INTERIM REMEDIAL MEASURES WORK PLAN

for

2 Ingraham Street
Brooklyn, New York 11206
NYSDEC BCP Site No. C224036

Prepared For:

74 Bogart LLC
26 West 17th Street, Suite 801
New York, New York 10011

Prepared By:

Langan Engineering, Environmental, Surveying,
Landscape Architecture and Geology, D.P.C.
21 Penn Plaza
360 West 31st Street, 8th Floor
New York, New York 10001

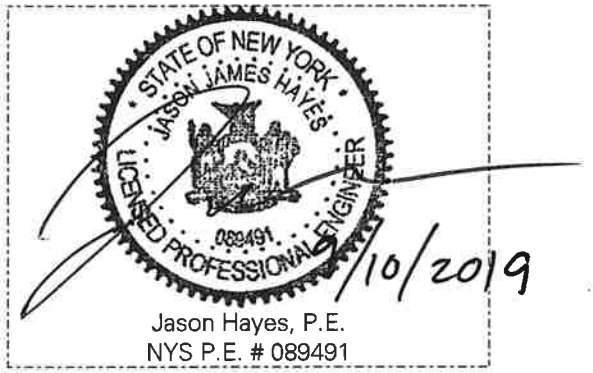
September 10, 2019

Langan Project No. 170519402

LANGAN

CERTIFICATION

I Jason Hayes, P.E., certify that I am currently a NYS-registered professional engineer as defined in 6 NYCRR Part 375 and that this IRM Work Plan was prepared in accordance with applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).



Jason Hayes, P.E.
NYS P.E. # 089491

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1.0 INTRODUCTION

1.1 General

74 Bogart LLC (the "Volunteer") retained Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C. (Langan) to prepare an Interim Remedial Measures Work Plan (IRMWP) for the property located at 2 Ingraham Street in the East Williamsburg section of Brooklyn, New York (the "site"). The site is enrolled in the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program, pursuant to a November 10, 2010 Brownfield Site Cleanup Agreement (BCA), and is identified by the NYSDEC as Site No. C224036. 74 Bogart LLC (the owner of the site) and Bogart Holdings LLC (the previous owner) are named as Volunteers on the BCA, pursuant to a January 18, 2019 BCA amendment. 74 Bogart LLC will implement the measures described in this IRMWP.

This IRMWP describes the following proposed interim remedial measures, which the Volunteer plans to complete in advance of the implementation of a NYSDEC-approved Remedial Action Work Plan (RAWP):

1. Remediation of chromium-impacted building slabs and removal of footings during demolition of the entire existing one-story building;
2. Advancement of eight soil borings, installation of three soil vapor points, and collection of eight soil and three soil vapor samples to investigate known mercury impacts in the western portion of the site;
3. Placement of a temporary about 6-inch-thick clean cover layer in the western portion of the site over exposed residual soil, to be replaced with a Division of Environmental Remediation (DER)-10 compliant cover as part of the forthcoming final remedy;
4. Installation of support-of-excavation (SOE) soldier piles and lagging to a minimum of 36 feet below grade surface (bgs) (about elevation [el.] -15 feet[1] NAVD88) along the eastern site perimeter and the eastern half of the north and south site perimeters; and
5. Excavation and off-site disposal of historic fill material, impacted with semivolatile organic compounds (SVOCs) and metals, and native soil to about 14 feet bgs (about el. 7 feet) in the eastern portion of the site to achieve Track 2 Restricted Use Restricted-Residential (RURR]) Soil Cleanup Objectives (SCOs]).

This IRMWP has been prepared in accordance with the requirements of the BCP and NYSDEC May 2010 DER-10 - Technical Guidance for Site Investigation and Remediation. The final remedial

[1] Elevations herein are referenced to the North American Vertical Datum of 1988 (NAVD88), which is approximately 1.1 feet above mean sea level datum at Sandy Hook, New Jersey as defined by the USGS (USGS NGVD 1929). In this IRMWP, references to "below grade surface" are relative to the building slab elevation.

measure needed for a permanent remedy will be described in a forthcoming RAWP. This approach is in accordance with the definition of an IRM (May 2010 DER-10):

> ***"Interim remedial measure" or "IRM"*** *means activities to address both emergency and non-emergency site conditions, which can be undertaken without extensive investigation and evaluation, to prevent, mitigate or remedy environmental damage or the consequences of environmental damage attributable to a site, including, but not limited to, the following activities: construction of diversion ditches; collection systems; drum removal; leachate collection systems; construction of fences or other barriers; installation of water filters; provision of alternative water systems; the removal of source areas; or plume control.*

1.2 Site Description

The site occupies an area of 80,000 square feet at 2 Ingraham Street (Tax Block 3084, Lot 1) in Brooklyn, New York. Alternate addresses include 74-92 Bogart Street, 1-39 Harrison Place, 2-40 Ingraham Street, and 75-91 Morgan Avenue. The site is bounded by Ingraham Street to the north, Morgan Avenue to the east, Harrison Place to the south, and Bogart Street to the west, and contains a one-story warehouse building encompassing the entire block. The building contains two partial cellars and has been vacant since around April 2016. The two partial cellars are in the central portion of the site; the dimensions of the cellars could not be determined during recent investigations because of the presence of standing water.

The northwest corner of the site includes an easement for New York City Water Tunnel No. 3, which is currently under construction by the New York City Department of Environmental Protection (NYCDEP) and is over 500 feet bgs within bedrock. The NYC Metropolitan Transportation Authority (MTA) L train subway tunnel runs underneath Harrison Place, adjacent to the southern site boundary. Surrounding property uses include restaurants, bars, co-working spaces, real estate businesses, masonry and concrete sales, construction materials staging, vacant lots, truck parking lots, and a city park. A site location map is included as Figure 1 and a site plan is provided as Figure 2.

1.3 Site Geology and Hydrology

1.3.1 Geologic Conditions

The site contains a layer of historic fill that extends from beneath the existing 6-inch concrete slab to a maximum depth of about 16 feet bgs in the western portion of the site and to a maximum depth of about 8.5 feet bgs in the eastern portion of the site. The historic fill layer predominantly consists of brown to grey to black, fine- to coarse-grained sand with varying amounts of silt, clay, gravel, and anthropogenic and pyrogenic material including coal, brick, concrete, wood, glass, metal, plastic, ceramic, and white amorphous material (possible ash).

Native soil beneath the historic fill consists of reddish-brown to brown to grey, fine- to coarse-grained sand with varying amounts of silt, clay, gravel, and cobbles.

The United States Geological Survey (USGS) "Bedrock and Engineering Geologic Maps of New York County and Parts Kings and Queens Counties, New York, and Parts of Bergen and Hudson Counties, New Jersey" indicates that the bedrock underlying the site is part of the Hartland Formation. The Hartland Formation is comprised of mica schist and quartz-feldspar granulite, with localized intrusions of granite and pegmatite. Depth to bedrock is expected to be between about 150 and 200 feet bgs.

1.3.2 Hydrogeologic Conditions

Synoptic groundwater level measurements were collected from monitoring wells located on site and on the adjoining sidewalks during a supplemental remedial investigation (SRI) on February 4, 2019. Depth to water ranged between 11.64 and 15.36 feet bgs (el. 5.38 to el. 8.07). Based on the well gauging results and local topography, groundwater is inferred to flow north-northwest towards English Kills Creek (a tributary of Newtown Creek).

1.4 Site History

According to Sanborn Fire Insurance Maps, the site was located in a moderately developed urban area as early as 1888, and by 1907 was partially improved with a church, rectory, convent, orphanage, and carriage house. Additional buildings shown in the 1933 Sanborn Map include a parochial school, a laundry, and a shelter. According to a Phase I Environmental Site Assessment (ESA) report prepared by ERD Environmental, Inc., the existing site-wide one-story building was constructed in 1946. In the 1951 Sanborn map, the northeast quarter of the building is shown as a machine shop and the southeast quarter is labeled as an electrical equipment manufacturing and repair business. From 1965 to 1995, historical records show the building as having been re-partitioned, with Sanborn maps indicating uses including metal finishing (northwest portion), zipper manufacturing (southwest portion), and umbrella manufacturing (eastern half). At the time of the ERD Phase I ESA reconnaissance visit in 1996, the site building had reportedly been vacant for about seven years. The two most recent tenants were listed as Jayer Plating (chromium and nickel plating operation in northwest portion) and Macon Umbrella Corporation (south and east portions).

According to the Remedial Investigation Work Plan (RIWP) prepared by MC Environmental, the site building was again occupied by 2011 with warehouse tenants and a picture frame assembly company. Uses described in ESPL's 2014 Draft Remedial Investigation Report (RIR) included a soda distribution warehouse (north-central portion of the site) and a party goods wholesaler (south-central portion of the site), with additional areas on the west and east sides of the site listed as vacant. According to the 2016 IRMWP prepared by ESPL, the entire site building was

vacated as of April 2016. The building was vacant during a site visit by Langan and the NYSDEC on May 18, 2018, and has remained vacant to the present.

