.041		0.061		0.07		0.34	U
trans-1,2-Dichloroethylene	0.19	500	0.072		**0.22**		**0.99**	D	**1.5**	D	**2**	D	**1.7**	D	**1.1**	D
Trichloroethylene	0.47	200	0.018		0.0042	U	0.0052	U	**200**	D	0.057		0.067		**57**	D
Vinyl Chloride	0.02	13	**4.3**	E	**0.39**	D, U	**5.4**	D	**0.45**	D, U	**3.2**	D	**0.75**	D, U	**0.34**	U
Xylenes, Total	0.26	500	0.013	U	0.013	U	0.016	U	0.014	U	0.011	U	0.012	U	**1**	U

NOTES:

1. Grab soil sample analytical results are compared to the New York State Department of Environmental Conservation (NYSDEC) title 6 of the official compilation of New York Codes, Rules, and Regulations (NYCRR) Part 375 Unrestricted Use and Commercial Use Soil Cleanup Objectives (SCOs).
2. Only compounds with detections are shown in table.
3. **NYSDEC Part 375 Unrestricted Use SCO exceedances are shaded and bolded.**
4. **NYSDEC Part 375 Restricted Use Commercial SCO exceedances are in bold red.**
5. mg/kg = milligrams per kilogram
6. ~ = No regulatory limit has been established for this analyte.
7. Methylene chloride was detected in the 4/21/2017 Trip Blank at 1.4 J µg/L.
8. Acetone and chloroform were detected in the 4/28/2017 Trip Blank at 2.3 SCAL-E and 0.21 J µg/L, respectively.

Qualifiers:

CCV-E = The value reported is ESTIMATED. The value is estimated due to its behavior during continuing calibration verification (>20% Difference for average Rf or >20% Drift for quadratic fit).
D = Result is from an analysis that required a dilution
E = The concentration indicated for this analyte is an estimated value above the calibration range of the instrument. This value is considered an estimate.
J = Detected below the Reporting Limit but greater than or equal to the Method Detection Limit (MDL/LOD) or in the case of a TIC, the result is an estimated concentration
SCAL-E = The value reported is ESTIMATED. The value is estimated due to its behavior during initial calibration (average Rf>20%).
U = Analyte not detected at or above the level indicated

Table 3
Remedial Performance/Documentation Sampling Results
Kings Plaza Shopping Center
Brooklyn, New York
NYSDEC BCP No. C224263
Langan Project No.: 140080119

Sample ID Sampling Date Sampling Depth (feet) Dilution Factor	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Restricted Use Commercial SCO	North-NW-Corner 4/27/2017 16 1		North-NE-Corner-MS/MSD 4/27/2017 16 1		North-SE-Corner 4/28/2017 16 1		North-SW-Corner 4/28/2017 16 1, 10		North-BW-Bottom 1 4/28/2017 16 1		North-BE-Bottom 2 4/28/2017 16 1	
Volatile Organic Compounds (mg/kg)														
1,1-Dichloroethane	0.27	240	0.0025	U	0.0033	U	0.0032	U	0.0027	U	0.0034	U	0.0031	U
1,1-Dichloroethylene	0.33	500	0.0025	U	0.0033	U	0.0032	U	0.0027	U	0.0034	U	0.0031	U
1,2,4-Trimethylbenzene	3.6	190	0.0025	U	0.0033	U	0.0032	U	0.018		0.0034	U	0.0031	U
1,2-Dichloroethane	0.02	30	0.0025	U	0.0033	U	0.0032	U	0.0027	U	0.0034	U	0.0031	U
1,3,5-Trimethylbenzene	8.4	190	0.0025	U	0.0033	U	0.0032	U	0.0077		0.0034	U	0.0031	U
1,4-Dioxane	0.1	130	0.05	U	0.067	U	0.063	U	0.055	U	0.068	U	0.062	U
2-Butanone (MEK)	0.12	500	0.023		0.0071		0.0032	U	0.0027	U	0.0088		0.0031	U
Acetone	0.05	500	**0.08**		0.033		0.03		0.027		0.036		0.023	
Benzene	0.06	44	0.0025	U	0.0033	U	0.0032	U	0.0037	J	0.0034	U	0.0031	U
Carbon disulfide	~	~	0.011		0.023		0.025		0.013		0.031		0.013	
cis-1,2-Dichloroethylene	0.25	500	0.0025	U	0.0033	U	0.0032	U	0.0027	U	0.0034	U	0.0031	U
Cyclohexane	~	~	0.0025	U	0.0033	U	0.0032	U	0.0027	U	0.0034	U	0.0031	U
Ethyl Benzene	1	390	0.0025	U	0.0033	U	0.0032	U	0.013		0.0034	U	0.0031	U
Methylene chloride	0.05	500	0.0062	J	0.0067	U	0.0063	U	0.0055	U	0.0068	U	0.0062	U
Naphthalene	12	500	NA		NA		NA		1.1	D	NA		NA	
o-Xylene	~	~	0.0025	U	0.0033	U	0.0032	U	0.015		0.0034	U	0.0031	U
p- & m- Xylenes	~	~	0.005	U	0.0067	U	0.0063	U	0.025		0.0068	U	0.0062	U
Tetrachloroethylene	1.3	150	0.0025	U	0.0033	U	0.0032	U	0.0027	U	0.0034	U	0.0031	U
Toluene	0.7	500	0.0025	U	0.0033	U	0.0032	U	0.012		0.0034	U	0.0031	U
trans-1,2-Dichloroethylene	0.19	500	0.0025	U	0.0033	U	0.0032	U	0.0027	U	0.0034	U	0.0031	U
Trichloroethylene	0.47	200	0.0025	U	0.0033	U	0.0032	U	0.0027	U	0.0034	U	0.0031	U
Vinyl Chloride	0.02	13	0.0025	U	0.0033	U	0.0032	U	0.0027	U	0.0034	U	0.0031	U
Xylenes, Total	0.26	500	0.0075	U	0.01	U	0.0095	U	0.04		0.01	U	0.0093	U

NOTES:
1. Grab soil sample analytical results are compared to the New York State Department of Environmental Conservation (NYSDEC) title 6 of the official compilation of New York Codes, Rules, and Regulations (NYCRR) Part 375 Unrestricted Use and Commercial Use Soil Cleanup Objectives (SCOs).
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8. Acetone and chloroform were detected in the 4/28/2017 Trip Blank at 2.3 SCAL-E and 0.21 J µg/L, respectively.

Qualifiers:
CCV-E = The value reported is ESTIMATED. The value is estimated due to its behavior during continuing calibration verification (>20% Difference for average Rf or >20% Drift for quadratic fit).
D = Result is from an analysis that required a dilution
E = The concentration indicated for this analyte is an estimated value above the calibration range of the instrument. This value is considered an estimate.
J = Detected below the Reporting Limit but greater than or equal to the Method Detection Limit (MDL/LOD) or in the case of a TIC, the result is an estimated concentration
SCAL-E = The value reported is ESTIMATED. The value is estimated due to its behavior during initial calibration (average Rf>20%).
U = Analyte not detected at or above the level indicated

Table 3B
Groundwater Analytical Results Summary
Kings Plaza Shopping Center
Brooklyn, New York
NYSDEC BCP No. C224263
Langan Project No.: 140080119

Sample Location	NYSDEC TOGS	EFR-1		EFR-3		EFR-6		EFR-12								HV-1					
Client Sample ID	Standards and	EFR1_20130828		EFR3_20130829		EFR6_20130829		EFR12_20130829		DUP_001		EFR-12_120413		EFR12_031914		HV1_20130829		HV-1_120313		DUP01_120313	
Lab Sample ID	Guidance Values	460-62066-2		460-62149-4		460-62149-2		460-62149-5		460-62149-6		460-67759-7		460-72892-6		460-62149-8		460-67628-4		460-67628-5	
Sampling Date		8/28/2013		8/29/2013		8/29/2013		8/29/2013		8/29/2013		12/4/2013		3/19/2014		8/29/2013		12/3/2013		12/3/2013	
Volatile Organic Compounds (µg/L)																					
1,1-Dichloroethene	5	1	U	1	U	1	U	**13**	**J,D**	**18**	**J,D**	**13**	**J,D**	**11**	**J,D**	1	U	1	U	1	U
Acetone	50	5	U	5	U	5	U	*250*	*U*	*250*	*U*	*130*	*U*	*130*	*U*	5	U	5	U	5	U
Benzene	1	1	U	**69**		**17**		**7.1**	**J,D**	**6.9**	**J,D**	*25*	*U*	**8.4**	**J,D**	**1.7**		**3.2**		**3.2**	
Bromoform	50	1	U	1	U	1	U	50	U	50	U	25	U	25	U	1	U	1	U	1	U
Carbon disulfide	60	1	U	1	U	1	U	*50*	*U*	*50*	*U*	25	U	25	U	1	U	1	U	1	U
Chloroethane	5	1	U	1	U	1	U	*50*	*U*	*50*	*U*	*25*	*U*	*25*	*U*	1	U	1	U	1	U
cis-1,2-Dichloroethene	5	0.9	J	0.26	J	1	U	**12,000**	**D**	**14,000**	**D**	**9,500**	**D**	**8,000**	**D**	3.5		1	U	1	U
Cyclohexane	~	1	U	4.5		4.8		50	U	*50*	*U*	25	U	25	U	2.9		2.5		2.7	
Ethylbenzene	5	1	U	**16**		**23**		*50*	*U*	*50*	*U*	*25*	*U*	*25*	*U*	3.5		3		3.3	
Isopropylbenzene	5	1	U	1.3		4.9		*50*	*U*	*50*	*U*	*25*	*U*	*25*	*U*	1.2		1.6		1.6	
m&p-Xylene	5	2	U	**65**		**130**		*100*	*U*	*100*	*U*	*50*	*U*	*50*	*U*	**10**		4.3		4.5	
Methyl tert-butyl ether (MTBE)	10	1	U	6.7		0.58	J	*50*	*U*	*50*	*U*	*25*	*U*	*25*	*U*	0.61	J	0.99	J	0.98	J
Methylcyclohexane	~	1	U	5		4.2		50	U	50	U	25	U	25	U	4.7		4.9		5.2	
o-Xylene	5	1	U	**12**		**37**		*50*	*U*	*50*	*U*	*25*	*U*	*25*	*U*	0.52	J	0.54	J	0.53	J
sec-Butylbenzene	5	1	U	1	U	1	U	*50*	*U*	*50*	*U*	*25*	*U*	*25*	*U*	1	U	1	U	1	U
tert-Butyl alcohol (TBA)	~	2	U	2	U	2	U	100	U	100	U	50	U	50	U	2	U	2	U	2	U
Tetrachloroethene (PCE)	5	1	U	1	U	1	U	**1,800**	**D**	**2,400**	**D**	**5,200**	**D**	**1,100**	**D**	2.1		1	U	1	U
Toluene	5	1	U	2		2.2		**8**	**J,D**	**8.7**	**J,D**	**8.1**	**J,D**	*25*	*U*	1	U	0.42	J	0.42	J
trans-1,2-Dichloroethene	5	0.21	J	1	U	1	U	**570**	**D**	**750**	**D**	**430**	**D**	**330**	**D**	0.53	J	0.15	J	0.19	J
Trichloroethene (TCE)	5	1	U	1	U	1	U	**3,800**	**D**	**5,200**	**D**	**2,600**	**D**	**1,300**	**D**	2.4		1	U	1	U
Vinyl chloride	2	1.7		0.55	J	0.35	J	**2,200**	**D**	**2,800**	**D**	**2,400**	**D**	**1,900**	**D**	0.59	J	1	U	1	U
Total Xylenes	5	2	U	**77**		**167**		*100*	*U*	*100*	*U*	*50*	*U*	*50*	*U*	**10.52**		4.84	J	**5.03**	**J**
Total VOC Concentration	~	2.81		182.31		224.03		20,398.1		25,183.6		20,151.1		12,649.4		34.25		21.6		22.62	
Semivolatile Organic Compounds (µg/L)																					
2,4-Dimethylphenol	~	10	U	10	U*J	11	U*J	10	U*J	10	U*J	10	U	60	U	10	U*	10	U	10	U
2-Methylnaphthalene	~	10	U	19		27		10	U	10	U	10	U	60	U	5.3	J	35		33	
4-Methylphenol	~	10	U	10	U	11	U	10	U	10	U	10	U	60	U	10	U	10	U	10	U
Acenaphthene	20	2.9	J	5.1	J	4.7	J	10	U	10	U	10	U	*60*	*U*	2.4	J	3.8	J	3.5	J
Anthracene	50	10	U	10	U	11	U	10	U	10	U	10	U	*60*	*U*	10	U	0.92	J	10	U
Bis(2-ethylhexyl) phthalate	5	*10*	*U*	**43**		**29**		*10*	*U*	*10*	*U*	*10*	*U*	*60*	*U*	**14**		**90**		**75**	
Carbazole	~	10	U	3.8	J	11	U	10	U	10	U	10	U	60	U	10	U	1.4	J	10	U
Dibenzofuran	~	10	U	1.8	J	2.1	J	10	U	10	U	10	U	60	U	10	U	2.2	J	1.6	J
Diethyl phthalate	50	10	U	10	U	11	U	10	U	10	U	10	U	**460**	**D**	10	U	10	U	10	U
Di-n-butyl phthalate	50	10	U	10	J	11	U	10	U	10	U	10	U	*60*	*U*	10	U	10	U	10	U
Di-n-octyl phthalate	50	10	U	10	U	11	U	10	U	10	U	10	U	*60*	*U*	10	U	10	U	10	U
Diphenyl	~	10	U	10	U	11	U	10	U	10	U	10	U	60	U	10	U	10	U	10	U
Fluorene	50	10	U	4.5	J	3.3	J	10	U	10	U	10	U	*60*	*U*	2.6	J	4.7	J	4.3	J
Naphthalene	10	10	U	6.5	J	**17**		10	U	10	U	10	U	*60*	*U*	3.5	J	**15**		**15**	
Phenanthrene	50	10	U	4.5	U*J	5.1	J	10	U	10	U	10	U	*60*	*U*	1.6	J	7.6	J	5.4	J
Pyrene	50	10	U	10	U	11	U	10	U	10	U	10	U	*60*	*U*	10	U	1.1	J	10	U
Total SVOC Concentration	~	2.9		93.7		88.2		10	U	10	U	10	U	460		29.4		161.72		137.8	

Notes:

1. Groundwater samples analytical results are compared to the New York State Department of Environmental Conservation (NYSDEC) Technical and Operational Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards (AWQS) and guidance values for drinking water (class GA) .
2. Only compounds with detections are shown in the table.
3. Results exceeding NYSDEC TOGS are shaded and in bold.
4. Reporting Limits (RL) above the NYSDEC TOGS Standards and Guidance Values are italicized.
5. µg/L = micrograms per liter
6. ~ = No regulatory limit has been established for this analyte.
6. Sample DUP_001 is a duplicate sample of EFR12_20130829, DUP01_120313 is a duplicate sample of HV-1_120313 and DUP01_031914 is a duplicate sample of LMW01_031914.
7. Tert-butyl alchohol (TBA) was detected in the 12/5/18 Trip Blank at a concentration of 0.61 µg/L with a SCAL-E flag.
8. The 12/7/18 Trip Blank had detections of 1,2-Dichlorobenzene (0.4 µg/L), acetone (1.02 µg/L with a SCAL-E flag), chloroform (1.03 µg/L), chloromethane (0.31 µg/L with a CCV-E flag), and methylene chloride (1.84 µg/L).

Qualifiers:

J =The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample.
U =The analyte was analyzed, but was not detected at a level greater than or equal to the level of the Reporting Limit (RL) or the sample concentration for results impacted by blank contamination.
* = Relative Percent Difference (RPD) of the Lab Control Sample (LCS) and the Lab Control Sample Duplicate (LCSD) exceeds the control limits.
D = Sample required dilution for reported result
NA = Not analyzed
CCV-E = The value reported is ESTIMATED. The value is estimated due to its behavior during continuing calibration verification (>20% Difference for average Rf or >20% Drift for quadratic fit).
SCAL-E = The value reported is ESTIMATED. The value is estimated due to its behavior during initial calibration (average Rf>20%).

Table 3B
Groundwater Analytical Results Summary
Kings Plaza Shopping Center
Brooklyn, New York
NYSDEC BCP No. C224263
Langan Project No.: 140080119

Sample Location	NYSDEC TOGS	LMW-1					LMW-2				MW-1		
Client Sample ID	Standards and	LMW1_20130830	LMW-1_120413	LMW01_031914	DUP01_031914	LMW-1_2018.12.05	LMW2_20130830	LMW-2	LMW02_031914	LMW-2_2018.12.05	MW1_20130830	MW-1_120413	MW-1_2018.12.05
Lab Sample ID	Guidance Values	460-62235-1	460-67759-3	460-72892-9	460-72892-8	18L0240-01	460-62235-2	460-67759-4	460-72892-4	18L0240-02	460-62235-3	460-67759-5	18L0240-03
Sampling Date		8/30/2013	12/4/2013	3/19/2014	3/19/2014	12/5/2018	8/30/2013	12/4/2013	3/19/2014	12/5/2018	8/30/2013	12/4/2013	12/5/2018
Volatile Organic Compounds (µg/L)													
1,1-Dichloroethene	5	1 U	1 U	1 U	1 U	0.2 U	1 U	1 U	1 U	0.75	1 U	0.45 J	0.2 U
Acetone	50	5 U	5 U	5 U	5 U	1 U	5 U	5 U	5 U	1 U	10 J	5 U	1 U,SCAL-E
Benzene	1	1 U	1 U	1 U	1 U	0.2 U	**4.1**	**1.8**	**6.6**	**4.72**	**2**	**6.3**	0.24 J
Bromoform	50	1 U	1 U	1 U	1 U	0.33	1 U	1 U	1 U	0.2 U	1 U	1 U	0.2 U
Carbon disulfide	60	1 U	1 U	3.1	1.8	0.2 U	1 U	1 U	5.3	0.2 U	0.66 J	1 U	0.2 U
Chloroethane	5	1 U	1 U	1 U	1 U	0.2 U	1 U	1 U	1 U	0.2 U	1 U	1 U	0.2 U
cis-1,2-Dichloroethene	5	0.19 J	0.27 J	0.23 J	1 U	0.24 J	0.24 J	0.24 J	0.21 J	**298** D	**25**	**320**	0.56
Cyclohexane	~	1 U	1 U	1 U	1 U	0.2 U	8.1	4.1	5.5	3.14	4.1	1.4	1.11
Ethylbenzene	5	1 U	1 U	1 U	1 U	0.2 U	1 U	1 U	1 U	0.2 U	1 U	0.14 J	0.2 U
Isopropylbenzene	5	0.12 J	1 U	0.11 J	0.1 J	0.2 U	0.66 J	0.35 J	0.46 J	0.22 J	1 U	0.11 J	0.2 U
m&p-Xylene	5	2 U	2 U	2 U	2 U	0.5 U	2 U	2 U	2 U	0.5 U	2 U	2 U	0.5 U
Methyl tert-butyl ether (MTBE)	10	0.72 J	0.94 J	0.58 J	0.57 J	0.38 J	0.41 J	0.26 J	0.39 J	0.26 J	1 U	0.18 J	0.2 U
Methylcyclohexane	~	1 U	1 U	1 U	1 U	0.2 U	4.2	0.75 J	0.5 J	0.36 J	1 U	1 U	0.2 U
o-Xylene	5	1 U	1 U	0.17 J	0.19 J	0.2 U	1 U	1 U	1 U	0.2 U	1 U	1 U	0.2 U
sec-Butylbenzene	5	1 U	1 U	1 U	1 U	0.2 U	1 U	1 U	1 U	0.2 U	1 U	1 U	0.2 U
tert-Butyl alcohol (TBA)	~	2 U	2 U	2 U	2 U	0.5 U	2 U	2 U	2 U	0.5 U	2 U	2 U	0.5 U
Tetrachloroethene (PCE)	5	1 U	1 U	1 U	1 U	0.2 U	1 U	1 U	1 U	0.2 U	1 U	1 U	0.2 U
Toluene	5	1 U	1 U	1 U	1 U	0.2 U	1 U	1 U	0.2 J	0.23 J	0.64 J	0.6 J	0.2 U
trans-1,2-Dichloroethene	5	1 U	1 U	1 U	1 U	0.2 U	1 U	1 U	1 U	**6.15**	0.48 J	**9.5**	0.2 U
Trichloroethene (TCE)	5	1 U	1 U	1 U	1 U	0.2 U	1 U	1 U	1 U	0.2 U	1 U	1 U	0.2 U
Vinyl chloride	2	0.24 J	1 U	0.31 J	0.24 J	0.38 J,CCV-E	1 U	1 U	1 U	0.2 U	**52**	**260**	1.9 CCV-E
Total Xylenes	5	2 U	2 U	0.17 J	0.19 J	0.5 U	2 U	2 U	2 U	0.5 U	2 U	2 U	0.5 U
Total VOC Concentration	~	1.27	1.21	4.5	2.9	1.33	17.71	7.5	19.16	313.83	94.88	598.68	3.81
Semivolatile Organic Compounds (µg/L)													
2,4-Dimethylphenol	~	10 U	11 U	11 U	11 U	NA	10 U	10 U	11 U	NA	10 U	12 U	NA
2-Methylnaphthalene	~	10 U*	2.2 J	11 U	11 U	NA	10 U*	10 U	11 U	NA	10 U*	12 U	NA
4-Methylphenol	~	10 U	11 U	11 U	11 U	NA	10 U	10 U	11 U	NA	10 U	12 U	NA
Acenaphthene	20	**32**	**31**	**35**	**35**	NA	10 U	10 U	11 U	NA	10 U	12 U	NA
Anthracene	50	10 U	11 U	11 U	11 U	NA	10 U	10 U	11 U	NA	10 U	12 U	NA
Bis(2-ethylhexyl) phthalate	5	*10 U*	*11 U*	*11 U*	*11 U*	NA	*10 U*	*10 U*	*11 U*	NA	**6.1 J**	**9.8 J**	NA
Carbazole	~	10 U	11 U	11 U	11 U	NA	10 U*	10 U	11 U	NA	10 U*	12 U	NA
Dibenzofuran	~	10 U	11 U	11 U	11 U	NA	10 U	10 U	11 U	NA	10 U	12 U	NA
Diethyl phthalate	50	10 U	11 U	11 U	11 U	NA	1.5 J	10 U	11 U	NA	8 J	12 U	NA
Di-n-butyl phthalate	50	10 U	11 U	11 U	11 U	NA	10 U	10 U	11 U	NA	10 U	12 U	NA
Di-n-octyl phthalate	50	10 U	11 U	11 U	11 U	NA	10 U	10 U	11 U	NA	10 U	12 U	NA
Diphenyl	~	10 U	11 U	11 U	11 U	NA	10 U	10 U	11 U	NA	10 U	12 U	NA
Fluorene	50	4.5 J	4.5 J	4.8 J	4.8 J	NA	10 U	10 U	11 U	NA	10 U	12 U	NA
Naphthalene	10	10 U	*11 U*	*11 U*	*11 U*	NA	10 U*	10 U	*11 U*	NA	10 U*	*12 U*	NA
Phenanthrene	50	10 U	11 U	11 U	11 U	NA	10 U	10 U	11 U	NA	10 U	12 U	NA
Pyrene	50	10 U	11 U	11 U	11 U	NA	10 U	10 U	11 U	NA	10 U	12 U	NA
Total SVOC Concentration	~	36.5	37.7	39.8	39.8	NA	1.5	10 U	11 U	NA	14.1	9.8	NA

Notes:

1. Groundwater samples analytical results are compared to the New York State Department of Environmental Conservation (NYSDEC) Technical and Operational Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards (AWQS) and guidance values for drinking water (class GA) .
2. Only compounds with detections are shown in the table.
3. Results exceeding NYSDEC TOGS are shaded and in bold.
4. Reporting Limits (RL) above the NYSDEC TOGS Standards and Guidance Values are italicized.
5. µg/L = micrograms per liter
6. ~ = No regulatory limit has been established for this analyte.
6. Sample DUP_001 is a duplicate sample of EFR12_20130829, DUP01_120313 is a duplicate sample of HV-1_120313 and DUP01_031914 is a duplicate sample of LMW01_031914.
7. Tert-butyl alchohol (TBA) was detected in the 12/5/18 Trip Blank at a concentration of 0.61 µg/L with a SCAL-E flag.
8. The 12/7/18 Trip Blank had detections of 1,2-Dichlorobenzene (0.4 µg/L), acetone (1.02 µg/L with a SCAL-E flag), chloroform (1.03 µg/L), chloromethane (0.31 µg/L with a CCV-E flag), and methylene chloride (1.84 µg/L).

Qualifiers:

J =The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample.
U =The analyte was analyzed, but was not detected at a level greater than or equal to the level of the Reporting Limit (RL) or the sample concentration for results impacted by blank contamination.
* = Relative Percent Difference (RPD) of the Lab Control Sample (LCS) and the Lab Control Sample Duplicate (LCSD) exceeds the control limits.
D = Sample required dilution for reported result
NA = Not analyzed
CCV-E = The value reported is ESTIMATED. The value is estimated due to its behavior during continuing calibration verification (>20% Difference for average Rf or >20% Drift for quadratic fit).
SCAL-E = The value reported is ESTIMATED. The value is estimated due to its behavior during initial calibration (average Rf>20%).

Table 3B
Groundwater Analytical Results Summary
Kings Plaza Shopping Center
Brooklyn, New York
NYSDEC BCP No. C224263
Langan Project No.: 140080119

Sample Location / Client Sample ID / Lab Sample ID / Sampling Date	NYSDEC TOGS Standards and Guidance Values	MW-4 MW4_20130828 460-62066-1 8/28/2013		MW-4 MW-4_120413 460-67759-2 12/4/2013		MW-4 MW4_031914 460-72892-3 3/19/2014		MW-8 MW8_20130829 460-62149-9 8/29/2013		MW-33 MW-33_2018.12.07 18L0360-01 12/7/2018		MW-36 MW36_20130829 460-62149-1 8/29/2013		MW-36 MW-36_120313 460-67628-3 12/3/2013		MW-36 MW36-031914 460-72892-11 3/19/2014	
Volatile Organic Compounds (µg/L)																	
1,1-Dichloroethene	5	1	U	1	U	1	U	1	U	0.2	U	1	U	1	U	1	U
Acetone	50	5	U	5	U	5	U	5	U	1	U	13		5	U	5	U*
Benzene	1	1	U	1	U	1	U	**13**		0.2	U	**45**		**27**		**15**	
Bromoform	50	1	U	1	U	1	U	1	U	0.2	U	1	U	1	U	1	U
Carbon disulfide	60	1	U	1	U	10		0.32	J	0.2	U	1	U	1	U	1	U
Chloroethane	5	1	U	1	U	1	U	1	U	0.2	U	1	U	1	U	1	U
cis-1,2-Dichloroethene	5	0.52	J	0.36	J	0.2	J	4.3		1.01		1	U	1	U	0.73	J
Cyclohexane	~	1	U	1	U	1	U	2.4		0.2	U	6.5		1.2		1.3	
Ethylbenzene	5	1	U	1	U	1	U	**10**		0.2	U	**150**		0.4	J	0.28	J
Isopropylbenzene	5	1	U	1	U	1	U	1.8		0.2	U	**12**		3.7		3.1	
m&p-Xylene	5	2	U	2	U	2	U	**32**		0.5	U	**390**		2.7		0.9	J
Methyl tert-butyl ether (MTBE)	10	1	U	1	U	1	U	1.2		0.2	U	4.4		6.9		2.3	
Methylcyclohexane	~	1	U	1	U	1	U	3.4		0.2	U	3.2		0.72	J	1.2	
o-Xylene	5	1	U	1	U	1	U	**15**		0.2	U	**300**		0.7	J	0.27	J
sec-Butylbenzene	5	1	U	1	U	1	U	1	U	0.2	U	1	U	1	U	1	U
tert-Butyl alcohol (TBA)	~	2	U	2	U	2	U	2	U	3.56	SCAL-E	2	U	2	U	2	U
Tetrachloroethene (PCE)	5	1	U	1	U	1	U	1.6		0.2	U	1	U	1	U	0.24	J
Toluene	5	1	U	1	U	1	U	1.3		0.2	U	**15**		0.49	J	0.19	J
trans-1,2-Dichloroethene	5	0.41	J	0.35	J	0.33	J	0.5	J	0.22	J	1	U	0.33	J	0.29	J
Trichloroethene (TCE)	5	1	U	1	U	1	U	2.2		0.2	U	1	U	1	U	0.2	J
Vinyl chloride	2	1	U	1	U	0.25	J	0.62	J	0.2	U	0.34	J	1	U	0.57	J
Total Xylenes	5	2	U	2	U	2	U	**47**		0.5	U	**690**		3.4	J	1.17	J
Total VOC Concentration	~	0.93		0.71		10.78		89.64		4.79		939.44		44.14		29.57	
Semivolatile Organic Compounds (µg/L)																	
2,4-Dimethylphenol	~	10	U	11	U	12	U	50	U*	NA		25	U*	10	U	11	U
2-Methylnaphthalene	~	10	U	11	U	12	U	87	D	NA		260	D	3.1	J	11	U
4-Methylphenol	~	10	U	11	U	22		6.1	J,D	NA		25	U	10	U	11	U
Acenaphthene	20	**22**		17		18		10	J,D	NA		18	J,D	8.1	J	8	J
Anthracene	50	10	U	11	U	12	U	5.4	J,D	NA		4.2	J,D	10	U	11	U
Bis(2-ethylhexyl) phthalate	5	*10*	*U*	*11*	*U*	*12*	*U*	**350**	**D**	NA		**25**	**D**	4.4	J	0.91	J
Carbazole	~	10	U	11	U	12	U	50	U	NA		6.6	J,D	2.3	J	1.9	J
Dibenzofuran	~	10	U	11	U	12	U	50	U	NA		8.3	J,D	3.6	J	3	J
Diethyl phthalate	50	10	U	11	U	12	U	50	U	NA		25	U	10	U	11	U
Di-n-butyl phthalate	50	10	U	11	U	12	U	50	U	NA		25	U	10	U	11	U
Di-n-octyl phthalate	50	10	U	11	U	12	U	7.3	J,D	NA		25	U	10	U	11	U
Diphenyl	~	10	U	11	U	12	U	50	U	NA		7.1	J,D	10	U	11	U
Fluorene	50	10	U	11	U	12	U	10	J,D	NA		16	J,D	2.5	J	2.3	J
Naphthalene	10	10	U	*11*	*U*	*12*	*U*	**44**	**J,D**	NA		**110**	**D**	10	U	*11*	*U*
Phenanthrene	50	10	U	11	U	12	U	25	J,D	NA		37	D	1.3	J	11	U
Pyrene	50	10	U	11	U	12	U	6.2	J,D	NA		4.6	J,D	10	U	11	U
Total SVOC Concentration	~	22		17		40		551		NA		496.8		25.3		16.11	

Notes:

1. Groundwater samples analytical results are compared to the New York State Department of Environmental Conservation (NYSDEC) Technical and Operational Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards (AWQS) and guidance values for drinking water (class GA) .
2. Only compounds with detections are shown in the table.
3. Results exceeding NYSDEC TOGS are shaded and in bold.
4. Reporting Limits (RL) above the NYSDEC TOGS Standards and Guidance Values are italicized.
5. µg/L = micrograms per liter
6. ~ = No regulatory limit has been established for this analyte.
6. Sample DUP_001 is a duplicate sample of EFR12_20130829, DUP01_120313 is a duplicate sample of HV-1_120313 and DUP01_031914 is a duplicate sample of LMW01_031914.
7. Tert-butyl alchohol (TBA) was detected in the 12/5/18 Trip Blank at a concentration of 0.61 µg/L with a SCAL-E flag.
8. The 12/7/18 Trip Blank had detections of 1,2-Dichlorobenzene (0.4 µg/L), acetone (1.02 µg/L with a SCAL-E flag), chloroform (1.03 µg/L), chloromethane (0.31 µg/L with a CCV-E flag), and methylene chloride (1.84 µg/L).

Qualifiers:

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U =The analyte was analyzed, but was not detected at a level greater than or equal to the level of the Reporting Limit (RL) or the sample concentration for results impacted by blank contaminatic
* = Relative Percent Difference (RPD) of the Lab Control Sample (LCS) and the Lab Control Sample Duplicate (LCSD) exceeds the control limits.
D = Sample required dilution for reported result
NA = Not analyzed
CCV-E = The value reported is ESTIMATED. The value is estimated due to its behavior during continuing calibration verification (>20% Difference for average Rf or >20% Drift for quadratic fit).
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Table 3B
Groundwater Analytical Results Summary
Kings Plaza Shopping Center
Brooklyn, New York
NYSDEC BCP No. C224263
Langan Project No.: 140080119

Sample Location	NYSDEC TOGS	MW-39			PEW-1		MW-46			
Client Sample ID	Standards and	MW39_20130829	MW-39_120413	MW39_031914	PEW-1_2018.12.05	DUP-1_2018.12.05	MW46_20130829	MW-46_120413	MW46_031914	MW-46_2018.12.07
Lab Sample ID	Guidance Values	460-62149-7	460-67759-6	460-72892-5	18L0240-04	18L0240-05	460-62149-3	460-67759-1	460-72892-2	18L0360-02
Sampling Date		8/29/2013	12/4/2013	3/19/2014	12/5/2018	12/5/2018	8/29/2013	12/4/2013	3/19/2014	12/7/2018
Volatile Organic Compounds (µg/L)										
1,1-Dichloroethene	5	**23 D**	**35 D**	**18 J,D**	**5.22**	**4.47**	1 U	1 U	1 U	0.2 U
Acetone	50	*100 U*	*100 U*	*100 U*	*1 U*	*1 U*	5 U	5 U	5 U	1 U
Benzene	1	**2.1 J,D**	*20 U*	*20 U*	0.78	0.8	0.19 J	0.98 J	1 U	0.2 U
Bromoform	50	20 U	20 U	20 U	0.2 U	0.2 U	1 U	1 U	1 U	0.2 U
Carbon disulfide	60	20 U	20 U	20 U	0.2 U	0.2 U	1 U	1 U	1 U	0.2 U
Chloroethane	5	*20 U*	*20 U*	*20 U*	17	18.2	1 U	1 U	1 U	0.2 U
cis-1,2-Dichloroethene	5	**7,700 D**	**8,900 D**	**5,700 D**	**2,600 D**	**2,610 D**	1.2	1	2.1	1.32
Cyclohexane	~	20 U	20 U	20 U	0.53	0.54	1	1 U	1 U	0.2 U
Ethylbenzene	5	*20 U*	*20 U*	*20 U*	*0.2 U*	*0.2 U*	**5.5**	0.49 J	1 U	0.2 U
Isopropylbenzene	5	*20 U*	*20 U*	*20 U*	0.48 J	0.49 J	0.45 J	0.1 J	1 U	0.2 U
m&p-Xylene	5	*40 U*	*40 U*	*40 U*	*0.5 U*	*0.5 U*	**35**	0.72 J	2 U	0.5 U
Methyl tert-butyl ether (MTBE)	10	*20 U*	*20 U*	*20 U*	*0.2 U*	*0.2 U*	1 U	1 U	1 U	0.2 U
Methylcyclohexane	~	20 U	20 U	20 U	0.49 J	0.51	0.85 J	1 U	1 U	0.2 U
o-Xylene	5	*20 U*	*20 U*	*20 U*	0.77	0.76	**8.8**	0.61 J	1 U	0.2 U
sec-Butylbenzene	5	*20 U*	*20 U*	*20 U*	0.71	0.71	1 U	1 U	1 U	0.2 U
tert-Butyl alcohol (TBA)	~	40 U	40 U	40 U	0.5 U	0.5 U	2 U	2 U	2 U	2.05 SCAL-E
Tetrachloroethene (PCE)	5	**1,600 D**	**2,800 D**	**2,200 D**	**148**	**155**	1 U	1 U	0.12 J	0.2 U
Toluene	5	3.3 J,D	*20 U*	*20 U*	0.46 J	0.48 J	1 J	0.26 J	1 U	0.2 U
trans-1,2-Dichloroethene	5	**750 D**	**930 D**	**630 D**	**68.2**	**50.5**	1 U	0.2 J	1 U	0.2 U
Trichloroethene (TCE)	5	**2,200 D**	**3,200 D**	**2,200 D**	**139**	**145**	1 U	1 U	0.23 J	0.2 U
Vinyl chloride	2	**1,200 D**	**1,600 D**	**930 D**	**1,470 D,CCV-E**	**1,510 D,CCV-E**	0.64 J	1 U	1	0.59 CCV-E
Total Xylenes	5	*40 U*	*40 U*	*40 U*	1.02 J	1.01 J	**43.8**	1.33 J	2 U	0.5 U
Total VOC Concentration	~	13,478.4	17,465	11,678	4,451.64	4,497.46	54.63	4.36	3.45	3.96
Semivolatile Organic Compounds (µg/L)										
2,4-Dimethylphenol	~	10 U*J	11 U	11 U	NA	NA	10 U*J	6.4 J	13 U	NA
2-Methylnaphthalene	~	10 U	11 U	11 U	NA	NA	15	11 U	13 U	NA
4-Methylphenol	~	10 U	11 U	11 U	NA	NA	10 U	11 U	13 U	NA
Acenaphthene	20	10 U	11 U	11 U	NA	NA	10 U	11 U	13 U	NA
Anthracene	50	10 U	11 U	11 U	NA	NA	10 U	11 U	13 U	NA
Bis(2-ethylhexyl) phthalate	5	1.2 J	*11 U*	1.4 J	NA	NA	3.7 J	4.5 J	*13 U*	NA
Carbazole	~	10 U	11 U	11 U	NA	NA	10 U	11 U	13 U	NA
Dibenzofuran	~	10 U	11 U	11 U	NA	NA	10 U	11 U	13 U	NA
Diethyl phthalate	50	10 U	11 U	11 U	NA	NA	10 U	11 U	13 U	NA
Di-n-butyl phthalate	50	10 U	11 U	11 U	NA	NA	10 U	11 U	13 U	NA
Di-n-octyl phthalate	50	10 U	11 U	11 U	NA	NA	10 U	11 U	13 U	NA
Diphenyl	~	10 U	11 U	11 U	NA	NA	10 U	11 U	13 U	NA
Fluorene	50	10 U	11 U	11 U	NA	NA	10 U	11 U	13 U	NA
Naphthalene	10	10 U	*11 U*	*11 U*	NA	NA	8.3 J	**22**	*13 U*	NA
Phenanthrene	50	10 U	11 U	11 U	NA	NA	2.4 J	11 U	13 U	NA
Pyrene	50	10 U	11 U	11 U	NA	NA	10 U	11 U	13 U	NA
Total SVOC Concentration	~	1.2	11 U	1.4	NA	NA	29.4	32.9	13 U	NA

Notes:

1. Groundwater samples analytical results are compared to the New York State Department of Environmental Conservation (NYSDEC) Technical and Operational Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards (AWQS) and guidance values for drinking water (class GA) .
2. Only compounds with detections are shown in the table.
3. Results exceeding NYSDEC TOGS are shaded and in bold.
4. Reporting Limits (RL) above the NYSDEC TOGS Standards and Guidance Values are italicized.
5. µg/L = micrograms per liter
6. ~ = No regulatory limit has been established for this analyte.
6. Sample DUP_001 is a duplicate sample of EFR12_20130829, DUP01_120313 is a duplicate sample of HV-1_120313 and DUP01_031914 is a duplicate sample of LMW01_031914.
7. Tert-butyl alchohol (TBA) was detected in the 12/5/18 Trip Blank at a concentration of 0.61 µg/L with a SCAL-E flag.
8. The 12/7/18 Trip Blank had detections of 1,2-Dichlorobenzene (0.4 µg/L), acetone (1.02 µg/L with a SCAL-E flag), chloroform (1.03 µg/L), chloromethane (0.31 µg/L with a CCV-E flag), and methylene chloride (1.84 µg/L).

Qualifiers:

J =The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample.
U =The analyte was analyzed, but was not detected at a level greater than or equal to the level of the Reporting Limit (RL) or the sample concentration for results impacted by blank contamination.
* = Relative Percent Difference (RPD) of the Lab Control Sample (LCS) and the Lab Control Sample Duplicate (LCSD) exceeds the control limits.
D = Sample required dilution for reported result
NA = Not analyzed
CCV-E = The value reported is ESTIMATED. The value is estimated due to its behavior during continuing calibration verification (>20% Difference for average Rf or >20% Drift for quadratic fit).
SCAL-E = The value reported is ESTIMATED. The value is estimated due to its behavior during initial calibration (average Rf>20%).

Table 3C
Post-Remediation Monitored Natural Attenuation Results
Kings Plaza Shopping Center
Brooklyn, New York
NYSDEC BCP No. C224263
Langan Project No.: 140080119

Sample Location	LMW-1		LMW-2		MW-1		PEW-1		DUP-1_2018.12.05		MW-33		MW-46	
Sample ID	**LMW-1_2018.12.05**		**LMW-2_2018.12.05**		**MW-1_2018.12.05**		**PEW-1_2018.12.05**				**MW-33_2018.12.07**		**MW-46_2018.12.07**	
Lab Sample ID	**18L0240-01**		**18L0240-02**		**18L0240-03**		**18L0240-04**		**18L0240-05**		**18L0360-01**		**18L0360-02**	
Sampling Date	**12/5/2018**		**12/5/2018**		**12/5/2018**		**12/5/2018**		**12/5/2018**		**12/7/2018**		**12/7/2018**	
Iron (µg/L)	7,550		1,790		9,300		728		685		14,600		4,470	
Manganese (µg/L)	639		310		487		5,120		5,020		2,480		804	
Alkalinity, Total (µg/L)	570,000		670,000		620,000		680,000		690,000		720,000		360,000	
Salinity (µg/L)	0.0000011		0.0000028		0.0000015		0.0000014		0.0000015		0.0000129		0.0000026	
Total Organic Carbon (µg/L)	3,490		7,710		6,930		12,900		13,000		10,000		9,600	
Chloride (µg/L)	569,000	D,E	1,670,000	D,E	865,000	D,E	730,000	D,E	729,000	D,E	9,040,000	D,E	1,650,000	D,E
Nitrate as N (µg/L)	50	U	459		50	U	50	U	50	U	25,000	U,HT-01	25,000	U,HT-01
Sulfate as SO4 (µg/L)	101,000	D,E	204,000	D,E	7,340		149,000	D,E	145,000	D,E	334,000	D,E	333,000	D,E

Notes:

1. µg/L = micrograms per liter
2. Sample DUP-1_2018.12.05 is a duplicate sample of PEW-1_2018.12.05.

Qualifiers:

U =The analyte was analyzed, but was not detected at a level greater than or equal to the level of the Reporting Limit (RL) or the sample concentration for results impacted by blank contamination.

D = Sample required dilution for reported result

E = Result is estimated and cannot be accurately reported due to levels encountered or interferences

HT-01 = This result was reported from an analysis conducted outside of the EPA recommended holding time.