1.5 Previous Environmental Reports

The following environmental reports and work plans have been prepared for the site and are listed for reference information. These reports are appended to the draft RIR submitted to the NYSDEC and New York State Department of Health (NYSDOH) on May 8, 2019. A description of the information provided in previous reports and work plans that informs the scope of this IRMWP is provided after the following list.

1. Phase I ESA, prepared by ERD, dated November 1996;
2. Focused Phase II Soil Investigation Report, prepared by Excel Environmental Resources, Inc. (Excel), dated May 22, 1997;
3. Site Investigation Report, prepared by AKRF, Inc., dated December 1, 1997;
4. RIWP, prepared by MC Environmental, dated November 2011;
5. Draft RIR, prepared by ESPL, dated February 2014;
6. Supplemental Remedial Investigation Work Plan (SRIWP), prepared by ESPL, dated October 2014;
7. Final IRMWP, prepared by ESPL, dated November 2016
8. SRIWP, prepared by Langan, dated November 29, 2018; and
9. Phase I ESA, prepared by Langan, dated April 17, 2019.
10. Draft RIR, prepared by Langan, dated May 8, 2019

The November 1996 Phase I ESA described the former nickel and chromium plating operation in the northwest portion of the site. The report noted corrosion of the concrete floor slab in the former plating area, possibly due to drips and spills from chemicals used during the plating process. According to an interview with the former general manager of the adjoining tenant space (Macon Umbrella), a concrete floor trench and drain were used to collect excess fluids from the plating process and discharge them into the city sewer. Several unidentified drums were observed on site during the Phase I site reconnaissance, including six drums within the former metal plating area.

Subsequent subsurface investigations performed from 1997 to the present included sampling of soil, groundwater, and sub-slab and soil vapor, with some investigations focusing on the metal plating trench area and others intending to characterize the entire site. The most recent subsurface investigation was performed pursuant to the NYSDEC-approved SRIWP. The SRI findings are detailed in the May 8, 2019 draft RIR.

Based on the results of the SRI and previous investigations, the following areas of concern (AOCs) were defined:

1.5.1 AOC 1 – Metals-Impacted Historic Fill in Western Portion of Site

AOC 1 represents metals-impacted historic fill in the western portion of the site. The AOC 1 extents were developed based on SRI field observations and corresponding analytical data showing that the historic fill layer extends to depths between about 7 and 16 feet bgs in the western half of the site and contains elevated concentrations of several metals (including mercury concentrations up to three orders of magnitude higher than the RURR SCO). Soil samples collected from historic fill in the eastern half of the site contain metals at generally lower concentrations; therefore AOC 1 is limited to the western portion of the site.

1.5.2 AOC 2 – Former Metal Plating Trench Drain Area

AOC 2 represents the area surrounding an abandoned trench drain used by the former chromium and nickel plating operation in the northwestern portion of the site. SRI survey data indicate that an about 1-foot-wide concrete-filled discontinuity, assumed to be the historical trench drain, has a total length of about 125 feet and terminates at a soil-filled circular discontinuity on the western end. Soil and groundwater samples collected in AOC 2 have contained elevated concentrations of metals, including hexavalent chromium, trivalent chromium, copper, and nickel, that (other than copper) are likely related to the plating process.

1.5.3 AOC 3 – Solvent Impacts in Eastern Portion of Site

AOC 3 represents an area in the eastern portion of the site where chlorinated volatile organic compounds (CVOCs), including cis-1,2-dichloroethene (cDCE), tetrachloroethene (PCE), and trichloroethene (TCE), have been detected in groundwater at concentrations above the Title 6 New York Codes, Rules and Regulations (6 NYCRR) Part 703.5 Technical and Operational Guidance Series (TOGS) 1.1.1 Ambient Water Quality Standards and Guidance Values (SGVs) for Class GA Water during previous sampling events. Impacts to groundwater and potential impacts to soil vapor are likely associated with an off-site source to the east.

1.5.4 AOC 4 – Site-Wide Groundwater and Soil Vapor Quality

AOC 4 represents general groundwater and soil vapor conditions across the site. Groundwater on the site and adjacent to the site on cross-gradient and down-gradient sidewalks is known to be impacted with CVOCs, SVOCs, and dissolved metals. Previous sub-slab and soil vapor samples have contained elevated concentrations of CVOCs, including 1,1,1-trichloroethane (1,1,1-TCA), carbon tetrachloride, PCE, and TCE.

AOC extents are depicted on Figure 2. The following section provides the conclusions of the May 8, 2019 draft RIR.

1.6 Remedial Investigation Report Conclusions

The SRI was implemented between December 2018 and February 2019 in accordance with the NYSDEC-approved SRIWP. The findings summarized herein are based on qualitative and quantitative data consisting of field observations, instrumental readings, and laboratory analytical results of soil, groundwater, and sub-slab and soil vapor samples collected during the SRI and previous environmental studies.

1. Stratigraphy: Historic fill was observed throughout the site and predominantly consists of brown to gray to black, fine- to coarse-grained sand with varying amounts of silt, clay, gravel, and anthropogenic and pyrogenic material including coal, brick, concrete, wood, glass, metal, plastic, ceramic, and ash. The historic fill layer extends from beneath the 6-inch-thick reinforced concrete slab to a maximum depth of about 16 feet bgs (about el. 5). The average depth of historic fill was generally greater in the southwestern portion of the site (about 11 to 16 feet bgs, or el. 10 to 5) than in the northwestern or eastern portions of the site (about 7 to 10 feet bgs, or el. 14 to 11). Native soil was encountered below the historic fill layer and generally consists of reddish-brown to brown to gray, fine- to coarse-grained sand with varying amounts of silt, clay, gravel, and cobbles.

2. Hydrogeology: Groundwater was observed at depths ranging from 11.64 to 15.36 feet bgs (el. 5.38 to el. 8.07) during the SRI. Based on gauging data and local topography, groundwater is inferred to flow north-northwest.

3. Historic Fill: Historic fill contains concentrations of polycyclic aromatic hydrocarbons (PAH) and metals above the 6 NYCRR Part 375 Unrestricted Use (UU), RURR, and/or Protection of Groundwater (PGW) SCOs. Detected concentrations of PAHs and metals, with the exception of mercury, were typical of historic fill found in New York City. The presence of hazardous lead waste, mercury concentrations up to three orders of magnitude higher than the RURR SCO, and elevated PAHs in historic fill in the western portion of the site is likely related to the observed presence of anthropogenic and/or pyrogenic material including coal and ash.

4. Chromium- and Nickel-Impacted Soil and Groundwater: Historic fill and native soil near the former metal plating trench in AOC 2 is impacted with hexavalent chromium, trivalent chromium, and nickel at concentrations exceeding the RURR and PGW SCOs to depths of up to 30 feet bgs. Oxidation-Reduction Potential (ORP) values in AOC 2 were generally between 130 and 260 millivolts (mV), indicative of a highly oxidative environment, which is consistent with the presence of nickel and hexavalent chromium. Groundwater contains hexavalent chromium and/or nickel at concentrations more than two orders of magnitude above the TOGS SGVs, at monitoring wells up to 40 feet south (upgradient) and up to 50 feet north (down-gradient) of the former metal plating trench. Green and

yellow crystals observed on the surface of the floor slab near the trench likely comprise calcium, sodium, or potassium chromate associated with chromium contamination, and purged groundwater containing concentrations of dissolved hexavalent chromium above 1,000 micrograms per liter (µg/L) exhibited green and yellow coloration (likely associated with chromate compounds). Elevated chromium and nickel concentrations are likely due to wastewater releases during the former metal plating operation.

The above-described geologic formation, consisting primarily of sand, offers a relatively low adsorption and reduction potential for the nickel and chromium cations. The presence of positive ORP values in and around AOC 2 also demonstrates the oxidizing nature of the aquifer resulting from the presence of nickel and hexavalent chromium. The concentrations and distribution of these metallic species indicates the soils' adsorption and reduction capacities are overwhelmed and will permit migration unless remediated.

5. CVOC-Impacted Groundwater: PCE was detected at concentrations less than an order of magnitude above the Class GA TOGS SGV in AOC 2. The maximum PCE concentration of 13 µg/L was detected at monitoring well MW-08, located down-gradient of the site on the Ingraham Street sidewalk. PCE in groundwater in AOC 2 may be related to an off-site source to the north and/or a historical on-site release. The CVOCs cDCE, PCE, and TCE were detected at concentrations exceeding the Class GA TOGS SGVs in AOC 3, in the eastern portion of the site, with the maximum concentration of each CVOC detected in MW-19. CVOC concentrations did not exceed the Class GA TOGS SGVs in MW-18, about 25 feet to the west of MW-19, indicating the likely presence of an off-site source to the east that is impacting site groundwater. Visual, olfactory, and photoionization detector (PID) screening of soil during the SRI did not indicate the presence of on-site solvent-impacted soil.

6. SVOC- and Metals-Impacted Groundwater: Groundwater across the site has contained SVOCs and metals at concentrations above the Class GA TOGS SGVs during investigations from 1997 to the present. Elevated PAHs in groundwater are likely related to the presence of PAHs in historic fill, while the presence of the metals (excluding nickel and chromium) detected in groundwater are likely related to a combination of historic fill quality, entrained sediments in groundwater samples, local geology, and/or regional groundwater conditions. The presence of PAHs and metals (excluding nickel and hexavalent chromium) in groundwater do not trigger the need for additional groundwater remediation.