Table 4A
Waste Characterization Samples - Grab Collection
Kings Plaza Shopping Center
Brooklyn, New York
NYSDEC BCP No. C224263
Langan Project No.: 140080119

Sample ID Sampling Date Client Matrix Sample Depth (ft)	6 NYCRR Part 376 Land Disposal Restrictions	40 CFR 268 Universal Treatment Standards	A-1 3/17/2017 13:15 Soil 10		A-2 3/17/2017 13:15 Soil 5		A-3 3/17/2017 13:15 Soil 5		A-4 3/17/2017 13:15 Soil 10		A-5 3/17/2017 13:15 Soil 5		B-1 3/17/2017 12:50 Soil 5		B-2 3/17/2017 12:50 Soil 5		B-3 3/17/2017 12:50 Soil 10		B-4 3/17/2017 12:50 Soil 5		B-5 3/17/2017 12:50 Soil 10	
VOCs (mg/kg)																						
1,2-Dichloroethene (total)	~	~	0.0022		NA		NA		NA		NA		0.2		NA		NA		NA		NA	
2-Butanone	36	LDR	0.0054	J	NA		NA		NA		NA		0.69	U	NA		NA		NA		NA	
Acetone	160	LDR	0.036	J	NA		NA		NA		NA		0.28	J	NA		NA		NA		NA	
Benzene	10	LDR	0.00029	J	NA		NA		NA		NA		0.069	U	NA		NA		NA		NA	
Carbon disulfide	~	~	0.0018	J	NA		NA		NA		NA		0.69	U	NA		NA		NA		NA	
cis-1,2-Dichloroethene	~	~	0.0022		NA		NA		NA		NA		0.2		NA		NA		NA		NA	
Isopropylbenzene	~	~	0.0011	U	NA		NA		NA		NA		0.046	J	NA		NA		NA		NA	
Methyl cyclohexane	~	~	0.0007	J	NA		NA		NA		NA		0.12	J	NA		NA		NA		NA	
p/m-Xylene	Xylenes (Total)	LDR	0.0022	U	NA		NA		NA		NA		0.039	J	NA		NA		NA		NA	
Tetrachloroethene	6	LDR	0.0024		NA		NA		NA		NA		0.037	J	NA		NA		NA		NA	
Toluene	10	LDR	0.0016	U	NA		NA		NA		NA		0.1	U	NA		NA		NA		NA	
trans-1,2-Dichloroethene	30	300	0.0016	U	NA		NA		NA		NA		0.1	U	NA		NA		NA		NA	
Trichloroethene	6	LDR	0.00094	J	NA		NA		NA		NA		0.046	J	NA		NA		NA		NA	
Vinyl Chloride	6	60	0.0022	U	NA		NA		NA		NA		0.14	U	NA		NA		NA		NA	
Xylenes (Total)	30	~	0.0022	U	NA		NA		NA		NA		0.039	J	NA		NA		NA		NA	
NJDEP EPH (mg/kg)																						
Dilution Factor			1		2		2		5		5		5		2		5		1		1	
Total EPH	~	~	301		1,620		1,980		4,290		2,810		2,460		1,160		1,710		28.6		1,010	
C9-C12 Aliphatics	~	~	NA		150		88.6		612		690		123		55.6		125		NA		NA	
C12-C16 Aliphatics	~	~	NA		538		519		1,520		1,150		830		254		390		NA		NA	
C16-C21 Aliphatics	~	~	NA		133		176		484		378		706		245		383		NA		NA	
C21-C40 Aliphatics	~	~	NA		526		891		667		213		160	U	143		161		NA		NA	
C10-C12 Aromatics	~	~	NA		11.3	U	11.4	U	84.8		65.2		32	U	19.6		33.7		NA		NA	
C12-C16 Aromatics	~	~	NA		30.7		31.1		322		127		178		92.3		157		NA		NA	
C16-C21 Aromatics	~	~	NA		89.6		81.5		484		184		618		279		464		NA		NA	
C21-C36 Aromatics	~	~	NA		150		190		115		120	U	128	U	68.3		126	U	NA		NA	

Notes:
1. Grab soil samples are compared to Title 6 New York Codes, Rules, and Regulations (NYCRR) Part 376 Land Disposal Restrictions (LDR) Treatment Standards for Hazardous Wastes for nonwastewaters. Underlying constiuents that are not categorized as F002 listed wastes were compared to 10 times the 40 CFR Part 268 Universal Treatment Standards for non wastewaters.
2. Only detected compounds are presented.
3. Concentrations exceeding Part 376 LDRs are highlighted and in red **BOLD**.
4. VOCs = Volatile organic compounds
5. mg/kg = milligram per kilogram

Qualifiers:
J = Estimated value. The Target analyte concentration is below the quantitation limit (RL), but above the Method Detection Limit (MDL) or Estimated Detection Limit (EDL) for SPME-related analyses. This represents an estimated concentration for Tentatively Identified Compounds (TICs).
U = Compound not detected at or above the reporting limit.
NA = Not analyzed
~ = No regulatory limit exists for this compound under its respective standards list as a non wastewater.

Table 4A
Waste Characterization Samples - Grab Collection
Kings Plaza Shopping Center
Brooklyn, New York
NYSDEC BCP No. C224263
Langan Project No.: 140080119

Sample ID Sampling Date Client Matrix Sample Depth (ft)	6 NYCRR Part 376 Land Disposal Restrictions	40 CFR 268 Universal Treatment Standards	C-1 3/17/2017 12:30 Soil 10		C-2 3/17/2017 12:30 Soil 5		C-3 3/17/2017 12:30 Soil 10		C-4 3/17/2017 12:30 Soil 10		C-5 3/17/2017 12:30 Soil 5		D-1 3/17/2017 13:30 Soil 10		D-2 3/17/2017 13:30 Soil 10		D-3 3/17/2017 13:30 Soil 5		D-4 3/17/2017 13:30 Soil 10		D-5 3/17/2017 13:30 Soil 5	
VOCs (mg/kg)																						
1,2-Dichloroethene (total)	~	~	0.0041		NA		NA		NA		NA		0.0076	J	NA		NA		NA		NA	
2-Butanone	36	LDR	0.02		NA		NA		NA		NA		0.0046	J	NA		NA		NA		NA	
Acetone	160	LDR	0.16		NA		NA		NA		NA		0.021	J	NA		NA		NA		NA	
Benzene	10	LDR	0.001	U	NA		NA		NA		NA		0.0011	U	NA		NA		NA		NA	
Carbon disulfide	~	~	0.0014	J	NA		NA		NA		NA		0.011	U	NA		NA		NA		NA	
cis-1,2-Dichloroethene	~	~	0.0041		NA		NA		NA		NA		0.0072		NA		NA		NA		NA	
Isopropylbenzene	~	~	0.001	U	NA		NA		NA		NA		0.0011	U	NA		NA		NA		NA	
Methyl cyclohexane	~	~	0.0017	J	NA		NA		NA		NA		0.0045	U	NA		NA		NA		NA	
p/m-Xylene	Xylenes (Total)	LDR	0.0021	U	NA		NA		NA		NA		0.0022	U	NA		NA		NA		NA	
Tetrachloroethene	6	LDR	0.0029		NA		NA		NA		NA		0.097		NA		NA		NA		NA	
Toluene	10	LDR	0.00028	J	NA		NA		NA		NA		0.0017	U	NA		NA		NA		NA	
trans-1,2-Dichloroethene	30	300	0.0016	U	NA		NA		NA		NA		0.00038	J	NA		NA		NA		NA	
Trichloroethene	6	LDR	0.00062	J	NA		NA		NA		NA		0.0094		NA		NA		NA		NA	
Vinyl Chloride	6	60	0.0026		NA		NA		NA		NA		0.0023		NA		NA		NA		NA	
Xylenes (Total)	30	~	0.0021	U	NA		NA		NA		NA		0.0022	U	NA		NA		NA		NA	
NJDEP EPH (mg/kg)																						
Dilution Factor			1		1		1		1		1		1		2		1		1		1	
Total EPH	~	~	971		1,130		526		670		211		1,030		1,060		154		90.4		86.8	
C9-C12 Aliphatics	~	~	NA		NA		NA		NA		NA		NA		39.3		NA		NA		NA	
C12-C16 Aliphatics	~	~	NA		NA		NA		NA		NA		NA		283		NA		NA		NA	
C16-C21 Aliphatics	~	~	NA		NA		NA		NA		NA		NA		240		NA		NA		NA	
C21-C40 Aliphatics	~	~	NA		NA		NA		NA		NA		NA		242		NA		NA		NA	
C10-C12 Aromatics	~	~	NA		NA		NA		NA		NA		NA		12	U	NA		NA		NA	
C12-C16 Aromatics	~	~	NA		NA		NA		NA		NA		NA		18.7		NA		NA		NA	
C16-C21 Aromatics	~	~	NA		NA		NA		NA		NA		NA		130		NA		NA		NA	
C21-C36 Aromatics	~	~	NA		NA		NA		NA		NA		NA		104		NA		NA		NA	

Notes:
1. Grab soil samples are compared to Title 6 New York Codes, Rules, and Regulations (NYCRR) Part 376 Land Disposal Restrictions (LDR) Treatment Standards for Hazardous Wastes for nonwastewaters. Underlying constiuents that are not categorized as F002 listed wastes were compared to 10 times the 40 CFR Part 268 Universal Treatment Standards for non wastewaters.
2. Only detected compounds are presented.
3. Concentrations exceeding Part 376 LDRs are highlighted and in red **BOLD**.
4. VOCs = Volatile organic compounds
5. mg/kg = milligram per kilogram

Qualifiers:
J = Estimated value. The Target analyte concentration is below the quantitation limit (RL), but above the Method Detection Limit (MDL) or Estimated Detection Limit (EDL) for SPME-related analyses. This represents an estimated concentration for Tentatively Identified Compounds (TICs).
U = Compound not detected at or above the reporting limit.
NA = Not analyzed
~ = No regulatory limit exists for this compound under its respective standards list as a non wastewater.

Table 4B
Waste Characterization Samples - Composite Collection
Kings Plaza Shopping Center
Brooklyn, New York
NYSDEC BCP No. C224263
Langan Project No.: 140080119

Sample ID Sampling Date Sample Depth (ft)	6 NYCRR Part 376 Land Disposal Restrictions	40 CFR 268 Universal Treatment Standards (10x)	Maximum Concentration of Contaminants for the Toxicity Characteristics	A-COMP 3/17/2017 5-10		B-COMP 3/17/2017 5-10		C-COMP 3/17/2017 5-10		D-COMP 3/17/2017 5-10		E-COMP 3/17/2017 5-10	
VOCs (mg/kg)													
Dilution Factor												4	
Ethylbenzene	33	LDR	~	NA		NA		NA		NA		0.45	
Isopropylbenzene	~	~	~	NA		NA		NA		NA		0.48	
Methyl cyclohexane	~	~	~	NA		NA		NA		NA		1.1	
Tetrachloroethene	6	LDR	~	NA		NA		NA		NA		2.2	
Trichloroethene	6	LDR	~	NA		NA		NA		NA		0.1	J
o-Xylene	Xylenes (Total)	LDR	~	NA		NA		NA		NA		0.45	
p/m-Xylene	Xylenes (Total)	LDR	~	NA		NA		NA		NA		1.3	
Xylenes (Total)	30	~	~	NA		NA		NA		NA		1.8	
TCLP VOCs (mg/L)													
Dilution Factor				10		10		10		10		10	
Tetrachloroethene	~	~	0.7	0.005	U	0.005	U	0.1		0.075		0.0042	J
Trichloroethene	~	~	0.5	0.005	U	0.005	U	0.0052		0.005	U	0.005	U
SVOCs (mg/kg)													
Dilution Factor				1, 4		1		1, 20		1			
2-Methylnaphthalene	~	~	~	1.4		8.5	E	23	D	2.7		NA	
Acenaphthene	3.4	30.4	~	0.24		1.2		2.8		0.27		NA	
Anthracene	3.4	30.4	~	0.17		0.59		1.6		0.14		NA	
Benzo(a)anthracene	3.4	30.4	~	0.19		0.17		0.25		0.098		NA	
Benzo(a)pyrene	3.4	30.4	~	0.17		0.12	J	0.11	J	0.078	J	NA	
Benzo(b)fluoranthene	6.8	60.8	~	0.22		0.17		0.17		0.1		NA	
Benzo(g,h,i)perylene	1.8	10.8	~	0.11	J	0.068	J	0.062	J	0.065	J	NA	
Benzo(k)fluoranthene	6.8	60.8	~	0.066		0.032	J	0.051		0.036	J	NA	
Bis(2-ethylhexyl)phthalate	28	280	~	9.2	D	**40**	E	**93**	D	12	E	NA	
Chrysene	3.4	30.4	~	0.21		0.19		0.28		0.12		NA	
Dibenzo(a,h)anthracene	8.2	80.2	~	0.033	J	0.06	U	0.064	U	0.065	U	NA	
Fluoranthene	3.4	30.4	~	0.53		0.76		1.6		0.27		NA	
Fluorene	3.4	30.4	~	0.28		1.8		0.18	U	0.36		NA	
Indeno(1,2,3-cd)pyrene	3.4	30.4	~	0.11		0.077		0.074	J	0.052	J	NA	
Naphthalene	5.6	50.6	~	0.53		3.5		**6.8**		0.59		NA	
Phenanthrene	5.6	50.6	~	0.89		4.1		**9**	E	0.85		NA	
Pyrene	8.2	80.2	~	0.48		0.98		2.2		0.36		NA	
Pesticides (mg/kg)													
4,4'-DDD	0.087	0.87	~	0.0277		0.0017	U	0.00265	P	0.00079	J	NA	
4,4'-DDE	0.087	0.87	~	0.00374	P	0.0017	U	0.00174	U	0.0011	J	NA	
Aldrin	0.066	0.66	~	0.00171	U	0.0017	U	0.00088	J	0.00171	U	NA	
Endrin	0.13	1.3	~	0.00071	U	0.00071	U	0.00148		0.00071	U	NA	
PCBs (mg/kg)													
Total PCBs	10	100	~	0.0357	U	0.0363	U	0.0368	U	0.0371	U	NA	
Total Metals (mg/kg)													
Dilution Factor				2		2		2		2			
Aluminum	~	~	~	2,700		3,000		2,700		2,800		NA	
Antimony	~	~	~	1.6	J	3.3	J	1.4	J	1.8	J	NA	
Arsenic	~	~	~	3.8		4.4		2.2		2.8		NA	
Barium	~	~	~	82		330		36		74		NA	
Beryllium	~	~	~	0.21	J	0.24	J	0.14	J	0.18	J	NA	
Cadmium	~	~	~	5.7		1.5		3.5		1.6		NA	
Calcium	~	~	~	31,000		8,900		6,400		26,000		NA	
Chromium	~	~	~	7.4		24		8.6		8		NA	
Cobalt	~	~	~	3.2		4.5		2.6		2.7		NA	
Copper	~	~	~	26		1,000		20		21		NA	
Iron	~	~	~	9,100		16,000		7,800		9,600		NA	
Lead	~	~	~	74		220		42		38		NA	
Magnesium	~	~	~	15,000		3,800		1,200		12,000		NA	
Manganese	~	~	~	89		110		83		81		NA	
Mercury	~	~	~	0.15		0.04	J	0.04	J	0.19		NA	
Nickel	~	~	~	13		31		12		11		NA	
Potassium	~	~	~	430		510		420		390		NA	
Selenium	~	~	~	0.32	J	0.36	J	1.8	U	1.8	U	NA	
Silver	~	~	~	0.85	U	0.89	U	0.9	U	0.88	U	NA	
Sodium	~	~	~	480		830		510		440		NA	
Thallium	~	~	~	1.7	U	1.8	U	1.8	U	1.8	U	NA	
Vanadium	~	~	~	17		14		11		15		NA	
Zinc	~	~	~	140		790		62		170		NA	
TCLP Metals (mg/L)													
Arsenic	~	~	5	1	U	1	U	1	U	1	U	NA	
Barium	~	~	100	0.76		0.25	J	0.45	J	0.55		NA	
Cadmium	~	~	1	0.05	J	0.1	U	0.06	J	0.04	J	NA	
Chromium	~	~	5	0.2	U	0.2	U	0.2	U	0.2	U	NA	
Lead	~	~	5	0.34	J	0.051		0.67		0.17	J	NA	
Mercury	~	~	0.2	0.001	U	0.001	U	0.001	U	0.001	U	NA	
Selenium	~	~	1	0.5	U	0.5	U	0.5	U	0.5	U	NA	
Silver	~	~	5	0.1	U	0.1	U	0.1	U	0.1	U	NA	
RCRA Characteristics													
Ignitability	~	~	~	NI		NI		NI		NI		NA	
Cyanide, Total (mg/kg)	590	5,900		1.1	U	1	U	1.1	U	1.1	U	NA	
pH	~	~	~	8.5		8.1		8.6		8.2		NA	
Cyanide, Reactive (mg/kg)	~	~	~	10	U	10	U	10	U	10	U	NA	
Sulfide, Reactive (mg/kg)	~	~	~	10	U	10	U	10	U	10	U	NA	
Paint Filter Test	~	~	~	Negative		Negative		Negative		Negative		NA	

Notes:
1. Composite soil samples are compared to Title 6 New York Codes, Rules, and Regulations (NYCRR) Part 376 Land Disposal Restrictions (LDR) Treatment Standards for Hazardous Wastes for nonwastewaters. Underlying constiuents that are not categorized as F002 listed wastes were compared to 10 times the 40 CFR Part 268 Universal Treatment Standards for non wastewaters.
2. Only detected compounds are presented.
3. Concentrations exceeding Part 376 LDRs are highlighted and in red **BOLD**.
4. VOCs = Volatile organic compounds
5. mg/kg = milligram per kilogram
6. NI = Not ignitable
7. mg/L = milligram per liter

Qualifiers:
D = Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.
E = Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.
J = Estimated value. The Target analyte concentration is below the quantitation limit (RL), but above the Method Detection Limit (MDL) or Estimated Detection Limit (EDL) for SPME-related analyses. This represents an estimated concentration for Tentatively Identified Compounds (TICs).
P = The RPD between the results for the two columns exceeds the method-specified criteria.
U = Compound not detected at or above the reporting limit.
NA = Not analyzed
~ = No regulatory limit exists for this compound under its respective standards list as a non wastewater.

Table 5
Backfill Quantities and Sources
Kings Plaza Shopping Center
Brooklyn, New York
NYSDEC BCP No. C224263
Langan Project No.: 140080119

STONE TRACKING	
Total Load Count	64
Total Import Quantity	1,574.8

Load Counter	Date Loaded	Quarry	Stone Ticket #	Quantity (TN)
1	4/19/2017	Fanwood Crushed Stone	14741	24.25
2	4/19/2017	Fanwood Crushed Stone	14742	23.95
3	4/19/2017	Fanwood Crushed Stone	14759	24.14
4	4/19/2017	Fanwood Crushed Stone	14768	24.26
5	4/19/2017	Fanwood Crushed Stone	14910	22.21
6	4/19/2017	Fanwood Crushed Stone	14913	21.54
7	4/21/2017	Fanwood Crushed Stone	15331	25.21
8	4/21/2017	Fanwood Crushed Stone	15335	23.88
9	4/21/2017	Fanwood Crushed Stone	15336	23.65
10	4/21/2017	Fanwood Crushed Stone	15339	24.16
11	4/21/2017	Fanwood Crushed Stone	15444	24.65
12	4/21/2017	Fanwood Crushed Stone	15479	26.5
13	4/21/2017	Fanwood Crushed Stone	15514	24.79
14	4/21/2017	Fanwood Crushed Stone	15515	24.1
15	4/21/2017	Fanwood Crushed Stone	15537	23.69
16	4/21/2017	Fanwood Crushed Stone	15485	24.28
17	4/21/2017	Fanwood Crushed Stone	15512	26.44
18	4/21/2017	Fanwood Crushed Stone	15547	26.33
19	4/21/2017	Fanwood Crushed Stone	15548	26.22
20	4/21/2017	Fanwood Crushed Stone	15558	25.41
21	4/22/2017	Fanwood Crushed Stone	15581	25.14
22	4/22/2017	Fanwood Crushed Stone	15592	26.51
23	4/22/2017	Fanwood Crushed Stone	15593	23.73
24	4/22/2017	Fanwood Crushed Stone	15595	26.75
25	4/22/2017	Fanwood Crushed Stone	15602	26.02
26	4/26/2017	Fanwood Crushed Stone	16423	24.95
27	4/26/2017	Fanwood Crushed Stone	16424	25.57
28	4/27/2017	Fanwood Crushed Stone	16430	25.17
29	4/27/2017	Fanwood Crushed Stone	16441	24.26
30	4/27/2017	Fanwood Crushed Stone	16442	23.99
31	4/27/2017	Fanwood Crushed Stone	16443	24.27
32	4/27/2017	Fanwood Crushed Stone	16534	25.41
33	4/27/2017	Fanwood Crushed Stone	16541	22.04
34	4/27/2017	Fanwood Crushed Stone	16656	25.78
35	4/27/2017	Fanwood Crushed Stone	16712	24.53
36	4/27/2017	Fanwood Crushed Stone	16713	24.4
37	4/27/2017	Fanwood Crushed Stone	80375	23.77
38	4/27/2017	Fanwood Crushed Stone	80376	23.47
39	4/27/2017	Fanwood Crushed Stone	80377	25.16
40	4/28/2017	Fanwood Crushed Stone	16805	25.65
41	4/28/2017	Fanwood Crushed Stone	16850	24.9
42	4/28/2017	Fanwood Crushed Stone	16852	25.04
43	4/28/2017	Fanwood Crushed Stone	16938	25.95
44	4/28/2017	Fanwood Crushed Stone	16974	24.68
45	4/28/2017	Fanwood Crushed Stone	16975	25.9
46	4/28/2017	Fanwood Crushed Stone	16988	26.34
47	4/28/2017	Fanwood Crushed Stone	16989	25.46
48	4/28/2017	Fanwood Crushed Stone	16722	24.73
49	4/28/2017	Fanwood Crushed Stone	16724	25.15
50	4/28/2017	Fanwood Crushed Stone	16726	24.92
51	4/28/2017	Fanwood Crushed Stone	16727	24.87
52	4/28/2017	Fanwood Crushed Stone	16731	23.87
53	4/29/2017	Fanwood Crushed Stone	17008	25.7
54	4/29/2017	Fanwood Crushed Stone	17009	25.83
55	4/29/2017	Fanwood Crushed Stone	17010	25.84
56	4/29/2017	Fanwood Crushed Stone	17018	25.18
57	4/29/2017	Fanwood Crushed Stone	17029	25.88
58	5/2/2017	Fanwood Crushed Stone	17353	21.1
59	5/2/2017	Fanwood Crushed Stone	17355	24.25
60	5/2/2017	Fanwood Crushed Stone	17356	24.49
61	5/2/2017	Fanwood Crushed Stone	17541	22.99
62	5/2/2017	Fanwood Crushed Stone	17545	24.39
63	6/23/2017	Fanwood Crushed Stone	28398	25.69
64	6/28/2017	Fanwood Crushed Stone	29696	15.42

Table 6
Soils Exceeding Unrestricted SCOs After the Remedial Action
Kings Plaza Shopping Center
Brooklyn, New York
NYSDEC BCP No. C224263
Langan Project No.: 140080119

Sample ID Sampling Date Sampling Depth (feet) Dilution Factor	NYSDEC Part 375 Unrestricted Use SCO	South-SE-Corner 4/21/2017 15 1		South-SW-Corner 4/21/2017 15 1, 100		South-NW-Corner 4/21/2017 15 1, 100		South-NE-Corner 4/21/2017 15 1, 100, 500, 2,000		South-Bottom1 4/21/2017 15 1, 200		DUP-1-4.21.17 (South-Bottom1) 4/21/2017 15 1, 200		South-Bottom2 4/21/2017 15 100, 2,000		North-NW-Corner 4/27/2017 16 1	
Volatile Organic Compounds (mg/kg)																	
1,1-Dichloroethane	0.27	0.0044	U	0.0042	U	0.0052	U	0.0045	U	0.0037	U	0.0039	U	**0.34**	U	0.0025	U
1,1-Dichloroethylene	0.33	0.0044	U	0.0042	U	0.012		0.018		0.042		0.053		**0.34**	U	0.0025	U
1,2,4-Trimethylbenzene	3.6	0.0044	U	0.0042	U	0.0052	U	0.0045	U	0.0037	U	0.0039	U	0.34	U	0.0025	U
1,2-Dichloroethane	0.02	0.0044	U	0.0042	U	0.0052	U	0.0045	U	0.0037	U	0.0039	U	**0.34**	U	0.0025	U
1,3,5-Trimethylbenzene	8.4	0.0044	U	0.0042	U	0.0052	U	0.0045	U	0.0037	U	0.0039	U	0.34	U	0.0025	U
1,4-Dioxane	0.1	0.088	U	0.084	U	0.1	U	0.09	U	0.074	U	0.078	U	**6.8**	U	0.05	U
2-Butanone (MEK)	0.12	0.015		0.02		0.0052	U	0.0045	U	0.0037	U	0.0039	U	**0.34**	U	0.023	
Acetone	0.05	**0.054**	SCAL-E	**0.075**	SCAL-E	**0.093**	SCAL-E	**0.063**	SCAL-E	0.034	SCAL-E	0.047	SCAL-E	**0.68**	U	**0.08**	
Benzene	0.06	0.019		0.039		0.0059	J	0.0045	U	0.021		0.023		**0.34**	U	0.0025	U
Carbon disulfide	~	0.051	CCV-E	0.011	CCV-E	0.026	CCV-E	0.02	CCV-E	0.043	CCV-E	0.057	CCV-E	0.34	U	0.011	
cis-1,2-Dichloroethylene	0.25	**0.82**	E	**2**	D	**18**	D	**52**	D	**55**	D	**50**	D	**36**	D	0.0025	U
Cyclohexane	~	0.0044	U	0.0042	U	0.0052	U	0.0083	J	0.0037	U	0.0039	U	0.34	U	0.0025	U
Ethyl Benzene	1	0.0044	U	0.0042	U	0.0052	U	0.0045	U	0.0037	U	0.0039	U	0.34	U	0.0025	U
Methylene chloride	0.05	0.0088	U	0.0084	U	0.01	U	0.009	U	0.0074	U	0.0078	U	**0.68**	U	0.0062	J
Naphthalene	12	NA		NA		NA		NA		NA		NA		NA		NA	
o-Xylene	~	0.0044	U	0.0042	U	0.0052	U	0.0045	U	0.0037	U	0.0039	U	0.34	U	0.0025	U
p- & m- Xylenes	~	0.0088	U	0.0084	U	0.01	U	0.009	U	0.0074	U	0.0078	U	0.68	U	0.005	U
Tetrachloroethylene	1.3	0.015		0.0042	U	0.0058	J	**300**	D	0.18		0.27		**310**	D	0.0025	U
Toluene	0.7	0.016		0.0042	U	0.0052	U	0.041		0.061		0.07		0.34	U	0.0025	U
trans-1,2-Dichloroethylene	0.19	0.072		**0.22**		**0.99**	D	**1.5**	D	**2**	D	**1.7**	D	**1.1**	D	0.0025	U
Trichloroethylene	0.47	0.018		0.0042	U	0.0052	U	**200**	D	0.057		0.067		**57**	D	0.0025	U
Vinyl Chloride	0.02	**4.3**	E	**0.39**	D, U	**5.4**	D	**0.45**	D, U	**3.2**	D	**0.75**	D, U	**0.34**	U	0.0025	U
Xylenes, Total	0.26	0.013	U	0.013	U	0.016	U	0.014	U	0.011	U	0.012	U	**1**	U	0.0075	U

NOTES:
1. Grab soil sample analytical results are compared to the New York State Department of Environmental Conservation (NYSDEC) title 6 of the official compilation of New York Codes, Rules, and Regulations (NYCRR) Part 375 Unrestricted Use and Commercial Use Soil Cleanup Objectives (SCOs).
2. Only compounds with detections are shown in table.
3. NYSDEC Part 375 Unrestricted Use SCO exceedances are shaded and bolded.
4. mg/kg = milligrams per kilogram
5. ~ = No regulatory limit has been established for this analyte.
6. Methylene chloride was detected in the 4/21/2017 Trip Blank at 1.4 J µg/L.
7. Acetone and chloroform were detected in the 4/28/2017 Trip Blank at 2.3 SCAL-E and 0.21 J µg/L, respectively.

Qualifiers:
CCV-E = The value reported is ESTIMATED. The value is estimated due to its behavior during continuing calibration verification (>20% Difference for average Rf or >20% Drift for quadratic fit).
D = Result is from an analysis that required a dilution
E = The concentration indicated for this analyte is an estimated value above the calibration range of the instrument. This value is considered an estimate.
J = Detected below the Reporting Limit but greater than or equal to the Method Detection Limit (MDL/LOD) or in the case of a TIC, the result is an estimated concentration
SCAL-E = The value reported is ESTIMATED. The value is estimated due to its behavior during initial calibration (average Rf>20%)
U = Analyte not detected at or above the level indicated

Table 7A
Remedial Investigation Soil Vapor Analytical Results Summary
Kings Plaza Shopping Center
Brooklyn, New York
NYSDEC BCP No. C224263
Langan Project No.: 140080119

Sample Location		LSV1	LSV2	LSV3	LSV4		LSV5	LSV6	LSV7	LSV8	AMBIENT	
Client Sample ID		LSV1-20130823	LSV2-20130823	LSV3-20130823	LSV4-20130823	DUP_001	LSV5-20130827	LSV6-20130823	LSV7-20130823	LSV8-20130823	AMBIENT	AMBIENT 2
Lab Sample ID	NYSDOH AGV	H3H270411009	H3H270411004	H3H270411002	H3H270411001	H3H270411007	H3H290419001	H3H270411006	H3H270411005	H3H270411008	H3H270411003	H3H290419002
Sampling Date		8/23/2013	8/23/2013	8/23/2013	8/23/2013	8/23/2013	8/27/2013	8/23/2013	8/23/2013	8/23/2013	8/23/2013	8/27/2013
Dilution Factor		320.25	774.5	10	226.2	224.85	210.05	10	20	10	1	1
Volatile Organic Compounds (µg/m^3)												
1,1,2,2-Tetrachloroethane	~	53 U	130 U	1.6 U	37 U	37 U	35 U	12	3.3 U	1.6 U	0.16 U	0.16 U
1,2,4-Trimethylbenzene	~	39 U	820	11	130 J	320 J	26 U	12	14	11	0.89	0.12 U
1,3,5-Trimethylbenzene	~	41 U	99 U	1.3 U	120 J	320 J	27 U	1.3 U	2.6 U	1.3 U	0.13 U	0.13 U
2,2,4-Trimethylpentane	~	24 U	1,400	16	17 U	17 U	16 U	0.75 U	1.5 U	0.75 U	5.7	0.075 U
2-Butanone (MEK)	~	76 U	180 U	63	53 U	53 U	50 U	18	22	49	1.1	1.9
4-Methyl-2-pentanone (MIBK)	~	24 U	1,400	11	17 U	17 U	15 U	0.74 U	1.5 U	0.74 U	0.074 U	0.074 U
Benzene	~	130	930	19	620	540	15 U	3	1.5 U	5.6	1.9	0.47
Carbon tetrachloride	~	30 U	73 U	0.94 U	21 U	21 U	20 U	0.94 U	1.9 U	0.94 U	0.35	0.32
Chloroform	~	23 U	57 U	19	17 U	16 U	15 U	29	140	74	0.073 U	0.073 U
Chloromethane	~	42 U	100 U	1.3 U	30 U	30 U	28 U	1.3 U	2.6 U	1.3 U	1.1	1.4
cis-1,2-Dichloroethene	~	30 U	330	28	22 U	21 U	20 U	0.95 U	110	17	0.095 U	0.095 U
Cyclohexane	~	1,300	9,500	92	670	580	12 U	0.55 U	1.1 U	0.55 U	2.5	0.055 U
Dichlorodifluoromethane	~	43 U	100 U	1.3 U	30 U	30 U	28 U	1.3 U	2.7 U	1.3 U	2.4	2
Ethanol	~	480 U	1,200 U	310	340 U	340 U	320 U	52	30 U	37	29	6.5
Ethylbenzene	~	38 U	1,400	5.9	670 J	1,300 J	25 U	1.2 U	2.3 U	11	1.3	0.42
Methylene chloride	60	*140* U	*350* U	4.5 U	*100* U	*100* U	*95* U	4.5 U	15	4.5 U	1.7	4.9
m-Xylene & p-Xylene	~	74 U	870	21	3,900 J	8,000 J	48 U	13	15	17	3.9	1.2
n-Hexane	~	810	10,000	100	840	720	9.6 U	12	0.92 U	0.46 U	7.6	0.046 U
o-Xylene	~	33 U	81 U	10	1,100 J	2,400 J	22 U	6.3	7.4	7.6	1.3	0.41
Styrene	~	31 U	76 U	0.98 U	770 J	1900 J	21 U	0.98 U	2 U	0.98 U	0.37	0.098 U
tert-Butyl alcohol	~	15 U	35 U	22	10 U	10 U	9.6 U	0.45 U	0.91 U	18	0.045 U	0.045 U
Tetrachloroethene (PCE)	30	*35* U	*84* U	**510**	**700**	**920**	**17,000**	**280**	**2,100**	**910**	0.71	0.11 U
Toluene	~	25 U	61 U	64	10,000	14,000	17 U	34	35	39	7.9	5
trans-1,2-Dichloroethene	~	25 U	61 U	0.79 U	18 U	18 U	17 U	0.79 U	1.6 U	3.8	0.079 U	0.079 U
Trichloroethene (TCE)	5	*24* U	*58* U	**76**	**100**	**100**	**730**	**26**	**400**	**290**	0.075 U	0.075 U
Trichlorofluoromethane	~	18 U	43 U	19	12 U	12 U	12 U	0.55 U	1.1 U	0.55 U	1.7	1.5
Vinyl chloride	~	320	1,400	14	17 U	17 U	16 U	0.74 U	7.5	23	0.074 U	0.074 U
Total VOC Concentration	~	2,560	28,050	1,410.9	19,620	31,100	17,730	497.3	2,865.9	1,513	71.42	26.02

Notes:
1. Soil vapor samples analytical results are compared to the New York State Department of Health (NYSDOH) Air Guideline Value (AGV).
2. Only compounds with detections are shown in table.
3. NYSDOH AGV exceedances are highlighted and bolded.
4. Reporting Limits (RL) above NYSDOH AGV are italicized.
5. µg/m^3 = micrograms per cubic meter
6. ~ = This indicates that no regulatory limit has been established for this analyte.
7. Sample DUP_001 is a duplicate sample of LSV4-20130823.

Qualifiers:
J = The analyte was positively identified and the associated numerical value is the approximate concentration of the analyte in the sample.
U = The analyte was analyzed, but was not detected at a level greater than or equal to the level of the Reporting Limit (RL) or the sample concentration for results impacted by blank contamination.

Table 7B
Remedial Investigation Vapor and Ambient Air Detection Summary
Kings Plaza Shopping Center
Brooklyn, New York
NYSDEC BCP No. C224263
Langan Project No.: 140080119

Type of Sample Sample Location Client Sample ID Lab Sample ID Sampling Date	NYSDOH AGV	NYSDOH Action Levels		Sub-Slab Vapor SS-1 SS-1-20140327 L1406477-01 3/27/14	Indoor Air IA-1 IA-1-20140327 L1406477-02 3/27/14	Sub-Slab Vapor SS-2 SS-2-20140327 L1406477-03 3/27/14	Indoor Air IA-2 IA-2-201403127 L1406477-04 3/27/14	Sub-Slab Vapor SS-3 SS-3-20140327 L1406477-05 3/27/14	Indoor Air IA-3 IA-3-201403127 L1406477-06 3/27/14	Sub-Slab Vapor SS-4 SS-4-20140327 L1406477-07 3/27/14	Indoor Air IA-4 IA-4-20140327 L1406477-08 3/27/14	Sub-Slab Vapor SS-5 SS-5-20140327 L1406477-09 3/27/14	Sub-Slab Vapor SS-6 SS-6-20140327 L1406477-10 3/27/14	Ambient Air AA-1 AA-1-20140327 L1406477-11 3/27/14
		Sub-Slab Vapor	Indoor Air											
Volatile Organic Compounds (µg/m³)														
1,2,4-Trimethylbenzene	--	--	--	5.11	0.983 U	7.87	0.983 U	5.21	0.983 U	7.33	0.983 U	4.39	2.35	0.983 U
1,2-Dichloroethane	--	--	--	1.64 U	0.809 U	0.809 U	0.809 U	0.809 U	0.809 U	2.7 U	1.01	0.809 U	0.809 U	0.809 U
1,2-Dichloropropane	--	--	--	1.88 U	0.924 U	0.924 U	0.924 U	0.924 U	0.924 U	3.08 U	2.18	0.924 U	0.924 U	0.924 U
1,3,5-Trimethylbenzene	--	--	--	8.26	0.983 U	12	0.983 U	2.58	0.983 U	3.88	0.983 U	1.89	0.983 U	0.983 U
2-Butanone	--	--	--	8.26	0.669	11	0.77	1.99	0.672	53.4	6.55	16	12.8	0.699
2-Hexanone	--	--	--	2.7	0.82 U	1.16	0.82 U	0.82 U	0.82 U	2.73 U	0.82 U	0.82 U	0.82 U	0.82 U
4-Ethyltoluene	--	--	--	2 U	0.983 U	0.983 U	0.983 U	1.03	0.983 U	3.28 U	0.983 U	1.65	0.983 U	0.983 U
4-Methyl-2-pentanone	--	--	--	1.66 U	0.82 U	1.12	0.82 U	0.82 U	0.82 U	20.2	0.82 U	1.19	0.967	0.82 U
Acetone	--	--	--	190	4.06	108	4.44	57	8.69	361	19.9	273	404	2.99
Benzene	--	--	--	1.3 U	0.639 U	0.639 U	0.639 U	0.639 U	0.639 U	11.4	0.639 U	9.2	0.783	0.639 U
Carbon disulfide	--	--	--	1.26 U	0.623 U	11.6	0.623 U	0.8	0.623 U	2.08 U	0.623 U	2.63	0.623 U	0.623 U
Carbon tetrachloride*‡	--	5	--	2.55 U	-	1.26 U	-	1.26 U	-	4.2 U	-	1.26 U	1.26 U	-
Chloroform	--	--	--	3.49	0.977 U	1.38	0.977 U	2.49	0.977 U	25.2	0.977 U	1.65	0.977 U	0.977 U
Chloromethane	--	--	--	0.838 U	1.13	0.413 U	1.01	0.413 U	1.1	1.38 U	1.12	0.413 U	1.03	1.09
cis-1,2-Dichloroethene*	--	--	--	7.3	-	0.805	-	0.793 U	-	7.61	-	0.793 U	0.793 U	-
Cyclohexane	--	--	--	1.4 U	0.688 U	0.688 U	0.688 U	0.688 U	0.688 U	4.51	0.688 U	1.29	1.29	0.688 U
Dichlorodifluoromethane	--	--	--	2.01 U	1.42	1.55	1.32	2.1	1.37	3.3 U	1.95	1.27	1.48	1.27
Ethanol	--	--	--	24.3	12.9	47.3	21.7	12.2	58.8	15.7 U	92.1	97.4	141	4.71 U
Ethyl Acetate	--	--	--	3.64 U	1.8 U	1.8 U	1.8 U	1.8 U	1.8 U	6.02 U	3.86	1.8 U	1.8 U	1.8 U
Ethylbenzene	--	--	--	2.55	0.869 U	1.67	0.869 U	0.869 U	0.869 U	9.08	1.17	2.59	1.79	0.869 U
Heptane	--	--	--	1.81	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U	3.66	1.62	5	2.51	0.82 U
Isopropanol	--	--	--	8.85	7.1	37.9	22.6	32	198	8.11	72.5	34.7	47.2	1.23 U
n-Hexane	--	--	--	1.43 U	0.705 U	0.705 U	0.705 U	0.705 U	0.705 U	3.98	0.705 U	3.84	2.2	0.705 U
o-Xylene	--	--	--	5.04	0.869 U	4.15	0.869 U	5	0.869 U	10.4	0.869 U	3.16	2.26	0.869 U
p/m-Xylene	--	--	--	8.21	1.74 U	6.86	1.74 U	4.6	1.74 U	29.8	1.74 U	7.77	5.21	1.74 U
Styrene	--	--	--	1.73 U	0.852 U	0.852 U	0.852 U	0.852 U	0.852 U	2.84 U	0.852 U	1.37	1.91	0.852 U
Tertiary butyl Alcohol	--	--	--	3.06 U	1.52 U	1.52 U	1.52 U	1.52 U	1.52 U	5.06 U	1.52 U	8.49	2.13	1.52 U
Tetrachloroethene*	30	30	--	**1,230†**	-	**381M**	-	**35.4≠**	-	**2,740†**	-	**59.1≠**	30≠	-
Tetrahydrofuran	--	--	--	1.2 U	0.59 U	6.69	0.59 U	0.59	0.59 U	9.05	0.59 U	12.7	0.59 U	0.59 U
Toluene	--	--	--	124	1.64	10.9	1.38	3.73	1.98	54.3	71.2	43	34.1	0.754 U
Trichloroethene*	5	5	--	**75.8M**	-	**13.6≠**	-	1.11	-	**104M**	-	1.38	1.86	-
Trichlorofluoromethane	--	--	--	2.28 U	1.12 U	1.21	1.17	1.18	1.19	3.75 U	1.12 U	1.13	1.18	1.12 U
Volatile Organic Compounds (µg/m³) SIM														
Carbon tetrachloride‡	--	--	0.25	-	0.453	-	0.465	-	0.459	-	0.453	-	-	0.453
cis-1,2-Dichloroethene	--	--	--	-	0.0793 U	-	0.0793 U	-	0.0793 U	-	0.0793 U	-	-	0.0793 U
Tetrachloroethene	30	--	3	-	0.203	-	0.136 U	-	0.136 U	-	0.359	-	-	0.136 U
Trichloroethene	5	--	0.25	-	0.107 U	-	0.107 U	-	0.107 U	-	0.107 U	-	-	0.107 U

Notes:

Shading indicates exceedance of NSYDOH AGV

Bold indicates exceedance of NYSDOH sub-slab vapor concentrations

Underline indiactes exceedance of NYSDOH target indoor air concentrations

Only compounds with detections are shown in table.

Sample results were compared to criteria listed in the New York State Department of Health (NYSDOH) Guidance for Evaluating Soil Vapor Intrusion in the State of New York, dated October 2006 - the Air Guideline Values (AGV)

µg/m^3 = micrograms per cubic meter

-' = Compound not measured in NYSDOH background study or without corresponding NYSDOH AGV

* = For those compounds not reported in standard analysis, compound is reported by SIM analysis.