7. CVOC-impacted Sub-slab Vapor: Previous sub-slab and soil vapor samples have contained elevated concentrations of CVOCs, including 1,1,1-TCA, carbon tetrachloride, PCE, and TCE. Elevated PCE and TCE in sub-slab vapor during previous sampling events may have

been associated with solvent impacts to groundwater in AOCs 2 and 3, respectively. Indoor air samples were not proposed in the SRIWP and were not collected.

8. Sufficient analytical data were gathered during the SRI, together with previous studies, to establish soil cleanup levels and to develop a remedy for the site.

Finalization of the draft RIR, dated May 8, 2019, is pending NYSDEC and NYSDOH review and approval.

1.7 Proposed Development

Abatement and demolition of the existing building, including below-grade foundations, is scheduled to begin in September 2019 and continue through winter 2019 and will be completed in accordance with this IRMWP. New building construction is anticipated to occur in 2020, and will be performed in conjunction with a site-wide remedy described in a forthcoming RAWP. Redevelopment will include the construction of a multi-story storage building with a cellar in the eastern portion of the site (facing Morgan Avenue) and an at-grade parking lot in the western portion of the site (facing Bogart Street). The proposed end use of the development is consistent with existing zoning regulations.

2.0 SUMMARY OF INTERIM REMEDIAL MEASURES

The proposed IRM consists of the following tasks:

1. Remediation of chromium-impacted building slabs and removal of footings during demolition of the entire existing one-story building;
2. Advancement of eight soil borings, installation of three soil vapor points, and collection of eight soil and three soil vapor samples to investigate known mercury impacts in the western portion of the site;
3. Placement of a temporary about 6-inch-thick clean cover layer in the western portion of the site over exposed residual soil, to be replaced with a DER-10 compliant cover as part of the forthcoming final remedy;
4. Installation of support-of-excavation (SOE) soldier piles and lagging to a minimum of 36 feet bgs (about el. -15) along the eastern site perimeter and the eastern half of the north and south site perimeters; and
5. Excavation and off-site disposal of historic fill material, impacted with SVOCs and metals, and native soil to about 14 feet bgs (about el. 7) in the eastern portion of the site to achieve Track 2 RURR SCOs).

The IRM described herein will be performed in accordance with applicable federal, state, and city regulations and a Construction Health and Safety Plan (CHASP), which is provided as Appendix A. Demolition and SOE progress drawings are provided as Appendix B.

2.1 Interim Remedial Measures Objectives and Rationale

The objective of the IRM is to decontaminate and remove existing building foundation elements in preparation for site-wide remediation and remove potential sources of SVOC and metals contamination to groundwater through remedial excavation in the eastern portion of the site. IRM activities will require equipment mobilization, decontamination and removal of the building slab and footings, SOE installation, and excavation and off-site disposal of historic fill and native soil. After removal of the at-grade slab, a below-grade reinforced concrete foundation slab will be installed in the eastern portion of the site and the western portion of the site will be capped with a minimum 6-inch-thick temporary cover of certified clean fill and/or gravel or impermeable pavement. The temporary cover will be replaced with a DER-10 compliant final cover as part of the forthcoming final remedy. The site will be locked and inaccessible to the public during IRMWP implementation, and the western portion of the site will remain locked and inaccessible until RAWP implementation is complete and a DER-10 compliant final cover is installed. The forthcoming RAWP will be submitted to and approved by the NYSDEC prior to implementation

to address additional contamination in the western portion and long-term protection of the proposed building in the eastern portion of the site.

The Remedial Action Objectives (RAOs) for this site are intended to be protective of public health and the environment and are developed based on contaminant-specific standards, criteria, and guidance (SCGs). The RAOs were developed from information derived from previous environmental investigations, including known impacted media and potential public health and environmental exposure pathways.

The RAOs for this IRMWP are as follows:

RAOs	RAOs for Public Protection	RAOs for Environmental Protection
Soil	• Prevent ingestion/direct contact with contaminated soil and concrete • Prevent inhalation of, or exposure to, contaminants volatilizing from contaminated soil	• Prevent migration of contaminants that would result in groundwater contamination
Groundwater	• Prevent ingestion of groundwater containing contaminant levels exceeding drinking water standards • Prevent contact with, or inhalation of, contaminants emanating from contaminated groundwater	• Prevent migration of contaminated groundwater onto or emanating from the site • Remove the source of groundwater contamination
Soil Vapor	• Prevent contaminants in groundwater that could transition into soil vapor from migrating onto or emanating from the site	

2.2 Summary of the Proposed Interim Remedial Measures

2.2.1 Site Preparation

Site preparation will be completed by the Contractor prior to the implementation of the IRM and will include, but not be limited to, the establishment of work zones, mobilization of support facilities, construction of decontamination facilities, and implementation of site security measures (i.e. erection of security fencing around work zones and staging areas). The Contractor will maintain soil erosion control and sediment control measures prior to and during work operations described in the IRMWP.

Prior to intrusive activities, Dig Safely New York (811) will be contacted by the Contractor a minimum of three business days in advance of the work. Dig Safely New York will be informed of the nature of the work and the intent to excavate at the site. The Contractor will obtain additional permits as required, including but not limited to NYC MTA approval of SOE plans.

2.2.2 Remediation of Chromium-Impacted Building Slab and Removal of Foundation Elements

Green and yellow crystals were observed on the surface of the concrete slab during the SRI and appeared to be concentrated near the former metal plating trench in AOC 2. The crystals may

comprise calcium, sodium, or potassium chromate associated with chromium contamination caused by the former metal plating operation. The chromium-impacted concrete slab and footings in the northwestern portion of the site and any other concrete with visible contamination will need to be decontaminated and/or sampled prior to off-site disposal.

If the slabs are decontaminated in place before disposal, the decontamination will be performed in accordance with the procedure described below:

1. Wash the concrete slab using a hot power-washer and detergent, and remove water/detergent utilizing a ride-on floor scrubber with a rear squeegee. The detergent will consist of a non-toxic floor cleaner prescribed for use with a ride-on floor scrubber. Wastes accumulated within the ride-on floor scrubber will be pumped into 250-gallon plastic totes or similar.
2. Perform a rinse after the third washing/fluid collection cycle. Collect and analyze a concrete slab and rinsate sample following the third rinse. Concrete samples will be analyzed for Toxicity Characteristic Leaching Procedure (TCLP) chromium and nickel, and compared to typical disposal facility criteria in preparation for disposal. Rinsate sample results will be compared to the NYSDEC TOGS Class GA SGVs.
3. Perform additional decontamination using a hot water power-washer and detergent/ ride-on floor scrubber as needed until no evidence of metals contamination remains on the surface of the slab and laboratory results of the rinsate samples meet the NYSDEC TOGS Class GA SGVs.
4. Liquid within the totes will be sampled to coordinate disposal facility acceptance. Waste characterization analyses will include, at a minimum, total and hexavalent chromium and nickel. Additional analyses may be required for compliance with disposal facility permits.

Following issuance of approval by the disposal facility(ies), a vacuum truck will be utilized to empty each of the 250-gallon plastic totes and transport the liquid for off-site disposal. Alternatively, the totes may be transported in box trucks by approved waste haulers to approved disposal facilities. Liquid and solid waste generated during decontamination of the concrete slabs will be transported by licensed waste transporters to facilities approved to accept the waste.

As an alternative, the chromium-impacted concrete slab may be demolished in-place, sampled for waste characterization, and disposed of as chromium-impacted construction and demolition (C&D) debris.

Localized soil disturbance will be required for the removal of footings in the western portion of the site. Footing removal in the eastern portion of the site will be performed concurrently with excavation and disposal of historic fill.

The approximate extents of the chromium-impacted slab and footing locations are presented on Figure 3, and a Quality Assurance Project Plan (QAPP) is included as Appendix C.

2.2.3 Supplemental Mercury Sampling in Western Portion of the Site

Soil Sampling

An environmental drilling subcontractor will be retained to advance eight soil borings in locations biased toward the maximum mercury concentrations observed during previous investigations; previous maximum mercury concentrations are shown on Figures 4A and 4B and listed below:

- SB02_0-5_042513 ([Hg] = 1,790 mg/kg);
- SSB-2E_0-5_122219 ([Hg] = 1,270 mg/kg);
- SSB-30_6-8 ([Hg] = 1,090 mg/kg);
- SSB-54_0-2 ([Hg] = 499 mg/kg);
- SSB-22_0-5_121714 ([Hg] = 407 mg/kg)
- SSB-46_2-3 ([Hg] = 132 mg/kg);
- SSB-42_0-2 ([Hg] = 106 mg/kg); and
- SSB-33_6-8 ([Hg] = 93.6 mg/kg).

A Langan field scientist or engineer will document the work, screen the soil samples for environmental impacts, and collect samples. Soil will be screened continuously to the boring termination depth for total organic vapor (TOV) concentration using a PID equipped with a 10.6 electron volt (eV) bulb, and for visual and olfactory indications of environmental impacts (e.g., staining and odor). Soil will also be screened with a Jerome® J405 mercury vapor analyzer (or equivalent).