≠ = No further action required

ǂ = Correlating indoor air concentration requires taking reasonable and parctical action to identify source(s) of compound of reduce exposure

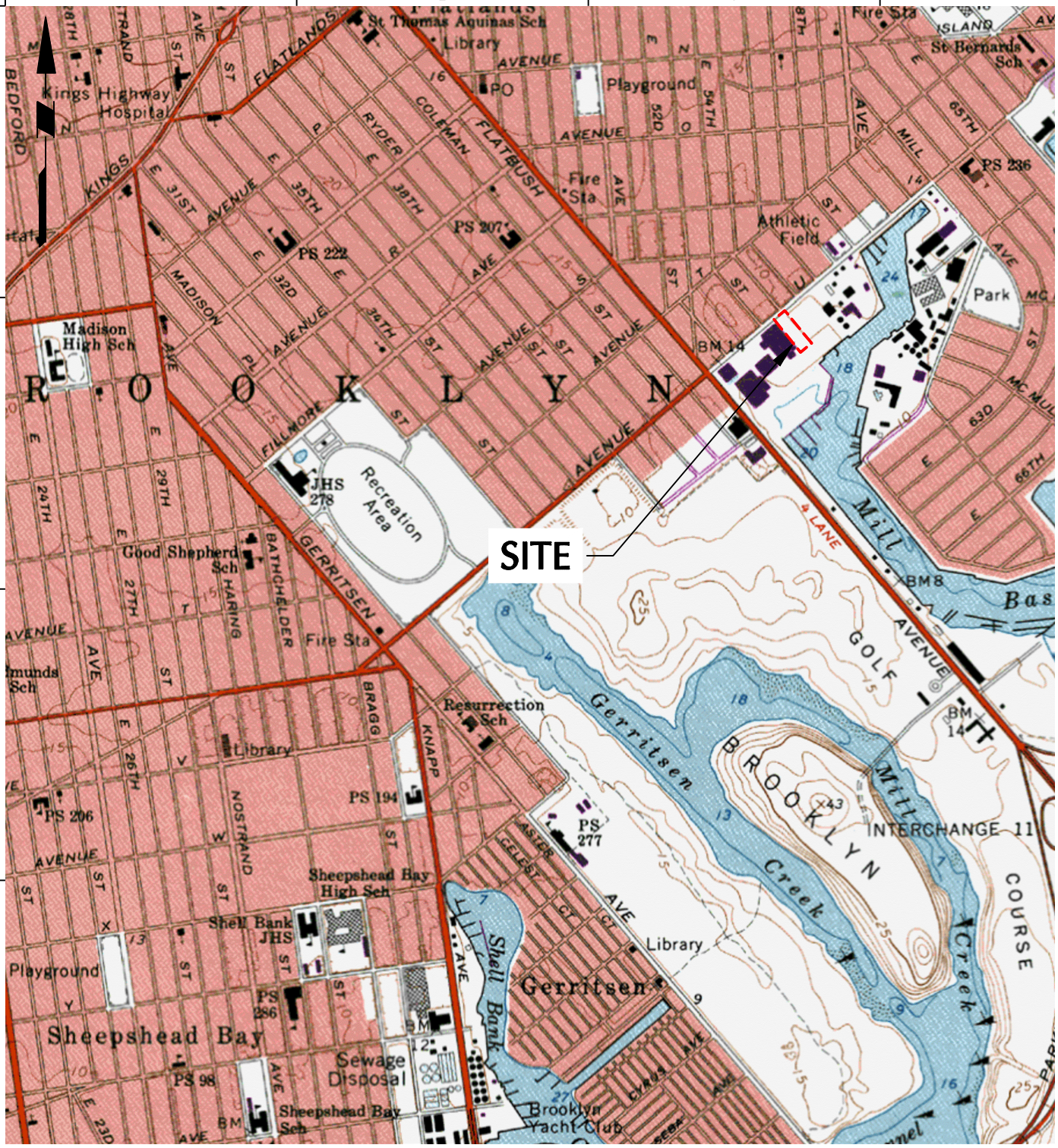
M = Continued monitoring, including sub-slab vapor, basement air, lowest occupied living space air, and outdfoor air sampling, is needed to determine whether concentrations in the sub-slab vapor have changed.

† = Mitigation is needed to minimize the current or potential exposures associated with soil vapor intrusion

Qualifiers:

U = Analyte included in the analysis, but not detected

FIGURES



LEGEND

BCP SITE BOUNDARY

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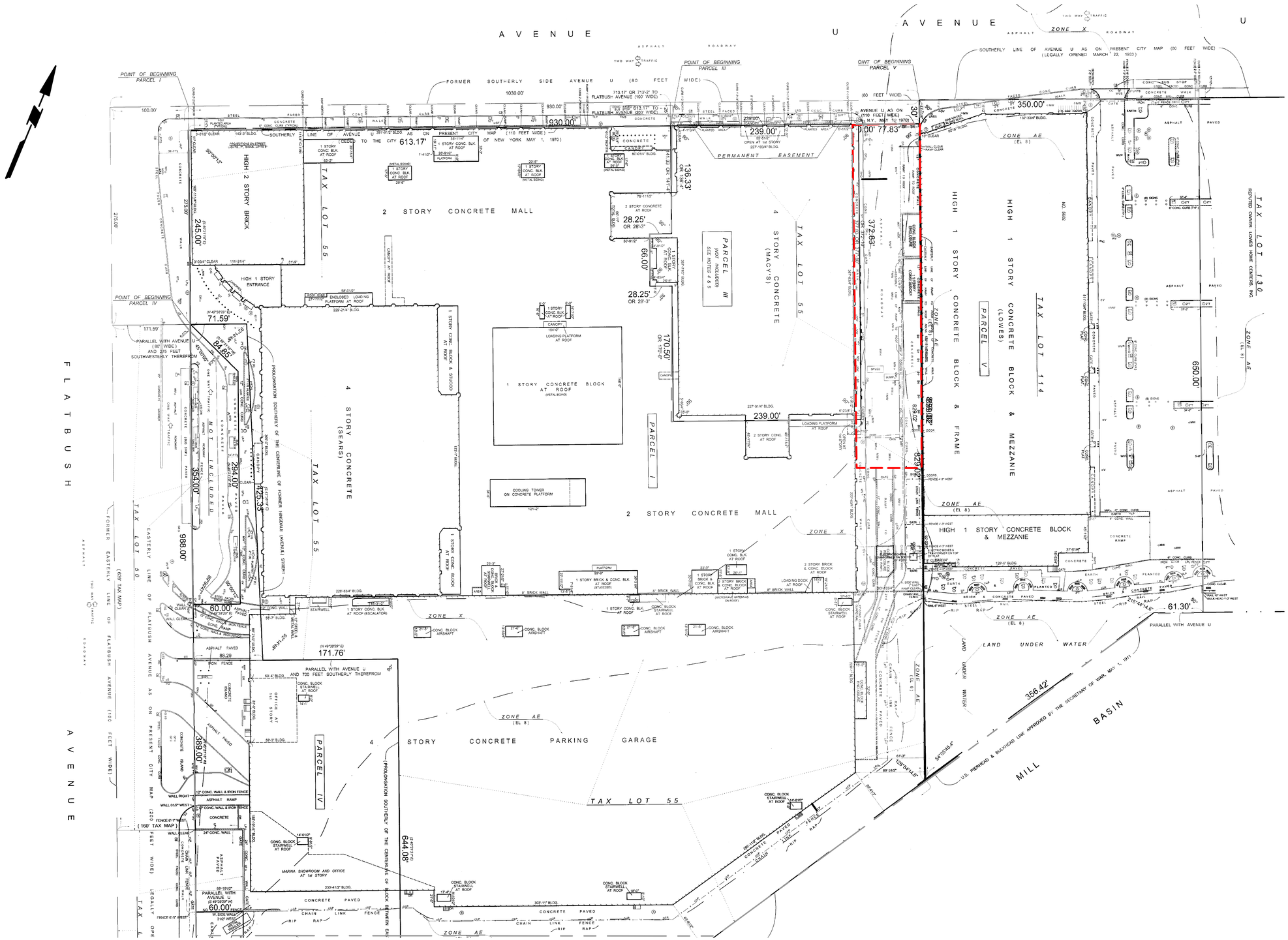
Project	KINGS PLAZA SHOPPING CENTER BROOKLYN NEW YORK
Drawing Title	SITE LOCATION MAP
Project No.	140080119
Date	01/30/2015
Scale	N.T.S.
Drawn By	HHG
Submission Date	DECEMBER 2018
Figure No.	1
Sheet	1 of 10

Filename: \\langan.com\data\NYC\data1\140080101\Cadd Data - 140080101\OU-1-FER\Figure 1 - Site Location Map.dwg Date: 12/17/2018 Time: 15:50 User: hgriesbach Style Table: Langan.stb Layout: FER



GENERAL NOTES

1. BASEMAP INFORMATION FROM ALTA/ASCM LAND TITLE SURVEY BY BARTLETT, LUDLAM & DILL ASSOCIATES DATED 5 MAY 2011.

LEGEND

BCP SITE BOUNDARY

60 0 20 40 60
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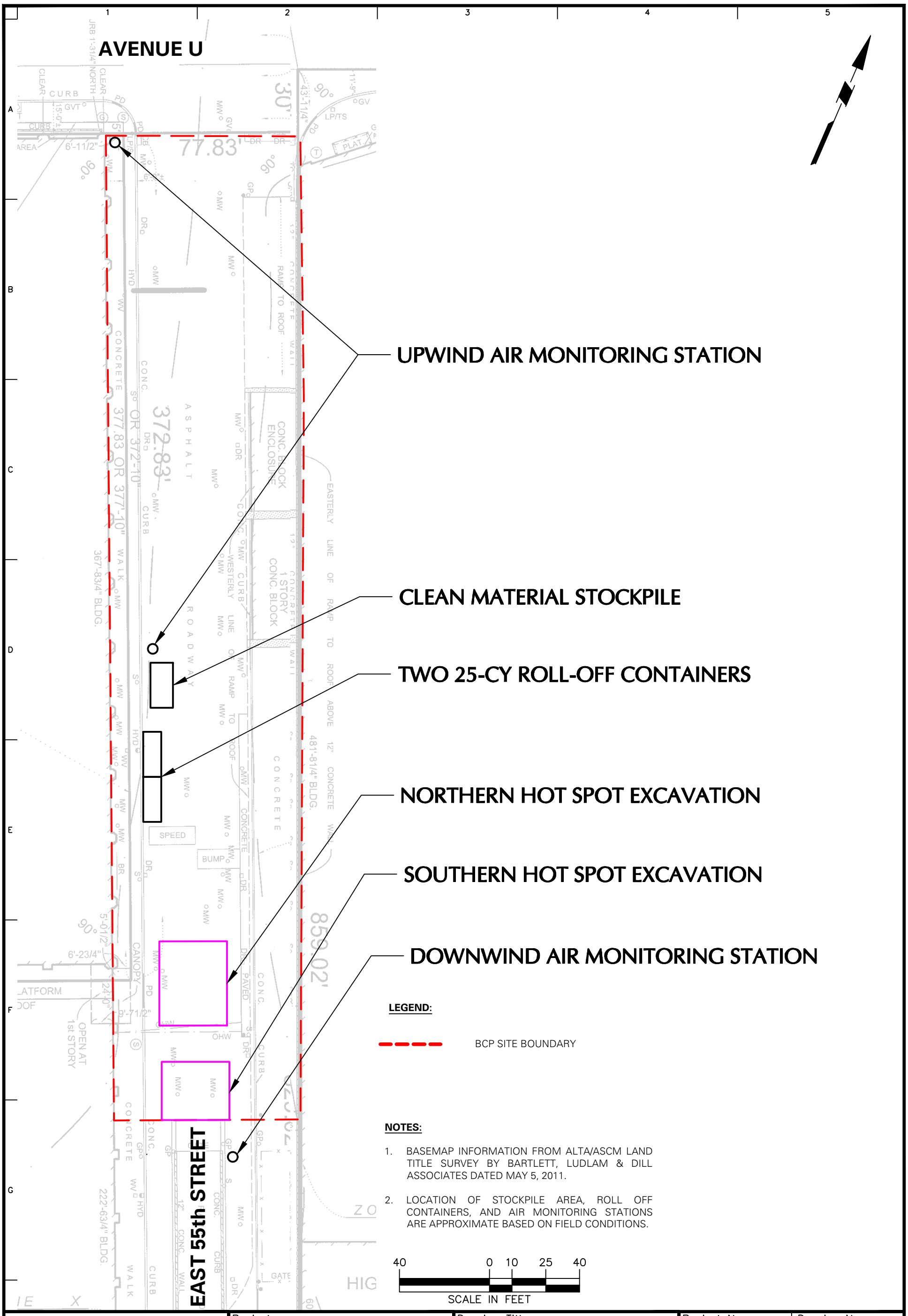
Project	KINGS PLAZA SHOPPING CENTER
	BROOKLYN NEW YORK
Drawing Title	SITE PLAN
Project No.	140080119
Date	01/30/2015
Scale	1"=60'
Drawn By	HHG
Submission Date	DECEMBER 2018
Drawing No.	2
Sheet	2 of 10

Filename: \\Langan.com\data\NH\data1\140080101\Cadd Data - 140080101\2D-DesignFiles\FER\Figure 2 - Site Plan with OUs.dwg Date: 12/21/2018 Time: 17:22 User: hgriesbach Style Table: Convert.stb Layout: FER



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Project
KINGS PLAZA SHOPPING CENTER
BROOKLYN NEW YORK

Drawing Title
STOCKPILE AREAS AND AIR MONITORING STATION LOCATIONS

Project No. 140080119	Drawing No. 3
Date 4/17/2017	
Scale 1"=40'	
Drawn By HHG / Checked By DVG	
Submission Date DECEMBER 2018	Sheet 3 of 10

Filename: \\langan.com\data\NYC\data1\140080101\Cadd Data - 140080101\OU-1-FER\Figure 7 - Stockpile Areas and Air Monitoring Station Locations.dwg Date: 12/17/2018 Time: 15:55 User: hgriesbach Style Table: Langan.stb Layout: ANSIB-BP

AVENUE U

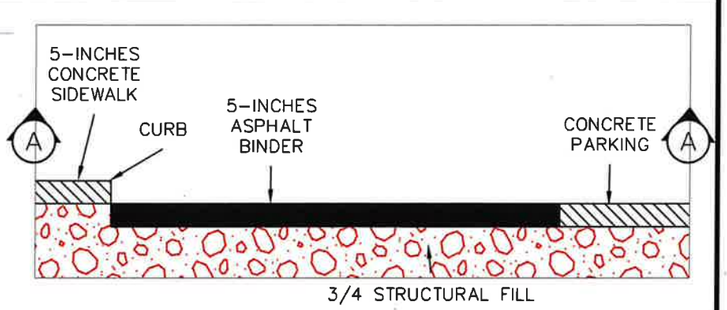
MACY'S BUILDING

EAST 55th STREET

LOWE'S BUILDING

MALL

MALL PARKING GARAGE



LEGEND:

- BCP SITE BOUNDARY
- ASPHALT CAP AREA
- 6-INCH NATURAL GAS PIPE
- ELECTRICAL CONDUIT
- STORM SEWER PIPE
- HOT SPOT EXCAVATION EXTENTS

GENERAL NOTES:

1. BASEMAP INFORMATION FROM ALTA/ASCM LAND TITLE SURVEY BY BARTLETT, LUDLAM & DILL ASSOCIATES DATED MAY 5, 2011.

80 0 40 80

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STATE OF NEW YORK
STEWART HARRIS ABRAMS
27853
STATE LICENSED PROFESSIONAL ENGINEER

SIGNATURE 12/26/18 DATE SIGNED
PROFESSIONAL STEWART H. ABRAMS
STATE LIC. 078833

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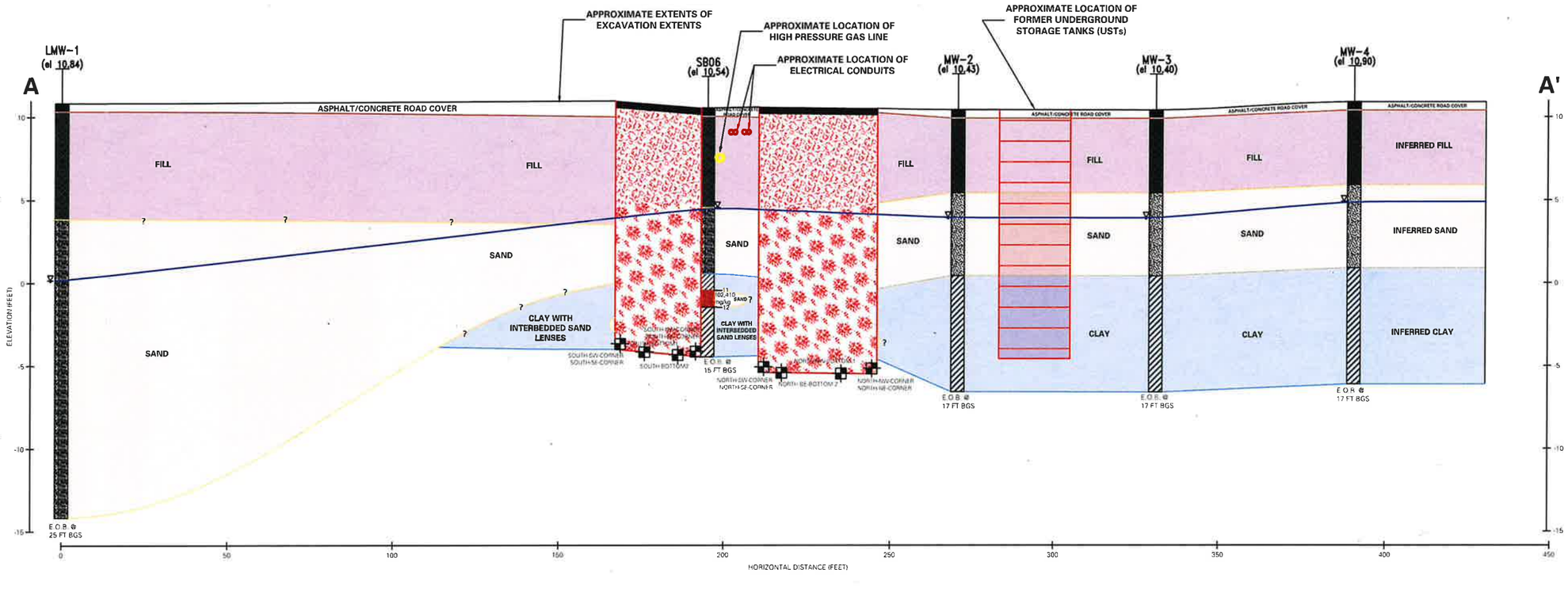
Drawing Title
SITE-WIDE COVER SYSTEM PLAN

Project No. 140080119	Drawing No. 4A
Date 01/30/2015	
Scale 1"=80'	
Drawn By HHG	
Submission Date DECEMBER 2018	Sheet 4A of 10

Filename: \\langan.com\data\NYC\data1\140080101\Cadd Data - 140080101\OU-1-FER\Figure 6A - Site-Wide Cover System Plan_REV.dwg Date: 12/21/2018 Time: 17:31 User: hgriesbach Style Table: Langan.stb Layout: FER



SECTION A - A'

SCALE = AS NOTED

LEGEND:

- # — TOP OF SOIL SAMPLING INTERVAL
- # mg/kg — TOTAL CVOC CONCENTRATION IN SOIL
- # — BOTTOM OF SOIL SAMPLING INTERVAL
- ? — INFERRED CONTACT BETWEEN LITHOLOGIC UNITS

SB01 (el. xx) — Borehole Number (elevation)

Borehole Legend

Water Level Reading at time of drilling.

- APPROXIMATE LOCATION OF FORMER UNDERGROUND STORAGE TANKS (USTs)
- ASPHALT/CONCRETE ROAD COVER
- FILL
- SAND
- CLAY WITH INTERBEDDED SAND LENSES
- CLEAN CRUSHED STONE
- CLEAN ¾-INCH STONE

NOTES:

1. mg/kg = MILLIGRAMS PER KILOGRAM
2. E.O.B. = END OF BORING
3. FT BGS = FEET BELOW GRADE SURFACE
4. cVOC = CHLORINATED VOLATILE ORGANIC COMPOUNDS
5. ELEVATION (EL.) ARE WITH RESPECT TO THE NORTH AMERICAN VERTICAL DATUM of 1988 (NAVD88).

STATE OF NEW YORK * STEWART HARRIS ABRAMS * 081078 * LICENSED PROFESSIONAL ENGINEER

SIGNATURE 12/24/18 DATE SIGNED

PROFESSIONAL STEWART H. ABRAMS

STATE LIC. NO. 081078

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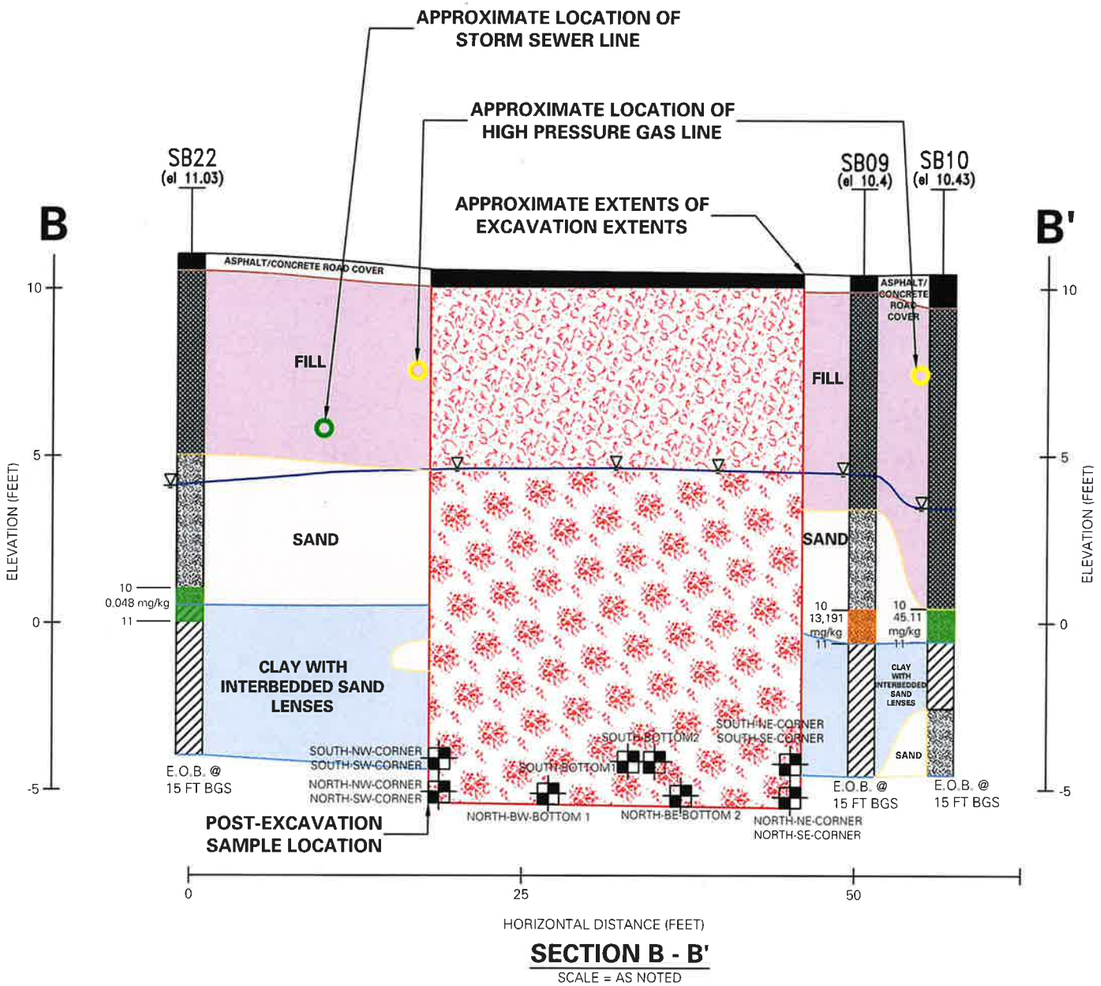
Project: KINGS PLAZA SHOPPING CENTER — BROOKLYN NEW YORK

Drawing Title: DETAIL FOR SITE-WIDE COVER SYSTEM - CROSS SECTION A-A'

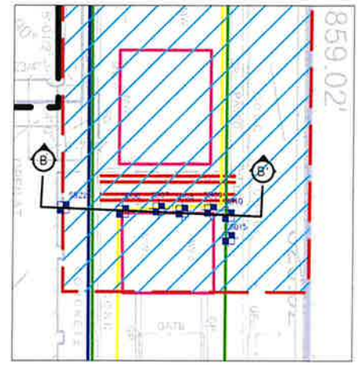
Project No. 140080119	Drawing No. 4B
Date 01/30/2015	
Scale AS NOTED	
Drawn By HHG	
Submission Date DECEMBER 2018	Sheet 4B of 10

Filename: \\langan.com\data\NYC\data1\140080101\Cadd Data - 140080101\OU-1-FER\Figure 6B-C - Detail for Site-Wide Cover System - Cross Sections.dwg Date: 12/21/2018 Time: 17:39 User: hgriesbach Style Table: Langan.stb Layout: A-A' FER



SECTION B - B'
SCALE = AS NOTED

KEY PLAN:



SCALE
1" = 50'

SB01 (el. xx) — Borehole Number (elevation)

Borehole Legend

Water Level Reading at time of drilling.

LEGEND:

- # — TOP OF SOIL SAMPLING INTERVAL
- # mg/kg — TOTAL CVOC CONCENTRATION IN SOIL
- # — BOTTOM OF SOIL SAMPLING INTERVAL
- ? — INFERRED CONTACT BETWEEN LITHOLOGIC UNITS
- ASPHALT/CONCRETE ROAD COVER
- FILL
- SAND
- CLAY WITH INTERBEDDED SAND LENSES
- CLEAN CRUSHED STONE
- CLEAN $\frac{3}{4}$-INCH STONE

GENERAL NOTES:

1. mg/kg = MILLIGRAMS PER KILOGRAM
2. E.O.B. = END OF BORING
3. FT BGS = FEET BELOW GRADE SURFACE
4. cVOC = CHLORINATED VOLATILE ORGANIC COMPOUNDS
5. ELEVATION (EL.) IS WITH RESPECT TO THE NORTH AMERICAN VERTICAL DATUM of 1988 (NAVD88).

STATE OF NEW YORK * STEWART HARRIS ABRAMS * 028833 * LICENSED PROFESSIONAL ENGINEER

SIGNATURE DATE SIGNED 12/26/18
PROFESSIONAL STEWART H. ABRAMS
STATE LIC. No. 028833

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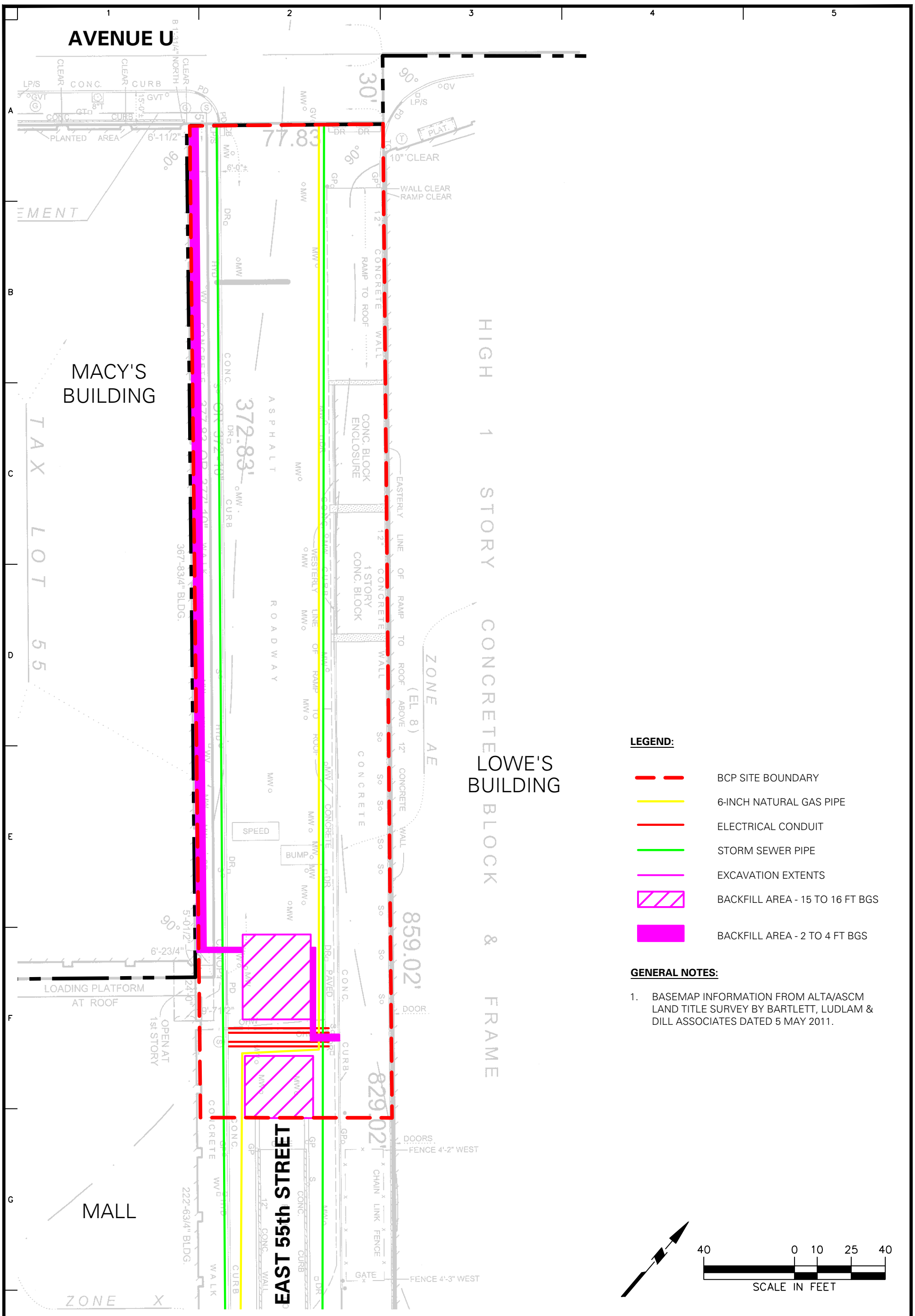
KINGS PLAZA SHOPPING CENTER
BROOKLYN NEW YORK

Drawing Title
DETAIL FOR SITE-WIDE COVER SYSTEM - CROSS SECTION B-B'

Project No. 140080119	Drawing No. 4C
Date 01/30/2015	
Scale AS NOTED	
Drawn By HHG	
Submission Date DECEMBER 2018	Sheet 4C of 10

Filename: \\langan.com\data\NYC\data1\140080101\Cadd Data - 140080101\OU-1-FER\Figure 6B-C - Detail for Site-Wide Cover System - Cross Sections.dwg Date: 12/21/2018 Time: 17:39 User: hgriesbach Style Table: Langan.stb Layout: B-B' FER



LEGEND:

- BCP SITE BOUNDARY
- 6-INCH NATURAL GAS PIPE
- ELECTRICAL CONDUIT
- STORM SEWER PIPE
- EXCAVATION EXTENTS
- BACKFILL AREA - 15 TO 16 FT BGS
- BACKFILL AREA - 2 TO 4 FT BGS

GENERAL NOTES:

1. BASEMAP INFORMATION FROM ALTA/ASCM LAND TITLE SURVEY BY BARTLETT, LUDLAM & DILL ASSOCIATES DATED 5 MAY 2011.

40 0 10 25 40
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BROOKLYN NEW YORK

Drawing Title
EXCAVATION AND BACKFILL AREAS

Project No.	Drawing No.
140080119	5
Date: 5/16/2017	
Scale: 1"=40'	
Drawn By: HHG	
Submission Date: DECEMBER 2018	Sheet 5 of 10

Filename: \\langan.com\data\NHV\data1\140080104\Cadd Data - 140080104\SheetFiles\FER\Figure 3 - Excavation and Backfill Areas.dwg Date: 12/21/2018 Time: 17:28 User: hgriesbach Style Table: Langan.stb Layout: ANSIB-BP

Sample ID Sampling Date Sampling Depth (feet)	North-NW-Corner 4/27/2017 16
VOCs (mg/kg)	
2-Butanone (MEK)	0.023
Acetone	**0.08**
Carbon disulfide	0.011
Methylene chloride	0.0062

Sample ID Sampling Date Sampling Depth (feet)	North-BW-Bottom 1 4/28/2017 16
VOCs (mg/kg)	
2-Butanone (MEK)	0.0088
Acetone	0.036
Carbon disulfide	0.031

Sample ID Sampling Date Sampling Depth (feet)	North-NE-Corner-MS/MSD 4/27/2017 16
VOCs (mg/kg)	
2-Butanone (MEK)	0.0071
Acetone	0.033
Carbon disulfide	0.023

Sample ID Sampling Date Sampling Depth (feet)	North-SW-Corner 4/28/2017 16
VOCs (mg/kg)	
1,2,4-Trimethylbenzene	0.018
1,3,5-Trimethylbenzene	0.0077
Acetone	0.027
Benzene	0.0037
Carbon disulfide	0.013
Ethyl Benzene	0.013
Naphthalene	1.1
o-Xylene	0.015
p- & m- Xylenes	0.025
Toluene	0.012
Xylenes, Total	0.04

Sample ID Sampling Date Sampling Depth (feet)	North-BE-Bottom 2 4/28/2017 16
VOCs (mg/kg)	
Acetone	0.023
Carbon disulfide	0.013

Sample ID Sampling Date Sampling Depth (feet)	North-SE-Corner 4/28/2017 16
VOCs (mg/kg)	
Acetone	0.03
Carbon disulfide	0.025

Sample Location Sampling Date Sampling Depth (feet)	South-NW-Corner 4/21/2017 15
VOCs (mg/kg)	
1,1-Dichloroethylene	0.012
Acetone	**0.093**
Benzene	0.0059
Carbon disulfide	0.026
cis-1,2-Dichloroethylene	**18**
Tetrachloroethylene	0.0058
trans-1,2-Dichloroethylene	**0.99**
Vinyl Chloride	**5.4**

Sample Location Sampling Date Sampling Depth (feet)	South-NE-Corner 4/21/2017 15
VOCs (mg/kg)	
1,1-Dichloroethylene	0.018
Acetone	**0.063**
Carbon disulfide	0.02
cis-1,2-Dichloroethylene	**52**
Cyclohexane	0.0083
Tetrachloroethylene	**300**
Toluene	0.041
trans-1,2-Dichloroethylene	**1.5**
Trichloroethylene	**200**

Sample ID Sampling Date Sampling Depth (feet)	South-Bottom1 4/21/2017 15	DUP-1-4.21.17 (South-Bottom1) 4/21/2017 15
VOCs (mg/kg)		
1,1-Dichloroethylene	0.042	0.053
Acetone	0.034	0.047
Benzene	0.021	0.023
Carbon disulfide	0.043	0.057
cis-1,2-Dichloroethylene	**55**	**50**
Tetrachloroethylene	0.18	0.27
Toluene	0.061	0.07
trans-1,2-Dichloroethylene	**2**	**1.7**
Trichloroethylene	0.057	0.067
Vinyl Chloride	**3.2**	ND

Sample ID Sampling Date Sampling Depth (feet)	South-Bottom2 4/21/2017 15
VOCs (mg/kg)	
cis-1,2-Dichloroethylene	**36**
Tetrachloroethylene	**310**
trans-1,2-Dichloroethylene	**1.1**
Trichloroethylene	**57**

Sample Location Sampling Date Sampling Depth (feet)	South-SW-Corner 4/21/2017 15
VOCs (mg/kg)	
2-Butanone (MEK)	0.02
Acetone	**0.075**
Benzene	0.039
Carbon disulfide	0.011
cis-1,2-Dichloroethylene	**2**
trans-1,2-Dichloroethylene	**0.22**

Sample ID Sampling Date Sampling Depth (feet)	South-SE-Corner 4/21/2017 15
VOCs (mg/kg)	
2-Butanone (MEK)	0.015
Acetone	**0.054**
Benzene	0.019
Carbon disulfide	0.051
cis-1,2-Dichloroethylene	**0.82**
Tetrachloroethylene	0.015
Toluene	0.016
trans-1,2-Dichloroethylene	0.072
Trichloroethylene	0.018
Vinyl Chloride	**4.3**

North–NW–Corner
North–NE–Corner
North–BW–Bottom 1
North–BE–Bottom 2
North–SW–Corner
North–SE–Corner
South–NW–Corner
South–NE–Corner
South–Bottom2
South–Bottom1
South–SW–Corner
South–SE–Corner

LEGEND:

EFR–2 — 2017 POST-EXCAVATION SAMPLES

BCP SITE BOUNDARY

6-INCH NATURAL GAS PIPE

ELECTRICAL CONDUIT

STORM SEWER PIPE

HOT SPOT EXCAVATION EXTENTS

GENERAL NOTES:

1. BASEMAP INFORMATION FROM ALTA/ASCM LAND TITLE SURVEY BY BARTLETT, LUDLAM & DILL ASSOCIATES DATED MAY 5, 2011.
2. CONCENTRATIONS EXCEEDING NYSDEC PART 375 UNRESTRICTED USE SCO ARE SHADED AND IN RED **BOLD**.
3. CONCENTRATIONS EXCEEDING NYSDEC PART 375 RESTRICTED USE COMMERCIAL SCO ARE IN SHADED, RED **BOLD**, AND IN A RED BOX.
4. ONLY COMPOUNDS WITH ESTABLISHED CRITERIA ARE SHOWN IN THE CRITERIA TABLE.
5. SCO = SOIL CLEANUP OBJECTIVES
6. VOCs = VOLATILE ORGANIC COMPOUNDS
7. MG/KG = MILLIGRAM PER KILOGRAM
8. ND = NOT DETECTED

Compound	NYSDEC Part 375 Unrestricted Use SCO	NYSDEC Part 375 Restricted Use Commercial SCO
VOCs (mg/kg)		
1,1-Dichloroethane	0.27	240
1,1-Dichloroethylene	0.33	500
1,2,4-Trimethylbenzene	3.6	190
1,2-Dichloroethane	0.02	30
1,3,5-Trimethylbenzene	8.4	190
1,4-Dioxane	0.1	130
2-Butanone (MEK)	0.12	500
Acetone	0.05	500
Benzene	0.06	44
Carbon disulfide	~	~
cis-1,2-Dichloroethylene	0.25	500
Cyclohexane	~	~
Ethyl Benzene	1	390
Methylene chloride	0.05	500
Naphthalene	12	500
o-Xylene	~	~
p- & m- Xylenes	~	~
Tetrachloroethylene	1.3	150
Toluene	0.7	500
trans-1,2-Dichloroethylene	0.19	500
Trichloroethylene	0.47	200
Vinyl Chloride	0.02	13
Xylenes, Total	0.26	500

10 0 2 4 6 8 10
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Project: KINGS PLAZA SHOPPING CENTER
BROOKLYN NEW YORK

Drawing Title: EXCEEDANCES OF SCOs POST-REMEDIATION

Project No. 140080119
Date 7/21/2017
Scale 1"=10'
Drawn By HHG | Checked By DVG
Submission Date DECEMBER 2018

Drawing No. 6
Sheet 6 of 10

SUBMISSION DATE: DECEMBER 2018
PROJECT NO. 140080119

Filename: \\langan.com\data\NHV\data1\140080104\Cadd Data - 140080104\SheetFiles\FER\Figure 4 - Exceedances of Unrestricted SCOs Post-Remediation.dwg Date: 12/17/2018 Time: 15:58 User: hgriesbach Style Table: Langan.stb Layout: FER

LOCATION	QUANTITY (Gal)	DATE
DPT-7	137	6/28/2017

LOCATION	QUANTITY (Gal)	DATE
DPT-4	137	6/27/2017

LOCATION	QUANTITY (Gal)	DATE
DPT-8	137	6/28/2017

LOCATION	QUANTITY (Gal)	DATE
DPT-5	137	6/27/2017

LOCATION	QUANTITY (Gal)	DATE
DPT-1	135	6/26/2017

LOCATION	QUANTITY (Gal)	DATE
DPT-2	120	6/26/2017

LOCATION	QUANTITY (Gal)	DATE
DPT-6	137	6/27/2017

LOCATION	QUANTITY (Gal)	DATE
DPT-3	137	6/27/2017

LOCATION	QUANTITY (lb)	DATE
ADS-3	85	6/29/2017

LOCATION	QUANTITY (lb)	DATE
ADS-6	85	6/29/2017

LOCATION	QUANTITY (lb)	DATE
ADS-11	85	6/30/2017

LOCATION	QUANTITY (lb)	DATE
ADS-8	85	6/30/2017

LOCATION	QUANTITY (lb)	DATE
ADS-1	55	6/28/2017

LOCATION	QUANTITY (lb)	DATE
ADS-5	85	6/29/2017

LOCATION	QUANTITY (lb)	DATE
ADS-9	110	6/30/2017

LOCATION	QUANTITY (lb)	DATE
ADS-2	110	6/29/2017

LOCATION	QUANTITY (lb)	DATE
ADS-4	85	6/29/2017

LOCATION	QUANTITY (lb)	DATE
ADS-7	85	6/29/2017

LOCATION	QUANTITY (lb)	DATE
ADS-10	85	6/30/2017

LEGEND:

- PIEZOMETER
- NaMnO4 INJECTION POINTS
- KMnO4 SLURRY INJECTION POINTS
- BCP SITE BOUNDARY
- 6-INCH NATURAL GAS PIPE
- ELECTRICAL CONDUIT
- STORM SEWER PIPE
- HOT SPOT EXCAVATION EXTENTS

GENERAL NOTES:

1. BASEMAP INFORMATION FROM ALTA/ASCM LAND TITLE SURVEY BY BARTLETT, LUDLAM & DILL ASSOCIATES DATED MAY 5, 2011.

10 0 2 4 10
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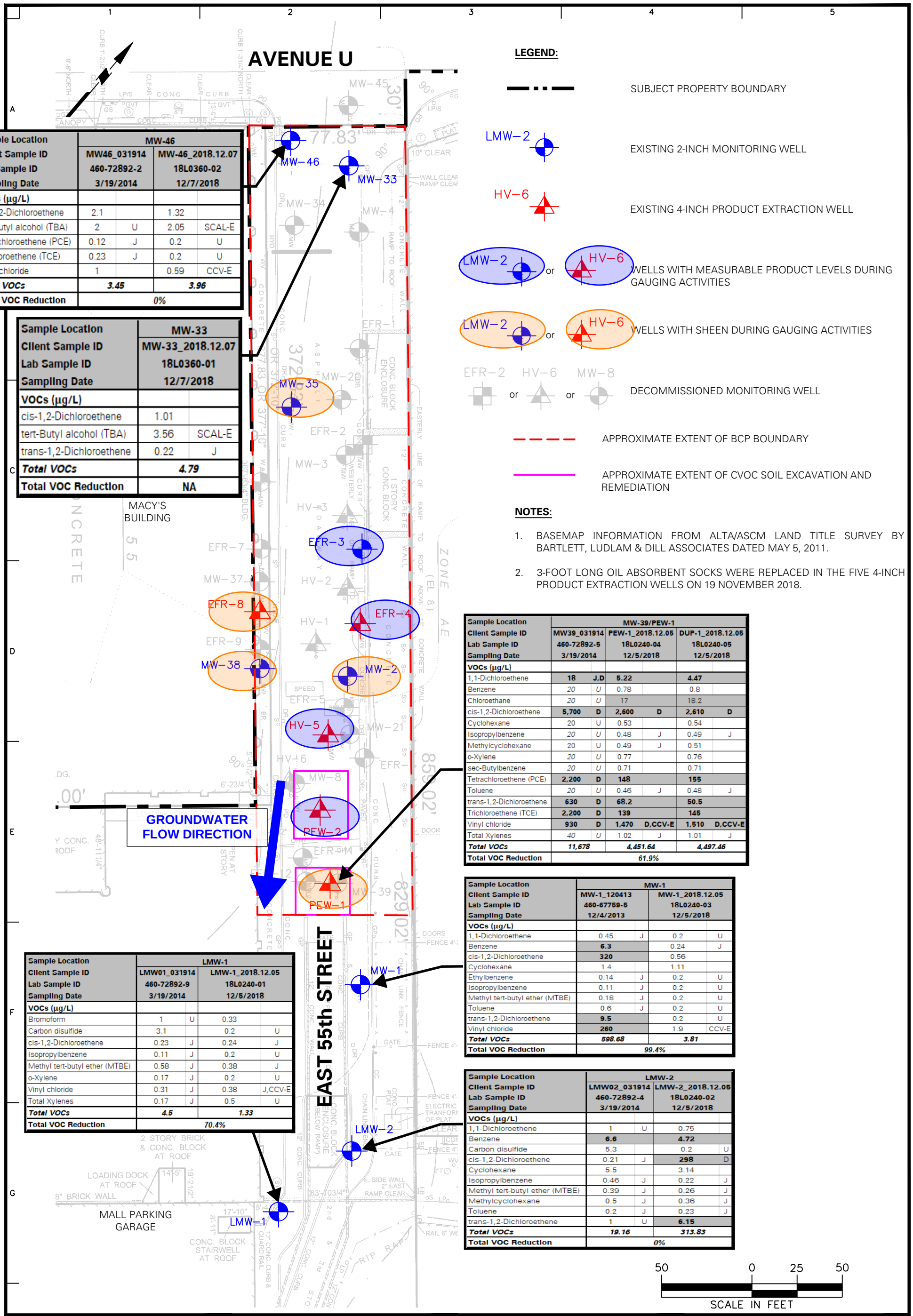
Langan International LLC
Collectively known as Langan

Project
KINGS PLAZA SHOPPING CENTER
BROOKLYN NEW YORK

Drawing Title
POST-EXCAVATION ISCO INJECTION LOCATION PLAN

Project No. 140080119	Drawing No. 7
Date 7/21/2017	
Scale 1"=10'	
Drawn By HHG / Checked By DVG	
Submission Date DECEMBER 2018	Sheet 7 of 10

Filename: \\langan.com\data\NHV\data1\140080104\Cadd Data - 140080104\SheetFiles\FER\Figure 5 - Post-Excavation ISCO Injection Location Plan.dwg Date: 12/17/2018 Time: 15:59 User: hgriesbach Style Table: Langan.stb Layout: ISCO Injection Locations



LEGEND:

- SUBJECT PROPERTY BOUNDARY
- LMW–2 — EXISTING 2-INCH MONITORING WELL
- HV–6 — EXISTING 4-INCH PRODUCT EXTRACTION WELL
- LMW–2 or HV–6 — WELLS WITH MEASURABLE PRODUCT LEVELS DURING GAUGING ACTIVITIES
- LMW–2 or HV–6 — WELLS WITH SHEEN DURING GAUGING ACTIVITIES
- EFR–2 HV–6 MW–8 (or or) — DECOMMISSIONED MONITORING WELL
- APPROXIMATE EXTENT OF BCP BOUNDARY
- APPROXIMATE EXTENT OF CVOC SOIL EXCAVATION AND REMEDIATION

NOTES:

1. BASEMAP INFORMATION FROM ALTA/ASCM LAND TITLE SURVEY BY BARTLETT, LUDLAM & DILL ASSOCIATES DATED MAY 5, 2011.
2. 3-FOOT LONG OIL ABSORBENT SOCKS WERE REPLACED IN THE FIVE 4-INCH PRODUCT EXTRACTION WELLS ON 19 NOVEMBER 2018.