One soil sample will be collected at each location from the interval of known mercury impacts, with samples biased toward historic fill observed to contain ash and coal, and will be analyzed for total mercury and mercury selective sequential extraction (hereafter referred to as "mercury speciation"). Soil samples will be homogenized during sample collection and the sample volume will be split between two laboratories: Alpha Analytical Laboratories (Alpha) and Eurofins Frontier Global Sciences, Inc. (Eurofins). Alpha, a NYSDOH Environmental Laboratory Approval Program (ELAP)-certified laboratory in Westborough, Massachusetts, will analyze samples for total mercury. Mercury speciation will be conducted by Eurofins in Bothell, Washington, a NYSDOH ELAP-certified analytical laboratory, to quantify the concentrations of various mercury species that may be present in the mercury-impacted soil.

Non-disposable, down-hole drilling equipment and sampling apparatus will be decontaminated between locations with Alconox® (or similar) and water where grossly-impacted material is

identified. Following sampling, each soil boring will be backfilled with non-impacted soil cuttings and/or clean sand. Grossly-contaminated soil or excess non-impacted soil that cannot fit down the borehole will be containerized in 55-gallon drums for off-site disposal.

Soil data gathered during previous investigations in the western portion of the site, including historical mercury concentrations, is shown on Figures 4A and 4B. A QAPP is included as Appendix C.

Soil Vapor Sampling

At the following three previous mercury soil sample locations (shown on Figures 4A and 4B), the driller will install soil vapor points in accordance with the October 2006 NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York, revised May 2017:

- SSB02_0-5_042513 ([Hg] = 1,790 mg/kg);
- SSB-2E_0-5_122219 ([Hg] = 1,270 mg/kg); and
- SSB-30_6-8 ([Hg] = 1,090 mg/kg).

Each soil vapor point will consist of a dedicated 1-7/8-inch polyethylene implant threaded into polyethylene tubing that will extend to surface grade. The soil vapor points will be installed at the same depth as the corresponding total mercury and mercury speciation soil samples, in a new borehole advanced within about 5 feet of the corresponding soil boring. A clean sand filter pack will be placed around the screen implant and the remaining annular space will be sealed with hydrated bentonite. A seal check will be performed at each installed soil vapor point with a helium tracer gas before and after sample collection. Prior to sampling, three tubing volumes will be purged from the soil vapor point using a multi-gas monitor, with a flow rate of about 0.15 liters per minute. The multi-gas monitor and Jerome® J405 mercury vapor analyzer (or equivalent) will also be used to screen the vapor for the presence of VOCs and mercury vapor.

Soil vapor samples will be collected using laboratory-provided, 6-liter air canisters equipped with 2-hour sample interval flow controllers. Soil vapor samples will be analyzed by Alpha, and for mercury vapor by Modified NIOSH Method 6009. A QAPP is presented in Appendix C.

2.2.4 Supplemental Emerging Contaminant Sampling

At eight locations distributed evenly throughout the site, soil samples will be collected from 0 to 2 feet bgs for analysis for emerging contaminants (per- and polyfluoroalkyl substances [PFAS] and 1,4-dioxane).

2.2.5 Clean Cover in Western Portion of Site

After slab removal, the western portion of the site (an about 46,000-square-foot area) will be backfilled with a temporary about 6-inch-thick clean cover layer until remediation is completed

under the forthcoming RAWP and the cover is replaced with a DER-10 compliant final cover. The temporary cover may consist of an impermeable material (e.g., asphalt), depending on the results of the supplemental mercury sampling described in Section 2.2.3 (see below). The site will be locked and inaccessible to the public during IRMWP implementation, and the western portion of the site will remain locked and inaccessible until RAWP implementation is complete and a DER-10 compliant final cover is installed. The estimated volume of clean cover material to be imported and placed during the IRM is about 900 cubic yards (CY).

Backfill material for the temporary cover will consist of clean soil or other acceptable fill material such as virgin quarry sand or stone or recycled concrete aggregate (RCA). Imported soil will be sampled and must meet the lower of the Part 375 PGW and RURR SCOs, as set forth in Table 375-6.8(b) of 6 NYCRR Part 375. RCA or virgin sand or stone aggregate may be imported without analytical data if it contains less than 10 percent by weight passing a No. 80 sieve. If RCA is imported to the site, it will be from NYSDEC-permitted or registered facilities in compliance with 6 NYCRR Part 360 registration and permitting requirements for the period of acquisition of RCA. RCA imported to the site must be derived from recognizable and uncontaminated concrete. RCA may be used as a temporary cover on the western portion of the site, but would be replaced by a DER-10 compliant final cover as part of the forthcoming RAWP that will describe the final remedy. Prior to installation, imported material will be screened for visual, olfactory, or instrumental evidence of contamination. Native soil excavated from the site during IRM implementation may be used in the clean cover layer if it meets the reuse requirements set forth in Section 2.3.8.

The results of the supplemental mercury sampling described in Section 2.2.3 will be used to determine whether the clean cover layer would be protective of human health and the environment. If the speciation results indicate that mercury volatility represents a public health concern, the RE will consult with the NYSDEC and NYSDOH to determine whether an impermeable cover material (e.g. asphalt) is required to reduce the potential exposures and ensure protection of public health.

Proposed IRM clean cover or pavement extents are presented on Figure 3.

2.2.6 Support-of-Excavation Installation

The proposed SOE will comprise a continuous soldier pile and timber lagging wall along the eastern site perimeter and the eastern half of the north and south site perimeters (see Figure 3). The SOE wall will be constructed using driven and drilled steel soldier piles installed from surface grade to a minimum of about 36 feet bgs, followed by installation of timber lagging between the piles. The soldier pile and lagging wall will provide SOE for construction of the proposed building, and will remain in place after building construction is completed.

Limited pre-excavation may be needed along the SOE wall to clear shallow obstructions and prepare the surface for equipment mobilization and pile installation. Soil that is disturbed during implementation of the IRM will be managed on-site, stockpiled on top of plastic sheeting until disposal or reuse, and covered when not being handled.

2.2.7 Remedial Excavation in Eastern Portion of Site

The eastern portion of the site (an about 34,000-square-foot area) will be excavated to a depth of about 14 feet bgs (about el. 7). A 1:1 slope will be excavated from the western end of the remedial excavation subgrade up to existing grade in the western portion of the site, and will be backfilled to existing grade after remedial excavation is complete. The stratigraphy in the eastern portion of the site consists of historic fill to a maximum depth of about 8.5 feet bgs, based on previous soil borings, underlain by native soil. The excavation will achieve Track 2 RURR SCOs by removing all historic fill in the eastern 34,000 square feet of the site (about 43% of the site).

The estimated volumes of historic fill and soil to be removed during the IRM are as follows:

- Historic fill excavation: About 12,000 CY
- Native soil excavation: About 6,500 CY

Excavated soil will be screened with a PID equipped with a 10.6 electron-volt (eV) lamp. If grossly-impacted soil is observed, it will be segregated for separate stockpiling, handling, and disposal. The excavated soil will be disposed of at a permitted off-site disposal facility(ies) in accordance with applicable regulations. Proposed disposal facility documentation will be presented to the NYSDEC prior to disposal activities. The proposed remedial excavation extents are presented on Figure 3.

2.3 Remedial Activity Oversight

A Langan engineer, scientist, or geologist will be on-site full-time during implementation of the IRMWP. Visual, olfactory, and PID soil screening and assessment will be performed for soil that is disturbed. The IRM activities will be documented in daily reports, monthly progress reports, and in the Constriction Completion Report (CCR) described in Section 4.0.

2.3.1 Soil Screening Methods

Visual, olfactory and PID soil screening and assessment will be performed by an engineer, geologist or scientist under the direct supervision of the Remedial Engineer (RE) or qualified environmental professional (QEP) during all soil-intrusive work performed under the IRMWP. Instrumental screening will be performed with a PID equipped with a 10.6 eV bulb and calibrated daily.

2.3.2 Monitoring Well Abandonment

Prior to slab demolition and excavation, on-site and adjacent sidewalk monitoring wells at risk of being destroyed during IRM implementation will be decommissioned in accordance with NYSDEC Commissioner's Policy (CP)-43: Groundwater Monitoring Well Decommissioning Policy by grouting them in place by a licensed contractor. The upper 5 feet of well casing and associated surface well materials will be removed following grouting. The upper 5 feet of the remaining borehole will be backfilled with either imported stone or production-grade silica sand. A representative for the RE will document the decommissioning and provide a summary and photographs of the activities in daily reports and the CCR.

2.3.3 Waste Characterization

Waste characterization samples will be collected from soil, chromium-impacted or decontaminated concrete, and rinsate water (if applicable) proposed for disposal during implementation of the IRM. Samples will be analyzed per disposal facility requirements. This activity will be coordinated and overseen by a representative of the RE. Samples will be representative of the material requiring disposal and will occur at a frequency consistent with disposal facility requirements.