Sample Location	MW-46			
Client Sample ID	MW46_031914		MW-46_2018.12.07	
Lab Sample ID	460-72892-2		18L0360-02	
Sampling Date	3/19/2014		12/7/2018	
VOCs (µg/L)				
cis-1,2-Dichloroethene	2.1		1.32	
tert-Butyl alcohol (TBA)	2	U	2.05	SCAL-E
Tetrachloroethene (PCE)	0.12	J	0.2	U
Trichloroethene (TCE)	0.23	J	0.2	U
Vinyl chloride	1		0.59	CCV-E
Total VOCs	***3.45***		***3.96***	
Total VOC Reduction	***0%***			

Sample Location	MW-33	
Client Sample ID	MW-33_2018.12.07	
Lab Sample ID	18L0360-01	
Sampling Date	12/7/2018	
VOCs (µg/L)		
cis-1,2-Dichloroethene	1.01	
tert-Butyl alcohol (TBA)	3.56	SCAL-E
trans-1,2-Dichloroethene	0.22	J
Total VOCs	***4.79***	
Total VOC Reduction	**NA**	

Sample Location	MW-39/PEW-1					
Client Sample ID	MW39_031914		PEW-1_2018.12.05		DUP-1_2018.12.05	
Lab Sample ID	460-72892-5		18L0240-04		18L0240-05	
Sampling Date	3/19/2014		12/5/2018		12/5/2018	
VOCs (µg/L)						
1,1-Dichloroethene	**18**	**J,D**	**5.22**		**4.47**	
Benzene	*20*	*U*	0.78		0.8	
Chloroethane	*20*	*U*	17		18.2	
cis-1,2-Dichloroethene	**5,700**	**D**	**2,600**	**D**	**2,610**	**D**
Cyclohexane	20	U	0.53		0.54	
Isopropylbenzene	*20*	*U*	0.48	J	0.49	J
Methylcyclohexane	20	U	0.49	J	0.51	
o-Xylene	*20*	*U*	0.77		0.76	
sec-Butylbenzene	*20*	*U*	0.71		0.71	
Tetrachloroethene (PCE)	**2,200**	**D**	**148**		**155**	
Toluene	*20*	*U*	0.46	J	0.48	J
trans-1,2-Dichloroethene	**630**	**D**	**68.2**		**50.5**	
Trichloroethene (TCE)	**2,200**	**D**	**139**		**145**	
Vinyl chloride	**930**	**D**	**1,470**	**D,CCV-E**	**1,510**	**D,CCV-E**
Total Xylenes	*40*	*U*	1.02	J	1.01	J
Total VOCs	***11,678***		***4,451.64***		***4,497.46***	
Total VOC Reduction	***61.9%***					

Sample Location	MW-1			
Client Sample ID	MW-1_120413		MW-1_2018.12.05	
Lab Sample ID	460-67759-5		18L0240-03	
Sampling Date	12/4/2013		12/5/2018	
VOCs (µg/L)				
1,1-Dichloroethene	0.45	J	0.2	U
Benzene	**6.3**		0.24	J
cis-1,2-Dichloroethene	**320**		0.56	
Cyclohexane	1.4		1.11	
Ethylbenzene	0.14	J	0.2	U
Isopropylbenzene	0.11	J	0.2	U
Methyl tert-butyl ether (MTBE)	0.18	J	0.2	U
Toluene	0.6	J	0.2	U
trans-1,2-Dichloroethene	**9.5**		0.2	U
Vinyl chloride	**260**		1.9	CCV-E
Total VOCs	***598.68***		***3.81***	
Total VOC Reduction	***99.4%***			

Sample Location	LMW-1			
Client Sample ID	LMW01_031914		LMW-1_2018.12.05	
Lab Sample ID	460-72892-9		18L0240-01	
Sampling Date	3/19/2014		12/5/2018	
VOCs (µg/L)				
Bromoform	1	U	0.33	
Carbon disulfide	3.1		0.2	U
cis-1,2-Dichloroethene	0.23	J	0.24	J
Isopropylbenzene	0.11	J	0.2	U
Methyl tert-butyl ether (MTBE)	0.58	J	0.38	J
o-Xylene	0.17	J	0.2	U
Vinyl chloride	0.31	J	0.38	J,CCV-E
Total Xylenes	0.17	J	0.5	U
Total VOCs	***4.5***		***1.33***	
Total VOC Reduction	***70.4%***			

Sample Location	LMW-2			
Client Sample ID	LMW02_031914		LMW-2_2018.12.05	
Lab Sample ID	460-72892-4		18L0240-02	
Sampling Date	3/19/2014		12/5/2018	
VOCs (µg/L)				
1,1-Dichloroethene	1	U	0.75	
Benzene	**6.6**		**4.72**	
Carbon disulfide	5.3		0.2	U
cis-1,2-Dichloroethene	0.21	J	**298**	D
Cyclohexane	5.5		3.14	
Isopropylbenzene	0.46	J	0.22	J
Methyl tert-butyl ether (MTBE)	0.39	J	0.26	J
Methylcyclohexane	0.5	J	0.36	J
Toluene	0.2	J	0.23	J
trans-1,2-Dichloroethene	1	U	**6.15**	
Total VOCs	***19.16***		***313.83***	
Total VOC Reduction	***0%***			

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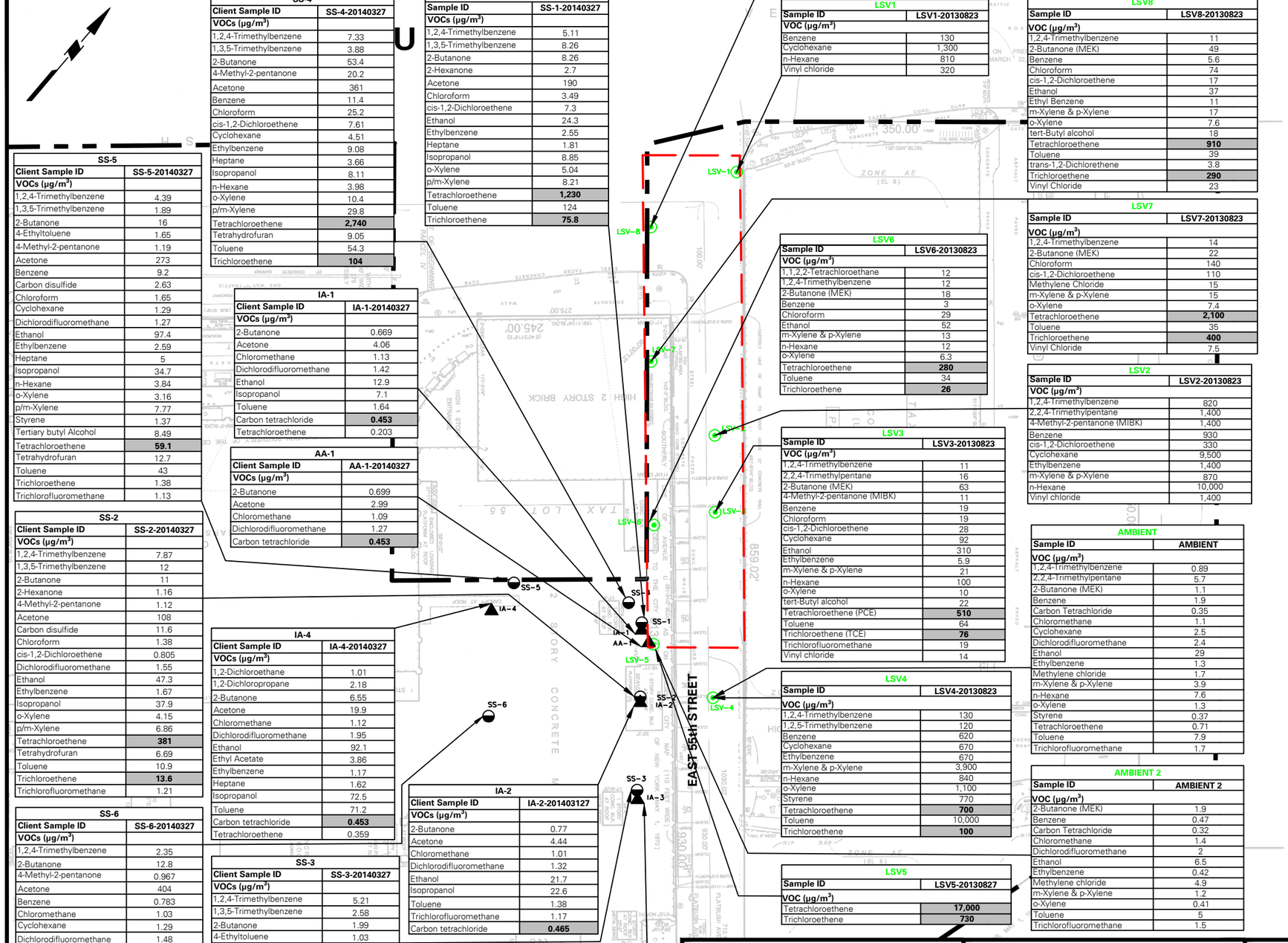
BROOKLYN NEW YORK

Drawing Title
POST-REMEDIATION GROUNDWATER RESULTS PLAN

Project No. 140080119
Date 12/11/2018
Scale 1" = 50'
Drawn By DVG
Submission Date DECEMBER 2018

Drawing No. 8
Sheet 8 of 10



SS-5	
Client Sample ID	**SS-5-20140327**
VOCs (µg/m³)	
1,2,4-Trimethylbenzene	4.39
1,3,5-Trimethylbenzene	1.89
2-Butanone	16
4-Ethyltoluene	1.65
4-Methyl-2-pentanone	1.19
Acetone	273
Benzene	9.2
Carbon disulfide	2.63
Chloroform	1.65
Cyclohexane	1.29
Dichlorodifluoromethane	1.27
Ethanol	97.4
Ethylbenzene	2.59
Heptane	5
Isopropanol	34.7
n-Hexane	3.84
o-Xylene	3.16
p/m-Xylene	7.77
Styrene	1.37
Tertiary butyl Alcohol	8.49
Tetrachloroethene	**59.1**
Tetrahydrofuran	12.7
Toluene	43
Trichloroethene	1.38
Trichlorofluoromethane	1.13

SS-2	
Client Sample ID	**SS-2-20140327**
VOCs (µg/m³)	
1,2,4-Trimethylbenzene	7.87
1,3,5-Trimethylbenzene	12
2-Butanone	11
2-Hexanone	1.16
4-Methyl-2-pentanone	1.12
Acetone	108
Carbon disulfide	11.6
Chloroform	1.38
cis-1,2-Dichloroethene	0.805
Dichlorodifluoromethane	1.55
Ethanol	47.3
Ethylbenzene	1.67
Isopropanol	37.9
o-Xylene	4.15
p/m-Xylene	6.86
Tetrachloroethene	**381**
Tetrahydrofuran	6.69
Toluene	10.9
Trichloroethene	**13.6**
Trichlorofluoromethane	1.21

SS-6	
Client Sample ID	**SS-6-20140327**
VOCs (µg/m³)	
1,2,4-Trimethylbenzene	2.35
2-Butanone	12.8
4-Methyl-2-pentanone	0.967
Acetone	404
Benzene	0.783
Chloromethane	1.03
Cyclohexane	1.29
Dichlorodifluoromethane	1.48
Ethanol	141
Ethylbenzene	1.79
Heptane	2.51
Isopropanol	47.2
n-Hexane	2.2
o-Xylene	2.26
p/m-Xylene	5.21
Styrene	1.91
Tertiary butyl Alcohol	2.13
Tetrachloroethene	30
Toluene	34.1
Trichloroethene	1.86
Trichlorofluoromethane	1.18

SS-4	
Client Sample ID	**SS-4-20140327**
VOCs (µg/m³)	
1,2,4-Trimethylbenzene	7.33
1,3,5-Trimethylbenzene	3.88
2-Butanone	53.4
4-Methyl-2-pentanone	20.2
Acetone	361
Benzene	11.4
Chloroform	25.2
cis-1,2-Dichloroethene	7.61
Cyclohexane	4.51
Ethylbenzene	9.08
Heptane	3.66
Isopropanol	8.11
n-Hexane	3.98
o-Xylene	10.4
p/m-Xylene	29.8
Tetrachloroethene	**2,740**
Tetrahydrofuran	9.05
Toluene	54.3
Trichloroethene	**104**

IA-1	
Client Sample ID	**IA-1-20140327**
VOCs (µg/m³)	
2-Butanone	0.669
Acetone	4.06
Chloromethane	1.13
Dichlorodifluoromethane	1.42
Ethanol	12.9
Isopropanol	7.1
Toluene	1.64
Carbon tetrachloride	**0.453**
Tetrachloroethene	0.203

AA-1	
Client Sample ID	**AA-1-20140327**
VOCs (µg/m³)	
2-Butanone	0.699
Acetone	2.99
Chloromethane	1.09
Dichlorodifluoromethane	1.27
Carbon tetrachloride	**0.453**

IA-4	
Client Sample ID	**IA-4-20140327**
VOCs (µg/m³)	
1,2-Dichloroethane	1.01
1,2-Dichloropropane	2.18
2-Butanone	6.55
Acetone	19.9
Chloromethane	1.12
Dichlorodifluoromethane	1.95
Ethanol	92.1
Ethyl Acetate	3.86
Ethylbenzene	1.17
Heptane	1.62
Isopropanol	72.5
Toluene	71.2
Carbon tetrachloride	**0.453**
Tetrachloroethene	0.359

SS-3	
Client Sample ID	**SS-3-20140327**
VOCs (µg/m³)	
1,2,4-Trimethylbenzene	5.21
1,3,5-Trimethylbenzene	2.58
2-Butanone	1.99
4-Ethyltoluene	1.03
Acetone	57
Carbon disulfide	0.8
Chloroform	2.49
Dichlorodifluoromethane	2.1
Ethanol	12.2
Isopropanol	32
o-Xylene	5
p/m-Xylene	4.6
Tetrachloroethene	**35.4**
Tetrahydrofuran	0.59
Toluene	3.73
Trichloroethene	1.11
Trichlorofluoromethane	1.18

SS-1	
Sample ID	**SS-1-20140327**
VOCs (µg/m³)	
1,2,4-Trimethylbenzene	5.11
1,3,5-Trimethylbenzene	8.26
2-Butanone	8.26
2-Hexanone	2.7
Acetone	190
Chloroform	3.49
cis-1,2-Dichloroethene	7.3
Ethanol	24.3
Ethylbenzene	2.55
Heptane	1.81
Isopropanol	8.85
o-Xylene	5.04
p/m-Xylene	8.21
Tetrachloroethene	**1,230**
Toluene	124
Trichloroethene	**75.8**

IA-2	
Client Sample ID	**IA-2-201403127**
VOCs (µg/m³)	
2-Butanone	0.77
Acetone	4.44
Chloromethane	1.01
Dichlorodifluoromethane	1.32
Ethanol	21.7
Isopropanol	22.6
Toluene	1.38
Trichlorofluoromethane	1.17
Carbon tetrachloride	**0.465**

IA-3	
Client Sample ID	**IA-3-201403127**
VOCs (µg/m³)	
2-Butanone	0.672
Acetone	8.69
Chloromethane	1.1
Dichlorodifluoromethane	1.37
Ethanol	58.8
Isopropanol	198
Toluene	1.98
Trichlorofluoromethane	1.19
Carbon tetrachloride	**0.459**

LSV1	
Sample ID	**LSV1-20130823**
VOC (µg/m³)	
Benzene	130
Cyclohexane	1,300
n-Hexane	810
Vinyl chloride	320

LSV6	
Sample ID	**LSV6-20130823**
VOC (µg/m³)	
1,1,2,2-Tetrachloroethane	12
1,2,4-Trimethylbenzene	12
2-Butanone (MEK)	18
Benzene	3
Chloroform	29
Ethanol	52
m-Xylene & p-Xylene	13
n-Hexane	12
o-Xylene	6.3
Tetrachloroethene	**280**
Toluene	34
Trichloroethene	**26**

LSV3	
Sample ID	**LSV3-20130823**
VOC (µg/m³)	
1,2,4-Trimethylbenzene	11
2,2,4-Trimethylpentane	16
2-Butanone (MEK)	63
4-Methyl-2-pentanone (MIBK)	11
Benzene	19
Chloroform	19
cis-1,2-Dichloroethene	28
Cyclohexane	92
Ethanol	310
Ethylbenzene	5.9
m-Xylene & p-Xylene	21
n-Hexane	100
o-Xylene	10
tert-Butyl alcohol	22
Tetrachloroethene (PCE)	**510**
Toluene	64
Trichloroethene (TCE)	**76**
Trichlorofluoromethane	19
Vinyl chloride	14

LSV4	
Sample ID	**LSV4-20130823**
VOC (µg/m³)	
1,2,4-Trimethylbenzene	130
1,2,5-Trimethylbenzene	120
Benzene	620
Cyclohexane	670
Ethylbenzene	670
m-Xylene & p-Xylene	3,900
n-Hexane	840
o-Xylene	1,100
Styrene	770
Tetrachloroethene	**700**
Toluene	10,000
Trichloroethene	**100**

LSV5	
Sample ID	**LSV5-20130827**
VOC (µg/m³)	
Tetrachloroethene	**17,000**
Trichloroethene	**730**

LSV8	
Sample ID	**LSV8-20130823**
VOC (µg/m³)	
1,2,4-Trimethylbenzene	11
2-Butanone (MEK)	49
Benzene	5.6
Chloroform	74
cis-1,2-Dichloroethene	17
Ethanol	37
Ethyl Benzene	11
m-Xylene & p-Xylene	17
o-Xylene	7.6
tert-Butyl alcohol	18
Tetrachloroethene	**910**
Toluene	39
trans-1,2-Dichlorethene	3.8
Trichloroethene	**290**
Vinyl Chloride	23

LSV7	
Sample ID	**LSV7-20130823**
VOC (µg/m³)	
1,2,4-Trimethylbenzene	14
2-Butanone (MEK)	22
Chloroform	140
cis-1,2-Dichloroethene	110
Methylene Chloride	15
m-Xylene & p-Xylene	15
o-Xylene	7.4
Tetrachloroethene	**2,100**
Toluene	35
Trichloroethene	**400**
Vinyl Chloride	7.5

LSV2	
Sample ID	**LSV2-20130823**
VOC (µg/m³)	
1,2,4-Trimethylbenzene	820
2,2,4-Trimethylpentane	1,400
4-Methyl-2-pentanone (MIBK)	1,400
Benzene	930
cis-1,2-Dichloroethene	330
Cyclohexane	9,500
Ethylbenzene	1,400
m-Xylene & p-Xylene	870
n-Hexane	10,000
Vinyl chloride	1,400

AMBIENT	
Sample ID	**AMBIENT**
VOC (µg/m³)	
1,2,4-Trimethylbenzene	0.89
2,2,4-Trimethylpentane	5.7
2-Butanone (MEK)	1.1
Benzene	1.9
Carbon Tetrachloride	0.35
Chloromethane	1.1
Cyclohexane	2.5
Dichlorodifluoromethane	2.4
Ethanol	29
Ethylbenzene	1.3
Methylene chloride	1.7
m-Xylene & p-Xylene	3.9
n-Hexane	7.6
o-Xylene	1.3
Styrene	0.37
Tetrachloroethene	0.71
Toluene	7.9
Trichlorofluoromethane	1.7

AMBIENT 2	
Sample ID	**AMBIENT 2**
VOC (µg/m³)	
2-Butanone (MEK)	1.9
Benzene	0.47
Carbon Tetrachloride	0.32
Chloromethane	1.4
Dichlorodifluoromethane	2
Ethanol	6.5
Ethylbenzene	0.42
Methylene chloride	4.9
m-Xylene & p-Xylene	1.2
o-Xylene	0.41
Toluene	5
Trichlorofluoromethane	1.5

LEGEND:

LSV–4 — LANGAN SOIL VAPOR POINT (INSTALLED AUGUST 2013)

SS–1 — LANGAN SUB-SLAB SOIL VAPOR POINT (INSTALLED MARCH 2014)

IA–1 — LANGAN INDOOR AND AMBIENT AIR SAMPLE LOCATION (MARCH 2014)