Waste characterization samples will be submitted to a NYSDOH Environmental Laboratory Approval Program (ELAP)-approved laboratory for analysis in accordance with the QAPP provided in Appendix C. Waste characterization samples will be analyzed for parameters that are typically required by disposal facilities. The following list is provided for planning purposes and may not reflect the analyses performed for waste characterization:

- 6 NYCRR Part 375/Total Compound List (TCL)/New Jersey Department of Environmental Protection (NJDEP) VOCs, extractable petroleum hydrocarbon (EPH), SVOCs, pesticides, herbicides, polychlorinated biphenyls (PCB), and target analyte list (TAL) metals (including hexavalent chromium);
- TCLP VOCs, SVOCs, pesticides, herbicides, and metals;
- Resource Conservation and Recovery Act (RCRA) characteristics, including ignitability, corrosivity, and reactivity (sulfide and cyanide);
- Total cyanide; and
- Paint filter analysis.

2.3.4 Stockpiles

Soil and concrete stockpiles will be constructed as necessary, pending off-site removal. Separate stockpiles will be constructed to avoid co-mingling different materials. Stockpiles will meet the following requirements:

- Individual stockpiles will not exceed 2,000 CY.

- Different material types will be segregated into separate stockpiles.
- Excavated soil, if stockpiled above soil of a different type, will be placed onto two layers of a minimum 8-mil low-permeability liner of sufficient strength and thickness to prevent puncture during use. Equipment and procedures will be used to place and remove the soil and minimize the potential to jeopardize the integrity of the liner.
- Stockpiles will be covered upon reaching capacity or, if active, at the end of each workday with minimum 8-mil plastic sheeting or tarps which will be securely anchored to the ground.
- Each stockpile area will be encircled with silt fences and hay bales as needed to contain and filter particulates from any rainwater runoff, and to mitigate the potential for surface water run-on.
- Stockpiles will be inspected once each week, at a minimum, and after every storm event. Any deficiencies will be promptly addressed. Any damaged tarps or coverings will be promptly replaced.
- Results of inspections will be recorded in a logbook and maintained at the site and made available for inspection by NYSDEC.

2.3.5 Material Load Out and Transport

Non-hazardous material will be handled, transported and disposed by a licensed hauler in accordance with applicable 6 NYCRR Part 360 Solid Waste Management Facilities requirements, 6 NYCRR Part 364 Waste Transporter Permit requirements, and other applicable federal, state and local regulations. Historic fill and contaminated soil from the site will not be disposed of at Part 360.15 registered facilities (also known as Soil Recycling Facilities) unless the requirements of Part 360.13 Special requirements for predetermined beneficial use of fill material are met and approved by the NYSDEC.

The waste disposal contractor will provide appropriate permits, certifications, and written commitments from disposal facilities to accept the material throughout the duration of the project. Waste manifests will be used to track transported material off-site. Haulers will be appropriately licensed and trucks will be properly placarded.

A representative for the RE will oversee the load-out of excavated material. After the loading of a container, dump truck, or trailer has been completed, the material will be transported to a NYSDEC-approved off-site disposal facility. Loaded vehicles leaving the site will be appropriately lined, securely covered, and manifested in accordance with appropriate federal, state, local, and New York State Department of Transportation (NYSDOT) requirements (or other applicable transportation requirements). Loads containing wet material capable of producing free liquid will not be transported off-site. A truck wash/cleaning area will be operated on-site. The RE will be responsible for documenting that all outbound trucks are washed/cleaned at the truck wash

before leaving the site until IRMWP implementation is complete. Locations where vehicles enter or exit the site shall be inspected daily for evidence of off-site sediment tracking. Proposed truck routes are shown on Figure 5.

2.3.6 Materials Disposal Off-site

The RE will review submittals for proposed disposal facilities before any materials leave the site to verify that the facility has the proper permits and to review their acceptance requirements. Waste characterization will be performed per Section 2.3.3. Sampling and analytical methods, sampling frequency, analytical results, and quality assurance/quality control (QA/QC) methods will be reported in the CCR. Waste characterization data available for soil/material to be disposed of at a given facility will be submitted to the disposal facility with suitable explanation prior to shipment and receipt. A letter from the disposal facility stating it is in receipt of the correspondence and is approved to accept the material shall be provided before any material is transported. Proposed disposal facility documentation will be presented to the NYSDEC prior to disposal activities.

2.3.7 Documentation Sampling

One documentation soil sample will be collected per every 900 square feet of excavation base, at about 14 feet bgs, in accordance with DER-10. A Track 2 cleanup requires the top 15 feet of soil to meet the RURR SCOs; therefore, additional documentation soil samples will be collected at 15 feet bgs (1 foot beneath the excavation base) at a frequency of one sample per 900 square feet. Sidewall soil samples will be collected at a frequency of one per every 30 linear feet along the western perimeter of the excavation. Sidewall samples will not be collected from the northern, eastern, or southern excavation perimeters, because the SOE system will preclude access to soil sidewalls.

Samples will be collected to document remedial performance, transported under standard chain-of-custody protocol to an NYSDOH ELAP-approved laboratory, and analyzed for the Part 375 list of VOCs, SVOCs, PCBs, pesticides and metals. Laboratory analyses will be conducted in accordance with Environmental Protection Agency (EPA) SW-846 methods and reported in the NYSDEC Analytical Services Protocol (ASP) Category B deliverable format. QA/QC procedures required by the NYSDEC ASP and SW-846 methods will be followed, including instrument calibration, standard compound spikes, surrogate compound spikes, and analysis of quality control samples. The laboratory will provide sample bottles, which are pre-cleaned and preserved. Where there are differences in the SW-846 and NYSDEC ASP requirements, the NYSDEC ASP shall take precedence.

A data usability summary report (DUSR) will be included in the CCR. Quality control procedures for the sampling are included in the QAPP (Appendix C). Documentation sample results will be

provided in NYSDEC electronic data deliverable (EDD) format for EQuIS™. Guidance on sampling frequency is presented in Section 5.4 of DER-10.

The CCR will provide a tabular and map summary of all documentation sample results.

2.3.8 Materials Reuse On-site

Non-hazardous historic fill or native soil that meets the lower of the 6 NYCRR Part 375 PGW or RURR SCOs (see DER-10 Section 5.4[e]4) may be reused or re-graded on-site at the discretion of the RE. Reused soil placed beneath the composite cover must be non-hazardous in accordance with the predetermined beneficial use, listed in 6 NYCRR 360.13. Soil removed during implementation of the remedy or other purposes will not be reused within a cover soil layer or within landscaped areas, unless approved by the NYSDEC. Reuse of soil will be coordinated in advance with the NYSDEC case manager. Material intended for reuse on-site will be stockpiled separately from waste material.

2.3.9 Import of Backfill and Clean Fill Material

Backfill from off-site sources will sampled for emerging contaminants (PFAS and 1,4-dioxane) in accordance with DER-10, Table 5.4(e)10 (Recommended Number of Soil Samples for Soil Imported to a Site) and analytical results will meet the lower (more restrictive) of the 6 NYCRR Part 375 RURR and PGW SCOs. Soil will not be imported without prior approval by the NYSDEC. Documentation from each proposed import facility will be obtained, including the facility name, address, state department permits, and site history, if necessary, in accordance with NYSDEC DER-10 5.4(e)6. Representative samples of all imported material will be collected and analyzed on import volume at a frequency consistent with DER-10, Table 5.4(e)10.

Backfill material will consist of clean soil or other acceptable fill material such as virgin quarry sand or stone or RCA. If RCA is imported to the site, it will be from NYSDEC-permitted or registered facilities in compliance with 6 NYCRR Part 360 registration and permitting requirements for the period of acquisition of RCA. RCA imported to the site must be derived from recognizable and uncontaminated concrete. RCA or virgin sand or stone aggregate may be imported without analytical data if it contains less than 10 percent by weight passing a No. 80 sieve.

If not paved following removal of the at-grade slab and foundation elements, the western portion of the site will be capped with a temporary about 6-inch-thick clean cover layer until remediation is completed under the forthcoming RAWP. Prior to its placement, imported material will be screened for visual, olfactory, or instrumental evidence of contamination. As an alternative, the western portion of the site may be covered with impermeable pavement until RAWP implementation. RCA may be used as a temporary cover on the western portion of the site, but would be replaced by a DER-10 compliant final cover as part of the final remedy. The site will be

locked and inaccessible to the public during IRMWP implementation, and the western portion of the site will be locked and inaccessible until RAWP implementation is complete.

Material from industrial sites, spill sites, other environmental remediation sites or other potentially impacted sites will also not be imported to the site. The imported fill will not include solid waste such as brick, concrete, glass, ash, wood, or other debris. Materials proposed for import onto the site will be sampled (if necessary), found to be in compliance with provisions in the IRMWP, and approved by the RE prior to receipt.

2.3.10 Fluids Management

Based on the depth to groundwater observed during previous investigations, localized dewatering may be required during excavation of the eastern portion of the site. Liquids to be removed from the site, including dewatering fluids, will be handled, transported and disposed of in accordance with applicable local, state, and federal regulations. Liquids generated during dewatering of groundwater and pooled surface water following precipitation events may be discharged into the New York City sewer system; approval will be obtained from the NYCDEP and a NYCDEP permit issued before any water is discharged to the sewer. Dewatering fluids not suitable for discharge to the NYCDEP sewer system may be collected, characterized, and managed off-site.

2.4 Contingency Plan

If underground storage tanks (USTs) or other previously unidentified contaminant sources are found during SOE installation, excavation, or other IRM activities, sampling will be performed on any product and surrounding subsurface material (e.g., soil, stone, etc.). Chemical analysis will include full scan parameters (Part 375 VOCs, SVOCs, PCBs, pesticides, and metals). Analyses will not be otherwise limited without NYSDEC approval.

If encountered, USTs will be decommissioned and closed in conformance with the criteria defined in 6 NYCRR Part 613-3.5, NYSDEC CP-51, and other applicable NYSDEC UST closure requirements including DER-10 Chapter 5.5.

Identification of unknown or unexpected contaminated media identified by screening during invasive site work will be promptly communicated by phone to NYSDEC Project Manager. These findings will be also be detailed in daily reports and the CCR.

2.5 Dust, Odor, Vapor and Nuisance Control Plan

This dust, odor, vapor and nuisance control plan was developed in accordance with the site-specific Community Air Monitoring Plan (CAMP) and Occupational Safety and Health Administration (OSHA) standards for construction (29 CFR 1926). Construction activities will be monitored for dust and odors by the RE's field inspector. Continuous monitoring on the perimeter

of the work zones for odor, VOCs, and dust will be required for all ground-intrusive activities such as soil excavation and handling. Continuous monitoring on the perimeter of the work zones for mercury vapor will be performed during ground-intrusive activities in the western portion of the site (i.e. in the area of known mercury impacts to soil); depending on the results of work zone mercury vapor monitoring, the scope of mercury monitoring may be re-assessed (see Section 2.8). The work zone is defined as the general area in which machinery is operating in support of IRM activities.

Two stationary air monitoring stations will be set up at site perimeters (one upwind and one downwind) for continuous monitoring during soil-intrusive work. Each station will include a PID, a DustTrak™ aerosol monitor (or equivalent), and a Jerome® J405 mercury vapor analyzer (or equivalent). A portable PID will be used to monitor the work zone for VOCs. Action levels for protection of the community and visitors are set forth in the CAMP that is included in Section 2.8.

2.5.1 Odor and Vapor Control

This odor control plan is capable of controlling off-site emissions of nuisance odors. Specific odor control methods to be used on a routine basis may include application of foam suppressants, application of Mercon-X™ (in the event that mercury vapor action levels are exceeded), or tarps over odorous or VOC source areas, as needed. If nuisance odors are identified, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC and NYSDOH will be notified of odor events and of other complaints about the project. Implementation of odor controls, including the halt of work, will be the responsibility of the RE, who is responsible for certifying the CCR. Application of odor and vapor controls is the responsibility of the Contractor.

All necessary means will be employed to prevent on- and off-site nuisances. If odors develop and cannot be otherwise controlled, means to eliminate odor nuisances may include: (a) shrouding open excavations with tarps and other covers; (b) use of odor-suppressing foam; (c) use of chemical odorants in spray or misting systems; and, (d) use of staff to monitor odors in the surrounding neighborhood.

2.5.2 Dust Control

A dust suppression plan that addresses dust management during invasive work will include, at a minimum, the items listed below:

- Use of a dedicated water distribution system, water trucks, or an alternate source with suitable supply and pressure for use in dust control.
- Gravel will be used on roadways to provide a clean and dust-free road surface.

On-site roads will be limited in total area to minimize the area required for water spraying.

2.5.3 Other Nuisances

A plan for rodent control will be developed and utilized by the Contractor prior to and during site clearing and site grubbing, and during all remedial work. A plan for noise control will be developed and utilized by the Contractor for IRM work and will conform, at a minimum, to NYCDEP noise control standards.

2.6 Contractor's Means and Methods

Appropriate management of structural stability of on- and/or off-site structures during SOE installation activities will be performed by the Contractor. The Contractor is solely responsible for safe execution of all invasive and other work performed under this IRMWP and will be responsible for obtaining any local, state or federal permits or approvals that may be required to perform work under this IRMWP.

2.7 Construction Health and Safety Plan

The RE prepared a site-specific CHASP, which is provided as Appendix A. The CHASP specifically addresses health and safety requirements pertaining to site contamination and will apply to all remedial and construction-related work on site. Contractors operating on the site are required to adhere to their own plans that, at a minimum, meet the requirements of the CHASP. The CHASP requires that all remedial work performed under this plan be in full compliance with governmental requirements, including site and worker safety requirements mandated by Federal OSHA. The CHASP provides a mechanism for establishing on-site safe working conditions, safety organization, procedures, and personal protective equipment (PPE) requirements during the IRM. The CHASP meets the requirements of 29 CFR 1910 and 29 CFR 1926 (which includes 29 CFR 1910.120 and 29 CFR 1926.65, respectively).

2.8 Community Air Monitoring Plan

Community air monitoring will be conducted in compliance with the site-specific CAMP outlined below.

The CAMP includes real-time continuous monitoring for VOCs, mercury vapor, and particulates at the downwind perimeter of each designated work area when certain activities are in progress. Continuous monitoring is required for all ground-intrusive activities and during demolition of metals-contaminated or potentially metals-contaminated structures. Ground-intrusive activities include, but are not limited to, pre-excavations for preparation of the working surface, removal of footings, and mass excavation in the eastern portion of the site.

CAMP monitoring will be conducted with the following equipment (or equivalent):

- MiniRAE 3000 PIDs (for VOCs)
- Jerome® J405 mercury vapor analyzers
- TSI DustTrak™ aerosol monitors (for particulate matter less than 10 microns in diameter [PM10]).

Monitoring for particulates, vapor, and odors will be conducted during all ground-intrusive activities by the RE's field inspector. The work zone is defined as the general area in which machinery is operating in support of IRM activities. A portable PID will be used within the work zone for periodic monitoring of VOCs during IRM activities. Should supplemental mercury sampling results indicate the presence of volatile mercury, a Jerome® J405 mercury vapor analyzer (or equivalent) will also be used within the work zone in accordance with the attached CHASP. The site perimeter will be visually monitored for fugitive dust emissions.

The following actions will be taken based on measured VOC levels:

- If total VOC levels exceed 5 parts per million (ppm) above background for the 15-minute average at the perimeter, work activities will be temporarily halted and monitoring continued. If levels readily decrease (per instantaneous readings) below 5 ppm above background, work activities will resume with continued monitoring.
- If total VOC levels at the downwind perimeter of the work zone persist at levels in excess of 5 ppm above background but less than 25 ppm, work activities will be halted, the source of vapors identified, corrective actions taken to abate emissions and monitoring continued. After these steps work will resume if the total organic vapor level 200 feet downwind of the work 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, is below 5 ppm above background for the 15-minute average.
- If the total VOC level is above 25 ppm at the perimeter of the work zone, work will be shut down.

The following actions will be taken based on elevated PM10 concentrations and/or visual dust observations:

- If the downwind PM10 concentration is 100 micrograms per cubic meter (µg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work zone, then dust suppression must be employed. Work may continue with dust suppression techniques provided that downwind PM10 levels do not exceed 150 µg/m^3 above the background level and provided that no visible dust is migrating from the work zone.

- If, after implementation of dust suppression techniques, downwind PM10 levels are greater than 150 µg/m³ above the background level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM10 concentration to within 150 µg/m³ of the upwind level and in preventing visible dust migration.

The following actions will be taken based on mercury vapor concentrations:

- If the downwind mercury vapor level is 3 µg/m³ for the 15-minute period, then boring installation and excavation activities will be halted and all exposed soil will be covered with polyethylene sheeting and/or containerized in closed 55-gallon drums, and work will cease. If levels readily decrease (per instantaneous readings) below 3 µg/m³ above background, work activities will resume with continued monitoring.
- If mercury vapor levels at the downwind perimeter of the work zone persist at levels in excess of 10 µg/m³ above background, work activities will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps work activities will resume provided that the mercury vapor level 200 feet downwind of the work 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, is below 3 µg/m³ above background for the 15-minute average.

The action level for mercury vapor in a residential setting is 1.0 µg/m³ for a 15-minute average[2] above background; this action level will be conservatively used to determine the potential risk to public health represented by mercury vapor at the site. Mercury vapor monitoring will be performed at the site perimeter during ground-intrusive activities in the western portion of the site (i.e. in the area of known mercury impacts to soil). If no sustained 15-minute average mercury vapor concentrations exceed 1.0 µg/m³ during the course of a representative data set of site activities, the RE will consult with the NYSDEC and NYSDOH to determine if continued mercury vapor monitoring is required as part of ongoing CAMP implementation.

Concentrations detected above the CAMP action levels will be reported to the NYSDEC and NYSDOH project managers and included in daily reports and the CCR. In addition, a map showing the location of the downwind and upwind CAMP stations will be included in each daily report.