BCP SITE BOUNDARY

NOTES:

1. BASEMAP INFORMATION FROM ALTA/ASCM LAND TITLE SURVEY BY BARTLETT, LUDLAM & DILL ASSOCIATES DATED MAY 5, 2011.
2. SAMPLE RESULTS WERE COMPARED TO THE NEW YORK STATE DEPARTMENT OF HEALTH (NYSDOH) AIR GUIDELINE VALUES (AGV).
3. ONLY DETECTED COMPOUNDS ARE SHOWN.
4. CONCENTRATIONS EXCEEDING NYSDOH AGV ARE HIGHLIGHTED AND IN BOLD.
5. INDOOR AIR CONCENTRATIONS EXCEEDING NYSDOH INDOOR AIR ACTION LEVELS ARE BOLD.
6. VOC = VOLATILE ORGANIC COMPOUND
7. CVOC = CHLORINATED VOLATILE ORGANIC COMPOUND
8. µg/m³ = MICROGRAM PER CUBIC METER

100 0 50 100

SCALE IN FEET

STANDARDS	NYSDOH AGV
VOC (µg/m³)	
Carbon Tetrachloride	--
Methylene Chloride	60
Tetrachloroethene	30
Trichloroethene	5

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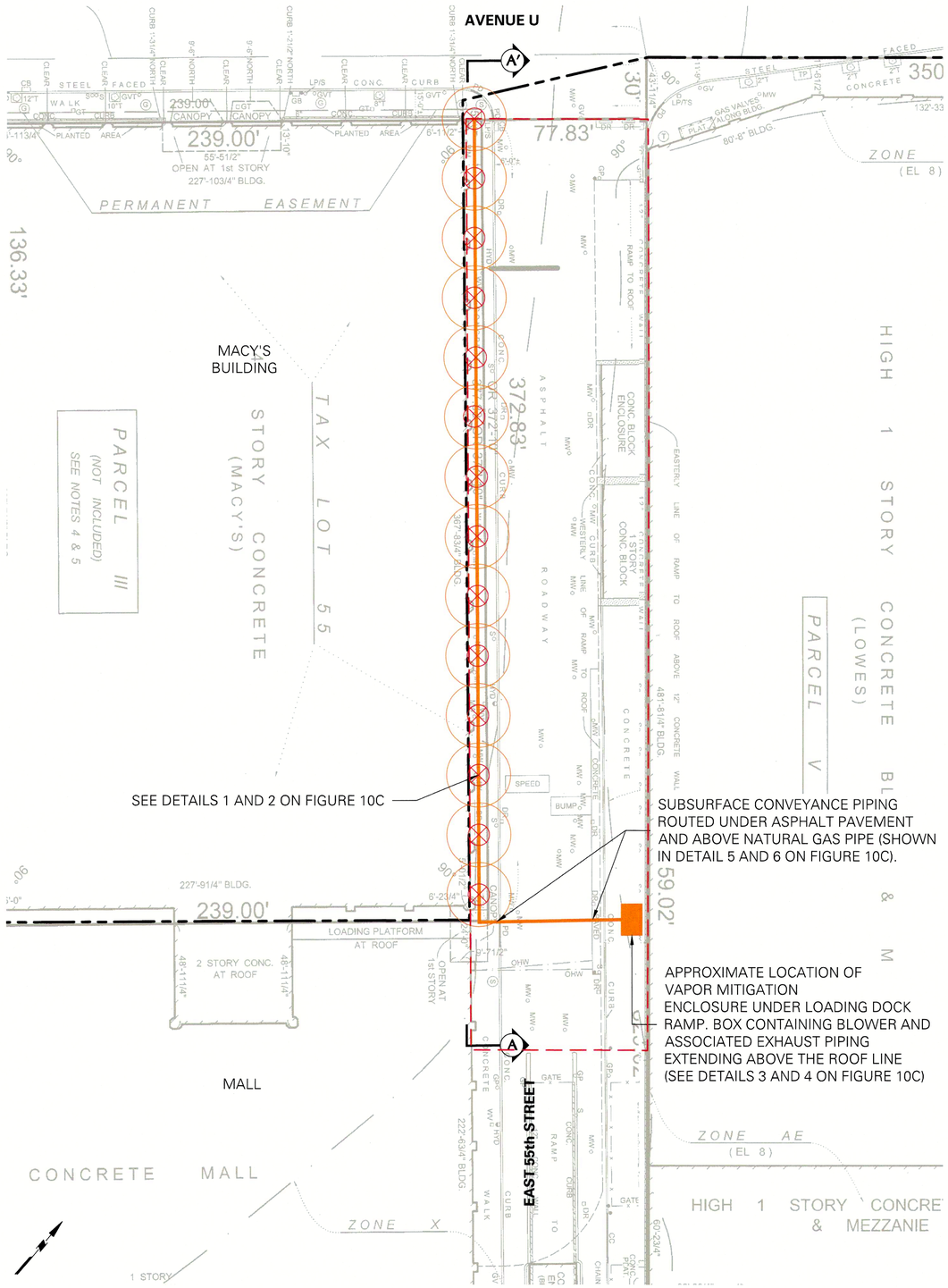
Project
KINGS PLAZA SHOPPING CENTER
BROOKLYN NEW YORK

Drawing Title
REMEDIAL INVESTIGATION VAPOR AND AMBIENT AIR RESULTS PLAN

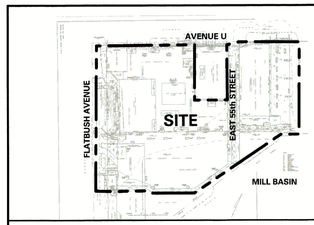
Project No. 140080119	Drawing No. 9
Date 05/08/2014	
Scale 1"=100'	
Drawn By EB	
Submission Date DECEMBER 2018	Sheet 9 of 10

Filename: \\langan.com\data\NYC\data1\140080101\Cadd Data - 140080101\OU-1-RIR\Figure 10 - Soil Vapor Sample Locations and Results Map.dwg Date: 12/18/2018 Time: 14:41 User: hgriesbach Style Table: Langan.stb Layout: FER



PLAN VIEW

30 0 15 30
SCALE IN FEET



PROJECT LOCATION MAP

SCALE: 1"=500'

LEGEND:

- BCP SITE BOUNDARY
- VAPOR MITIGATION WELL POINT
- APPROXIMATE VAPOR MITIGATION POINT AREA OF INFLUENCE (APPROX. 15-FEET)
- VAPOR MITIGATION PIPING

NOTES:

1. THE VAPOR MITIGATION SYSTEM WAS INSTALLED IN ACCORDANCE WITH THE NEW YORK STATE PLUMBING CODE, INCLUDING, BUT NOT LIMITED TO, THOSE REQUIREMENTS PERTAINING TO:
   - PROTECTION OF SYSTEM COMPONENTS
   - TRENCHING, EXCAVATION, AND BACKFILL
   - STRUCTURAL SAFETY
   - PIPING SUPPORT
   - JOINTS
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7. VACUUM GAUGES AT WELL POINTS HAVE A RANGE OF 0 TO 50 INCHES OF WATER WITH MINOR DIVISIONS OF 1.0 INCHES OF WATER IF NEEDED. VACUUM GAUGES AT BLOWER HAVE A RANGE OF 0 TO 100 INCHES OF WATER WITH MINOR DIVISIONS OF 10.0 INCHES OF WATER IF NEEDED.
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BLOWER NOTES:

9. REGENERATIVE BLOWER UNIT IS AN AIRTECH VACUUM 1-VE-3BA1600-3.
10. THE VACUUM ASSEMBLY PROVIDES, AT CONTINUOUS OPERATION, A MINIMUM OF 162 CUBIC FEET PER MINUTE (CFM) FLOW RATE AT A MINIMUM OF 25-INCHES OF WATER COLUMN VACUUM.
11. THE BLOWER MOTOR REQUIRES A STANDARD THREE-PHASE, 60 HZ, 230 VOLT, 20 AMP AC POWER SUPPLY. POWER SUPPLIES WERE COORDINATED WITH THE SITE OWNER, WHO PROVIDED A JUNCTION BOX FOR THE SYSTEM.
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   - SERVICE BLOWER IMMEDIATELY

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16. SPECIFICATION SECTION 026216 - VAPOR MITIGATION SYSTEM.
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SIGNATURE DATE SIGNED
PROFESSIONAL STEWART H. ABRAMS
STATE LIC. No. 078833

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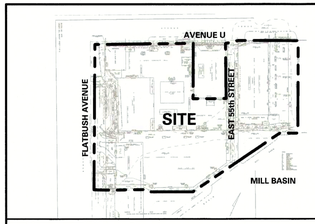
Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C. S.A.
Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C.
Langan Engineering and Environmental Services, Inc.
Langan CT, Inc.
Langan International LLC
Collectively known as Langan

Project	KINGS PLAZA SHOPPING CENTER
	BROOKLYN NEW YORK
Drawing Title	VAPOR MITIGATION SYSTEM PLAN
Project No.	140080119
Date	3/16/2016
Scale	1"=30'
Drawn By / Checked By	HHG / DVG
Submission Date	DECEMBER 2018
Drawing No.	10A
Sheet	10A of 10

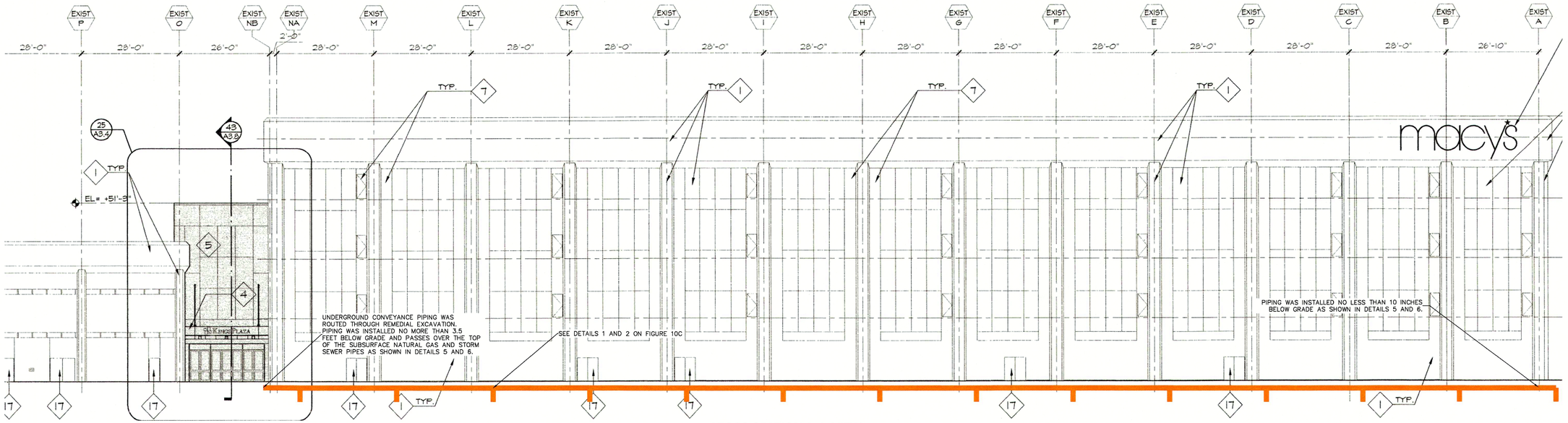
SUBMISSION DATE: DECEMBER 2018
PROJECT NO. 140080119

Filename: \\langan.com\data\NYC\data1\140080101\Cadd Data - 140080101\OU-1-FER\Figure 8A-C - Vapor Mitigation Plan.dwg Date: 12/17/2018 Time: 14:05 User: hgriesbach Style Table: Langan.stb Layout: PLAN FER



PROJECT LOCATION MAP

SCALE: 1"=500'



CROSS SECTION A-A' VIEW

15 0 5 10 15

SCALE IN FEET

LEGEND:

VAPOR MITIGATION PIPING

NOTES:

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STATE OF NEW YORK — STEWART HARRIS ABRAMS — 078833 — LICENSED PROFESSIONAL ENGINEER

SIGNATURE DATE SIGNED

PROFESSIONAL STEWART H. ABRAMS

STATE LIC. No. 078833

LANGAN
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Langan Engineering and Environmental Services, Inc
Langan CT, Inc.
Langan International LLC
Collectively known as Langan

Project: KINGS PLAZA SHOPPING CENTER — BROOKLYN NEW YORK

Drawing Title: VAPOR MITIGATION SYSTEM SECTION (A-A')

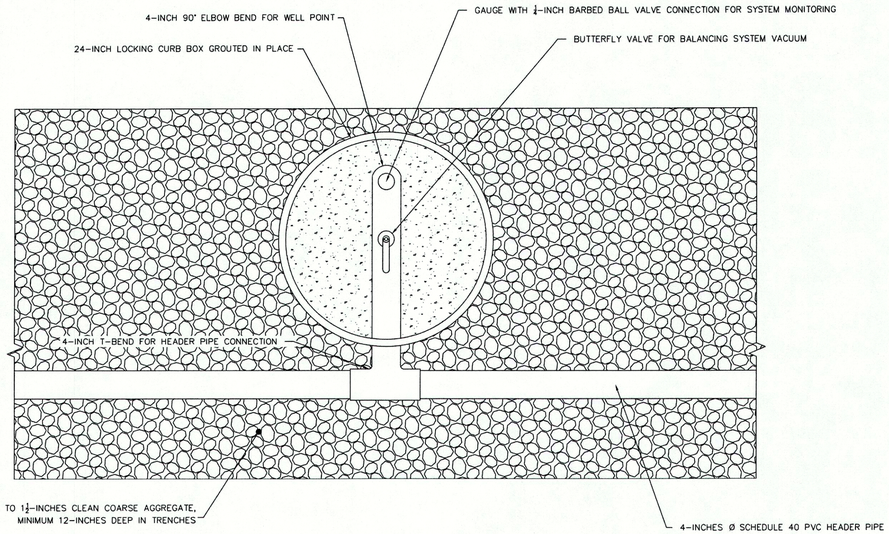
Project No. 140080119	Drawing No. 10B
Date 3/16/2016	
Scale 1"=15'	
Drawn By HHG / Checked By DVG	
Submission Date DECEMBER 2018	Sheet 10B of 10

LANGAN

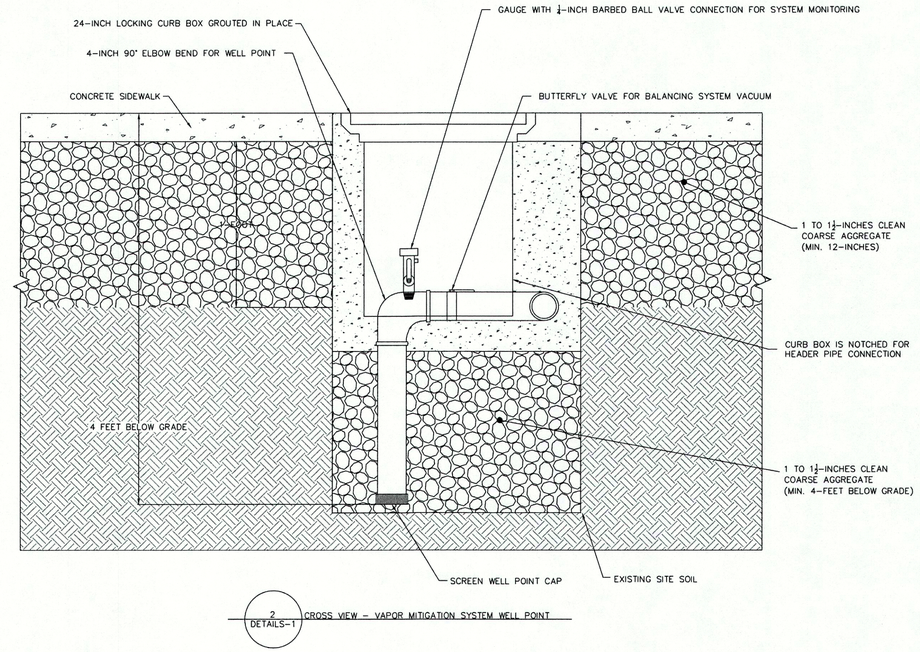
SUBMISSION DATE: DECEMBER 2018

PROJECT NO. 140080119

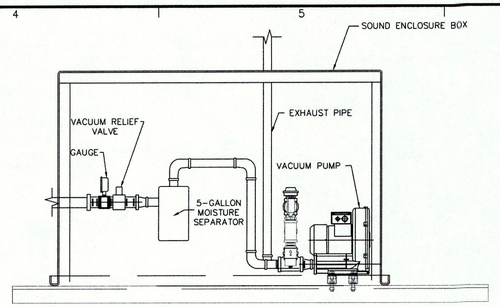
Filename: \\langan.com\data\NYC\data11\140080101\Cadd Data - 140080101\OU-1-FER\Figure 8A-C - Vapor Mitigation Plan.dwg Date: 12/17/2018 Time: 14:02 User: hgriesbach Style Table: Langan.stb Layout: SECTION FER



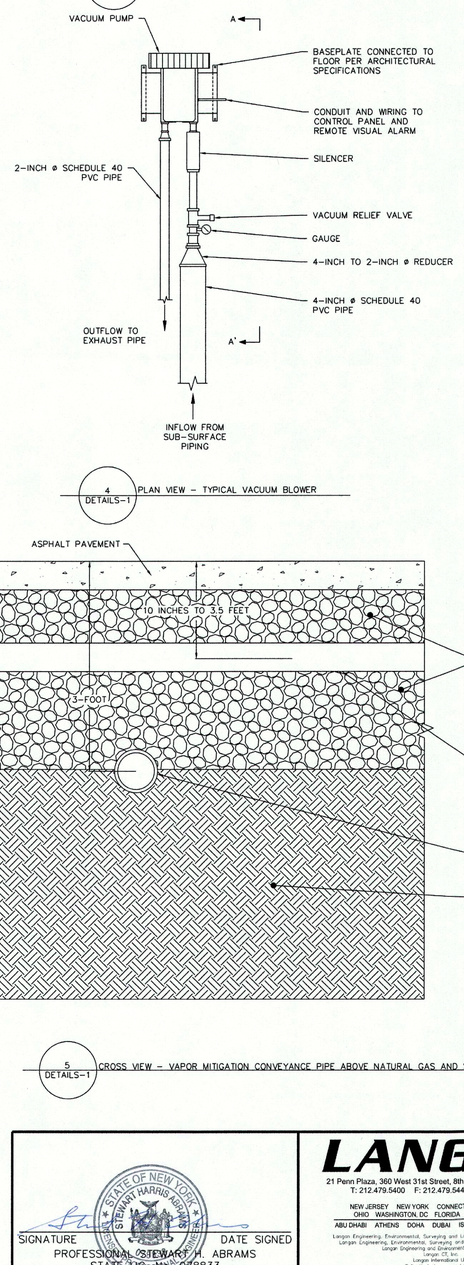
1 DETAILS-1 PLAN VIEW – VAPOR MITIGATION SYSTEM WELL POINT



2 DETAILS-1 CROSS VIEW – VAPOR MITIGATION SYSTEM WELL POINT



3 DETAILS-1 CROSS VIEW – TYPICAL VACUUM BLOWER (A-A')



4 DETAILS-1 PLAN VIEW – TYPICAL VACUUM BLOWER

5 DETAILS-1 CROSS VIEW – VAPOR MITIGATION CONVEYANCE PIPE ABOVE NATURAL GAS AND STORM SEWER PIPE

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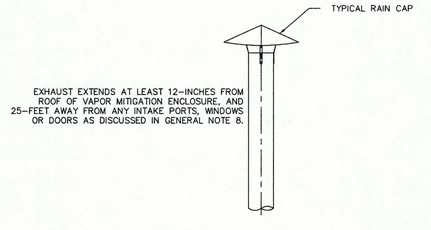
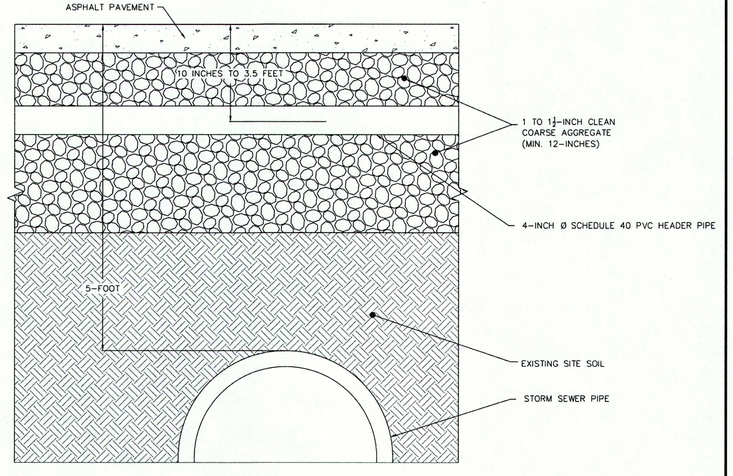


7 DETAILS-1 CROSS VIEW – RISER PIPE WITH RAIN CAP



6 DETAILS-1 CROSS VIEW – VAPOR MITIGATION CONVEYANCE PIPE ABOVE WATER AND STORM SEWER PIPE

SIGNATURE DATE SIGNED
PROFESSIONAL ENGINEER STEWART H. ABRAMS
STATE LIC. No. 078833

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Project	KINGS PLAZA SHOPPING CENTER
	BROOKLYN NEW YORK
Drawing Title	VAPOR MITIGATION SYSTEM DETAILS
Project No.	140080119
Date	3/16/2016
Scale	N.T.S.
Drawn By / Checked By	HHG / DVG
Submission Date	DECEMBER 2018
Drawing No.	10C
Sheet	10C of 10

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SUBMISSION DATE: DECEMBER 2018
PROJECT NO.140080119

Filename: \\langan.com\data\NYC\data11\140080101\Cadd Data - 140080101\OU-1-FER\Figure 8A-C - Vapor Mitigation Plan.dwg Date: 12/17/2018 Time: 14:02 User: hgriesbach Style Table: Langan.stb Layout: DETAIL FER