[2] Reference to the March 22, 2012 Chemical Specific Health Consultation, prepared for Joint EPA/ATSDR National Mercury Cleanup Policy Workgroup - Action Levels For Elemental Mercury Spills, Section 2.2.1 Residential Settings – Normal Occupancy

3.0 SCHEDULE

The Volunteer anticipates that the IRM implementation will take about 6 to 8 months from mobilization through completion. After completion of the IRM, the remainder of the site will be remediated under a forthcoming NYSDEC-approved RAWP.

3.1 Notification

The NYSDEC will be notified at least seven calendar days prior to commencement of work related to the IRM to arrange a pre-construction meeting.

4.0 REPORTING

Following implementation of the NYSDEC-approved IRMWP, a CCR will be prepared and submitted. During the IRM, progress reports will be prepared and submitted as described below. The RE responsible for certifying the CCR will be an individual licensed to practice engineering in the State of New York. Jason Hayes, P.E. of Langan Engineering will have this responsibility. Should Mr. Hayes become unable to fulfill this responsibility, another suitably qualified New York State professional engineer will take his place.

Daily reports and monthly progress reports will be provided in electronic format (e.g., PDF) to the NYSDEC's project manager during IRMWP implementation. Electronic copies of the daily reports and monthly progress reports will be included in the CCR.

4.1 Daily Reports

Daily reports will be submitted to NYSDEC and NYSDOH Project Managers by the end of each week following the reporting period and will include:

- A progress update;
- A description of work locations;
- A site plan depicting relevant IRMWP site activities;
- A summary of complaints with relevant details (names, phone numbers);
- A summary of CAMP results; and
- Deviations from the IRMWP (if applicable).

Daily reports are not intended to be the mode of communication for notification to the NYSDEC of emergencies (accident, spill), requests for changes to the IRMWP or other sensitive or time critical information. However, such conditions will also be included in the daily reports. Emergency conditions and deviations to the IRMWP will be addressed directly to NYSDEC Project Manager via personal communication. If site conditions warrant, the RE may request to change from daily to weekly reports that include the above information.

4.2 Monthly Reports

Consistent with the BCA, monthly reports will be submitted to NYSDEC and NYSDOH Project Managers by the 10th of each month following the reporting period and will include:

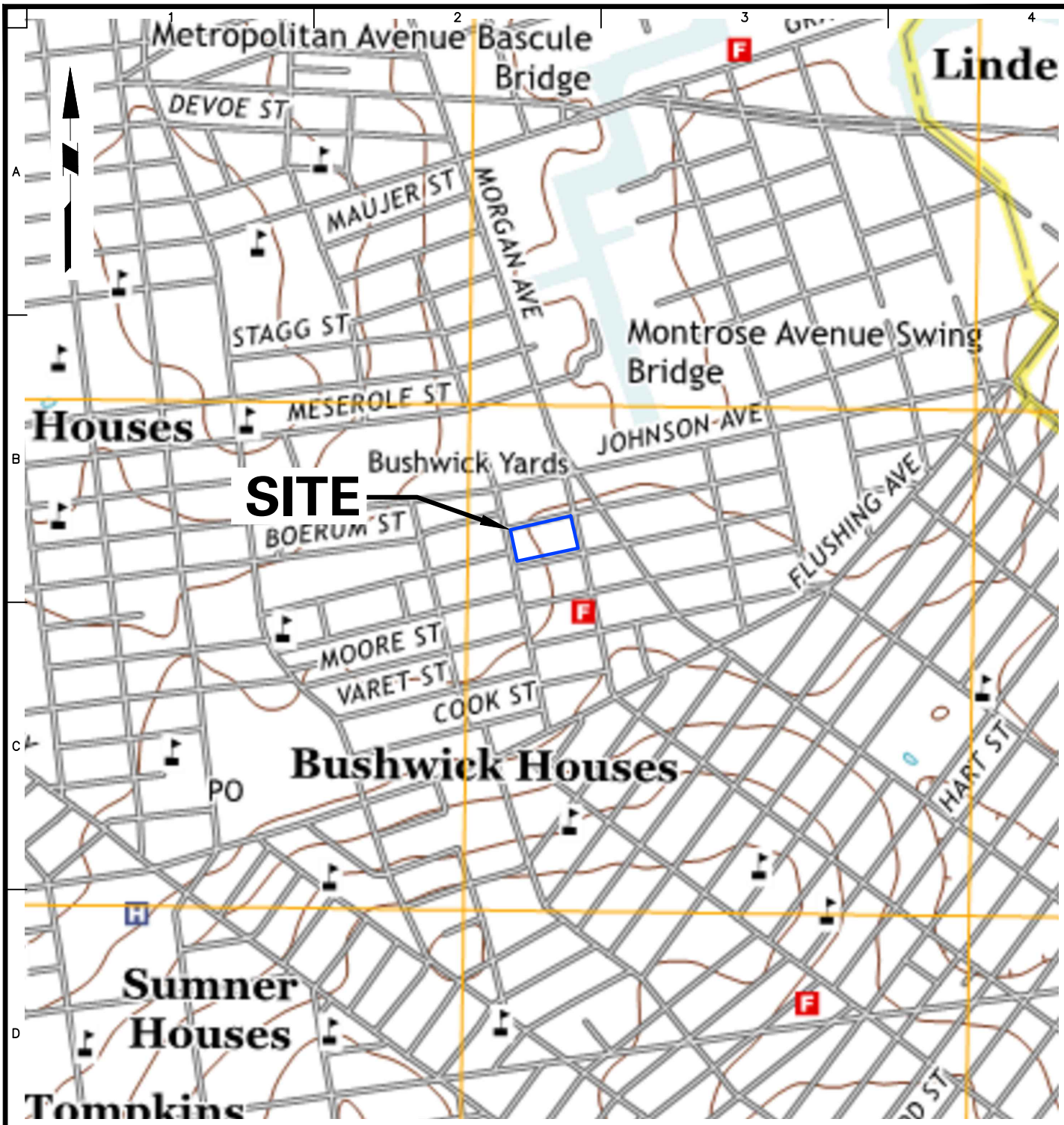
- Activities relative to the site during the previous reporting period and those anticipated for the next reporting period, including a quantitative presentation of work performed;
- Description of approved activity modifications, including changes of work scope and/or schedule;

- Sampling results received following internal data review and validation, as applicable; and
- An update of the remedial schedule including the percentage of project completion, unresolved delays encountered or anticipated that may affect the future schedule, and efforts made to mitigate such delays.

4.3 Construction Completion Report

A CCR, prepared in accordance with DER-10 Section 5.8, will be submitted to the NYSDEC following IRMWP implementation. The CCR will provide documentation that the remedial work required under the IRMWP was completed in substantial compliance with these plans.

FIGURES



MAP REFERENCE: USGS 7.5-MINUTE BROOKLYN, N.Y. (2013) TOPOGRAPHIC QUADRANGLE

1000 0 500 1000

SCALE IN FEET

LEGEND:

SITE BOUNDARY

LANGAN

21 Penn Plaza, 360 West 31st Street, 8th Floor
New York, NY 10001
T: 212.479.5400 F: 212.479.5444 www.langan.com

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

Project

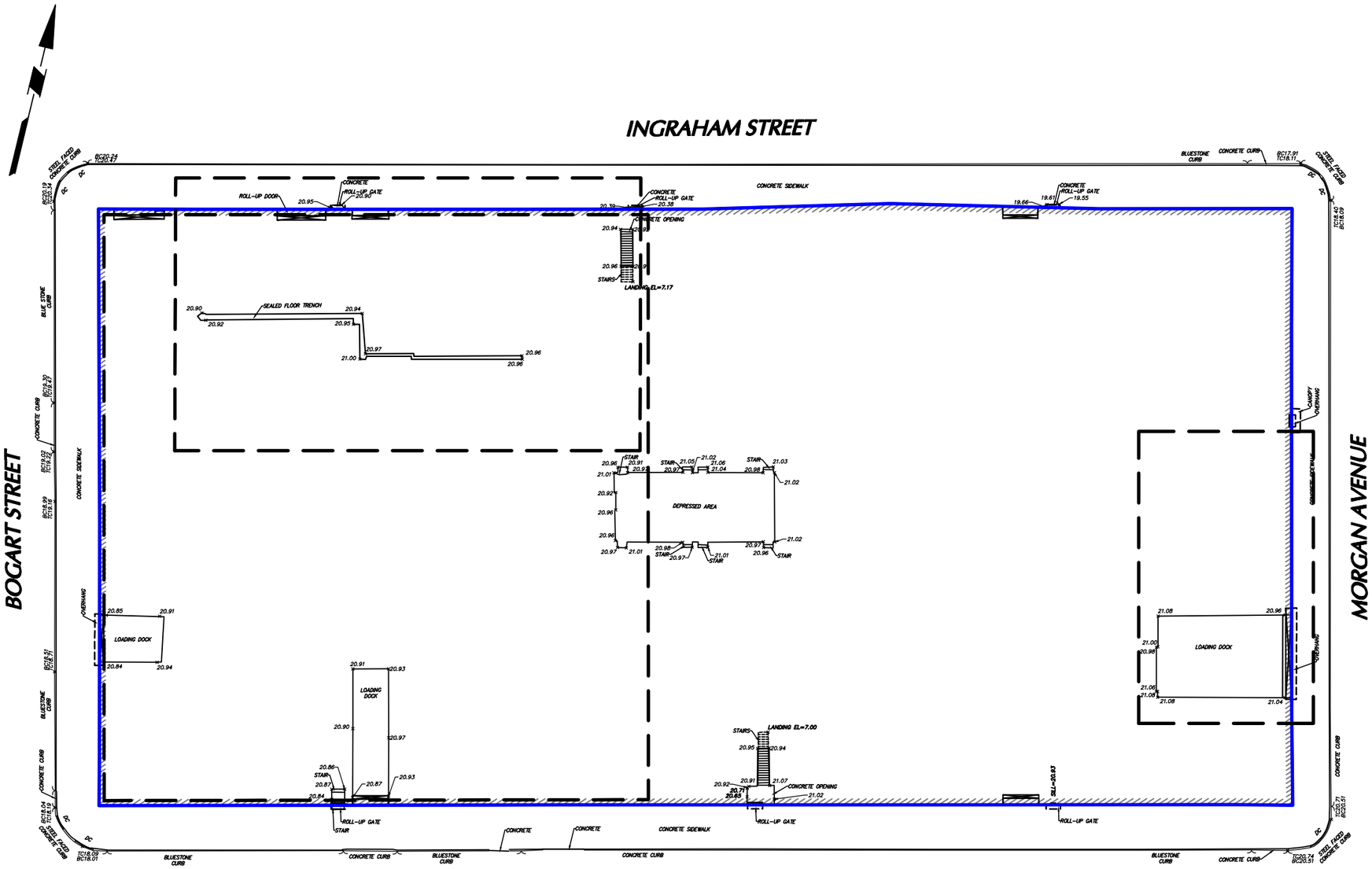
2 INGRAHAM STREET

BLOCK No. 3084, LOT No. 1
BROOKLYN
KINGS NEW YORK

Figure Title

SITE LOCATION MAP

Project No. 170519402	Figure No. 1
Date 4/11/2019	
Scale 1" = 1000'	
Drawn By JFY / Checked By PTF	
Submission Date	Sheet 1 of 6



LEGEND:

- APPROXIMATE SITE BOUNDARY
- APPROXIMATE AOC 1 THROUGH 3 BOUNDARIES

AOCs:

AOC 1 - METALS-IMPACTED HISTORIC FILL IN WESTERN PORTION OF SITE

AOC 2 - FORMER METAL PLATING TRENCH DRAIN AREA

AOC 3 - SOLVENT IMPACTS IN EASTERN PORTION OF SITE

AOC 4 - SITE-WIDE GROUNDWATER AND SUB-SLAB VAPOR QUALITY

NOTES:

1. BASE MAP IS TAKEN FROM "PARTIAL TOPOGRAPHIC SURVEY", PREPARED BY LANGAN, DATED FEBRUARY 14, 2019
2. ELEVATIONS SHOWN ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)
3. AOC = AREA OF CONCERN

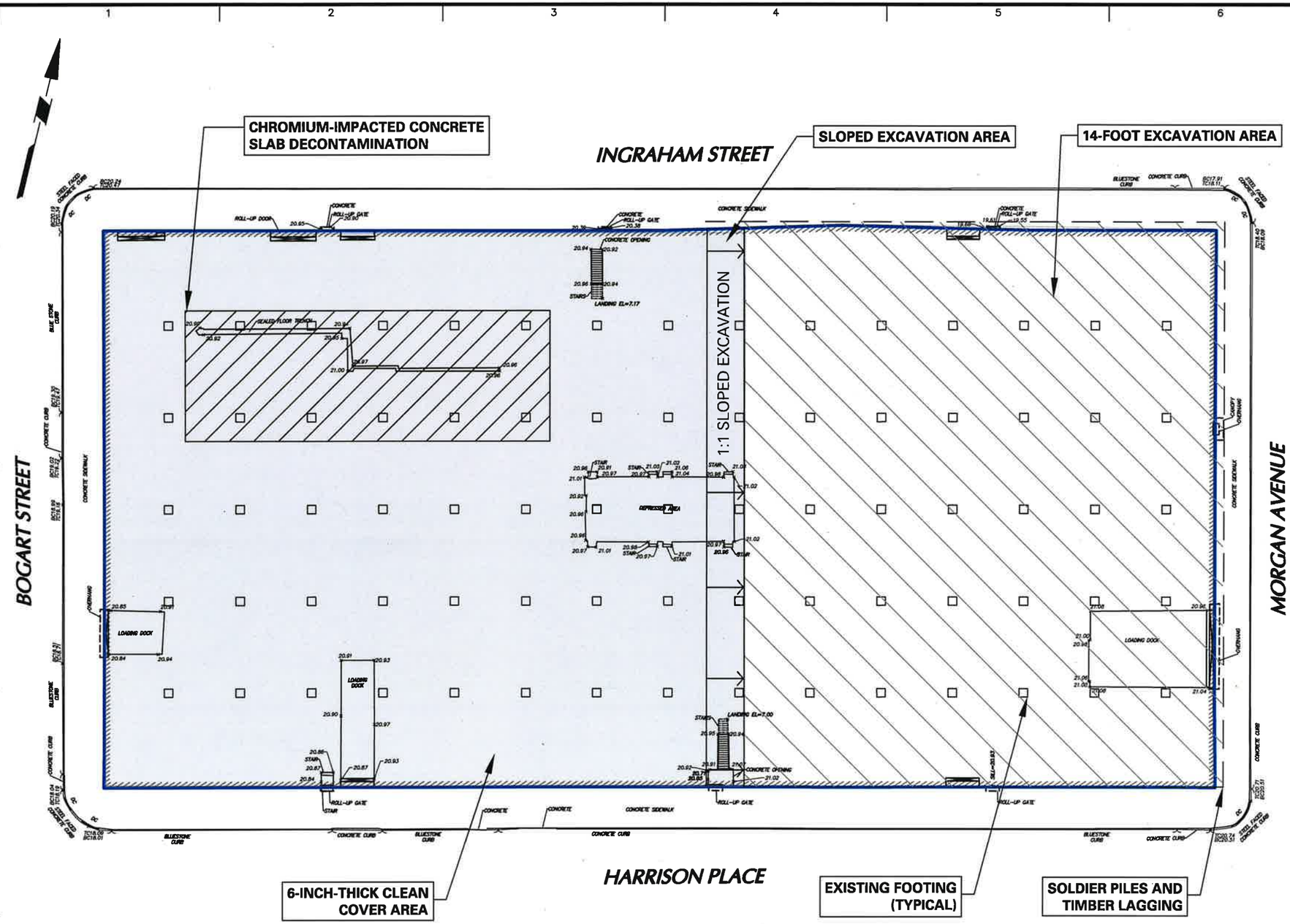
WARNING: IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS ITEM IN ANY WAY.

40 0 10 25 40
SCALE IN FEET

LANGAN
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
21 Penn Plaza, 360 West 31st Street, 8th Floor
New York, NY 10001
T: 212.479.5400 F: 212.479.5444 www.langan.com

Project	2 INGRAHAM STREET BLOCK No. 3084 LOT No. 1 BROOKLYN KINGS NEW YORK
Figure Title	SITE PLAN
Project No.	170519402
Date	04/11/2019
Drawn By	JFY
Checked By	PF
Figure No.	2
Sheet	2 of 6

Filename: \\langan.com\data\NYC\data4\170519401\Project Data\CAD\01\SheetFiles\Environmental\IRMWP\Figure 2 - Site Layout Plan.dwg Date: 8/23/2019 Time: 09:31 User: knagotko Style Table: Langan.stb Layout: ANSIB-BL



LEGEND:

- APPROXIMATE SITE BOUNDARY
- APPROXIMATE LOCATION OF PROPOSED EXCAVATION TO 14 FEET BELOW GRADE SURFACE (ABOUT EL. 7 FEET) AND INSTALLATION OF A REINFORCED CONCRETE FOUNDATION SLAB
- APPROXIMATE LOCATION OF PROPOSED ABOUT 6-INCH-THICK CLEAN COVER LAYER OR IMPERMEABLE PAVEMENT
- APPROXIMATE LOCATION OF PROPOSED SLAB DECONTAMINATION
- APPROXIMATE LOCATION OF PROPOSED FOOTING TO BE REMOVED
- APPROXIMATE LOCATION OF PROPOSED SUPPORT-OF-EXCAVATION SOLDIER PILE AND TIMBER LAGGING WALL

NOTES:

1. BASE MAP IS TAKEN FROM "PARTIAL TOPOGRAPHIC SURVEY", PREPARED BY LANGAN, DATED FEBRUARY 14, 2019
2. ELEVATIONS SHOWN ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)
3. APPROXIMATE FOOTING LOCATIONS TAKEN FROM "EXCAVATION SHORING & SHEETING PLAN", PREPARED BY RAS P.E. CONSULTING ENGINEERS, DATED JUNE 12, 2017
4. SUPPORT-OF-EXCAVATION INFORMATION TAKEN FROM DRAWING SOE-100.00, "SUPPORT OF EXCAVATION PLAN", PREPARED BY GEODESIGN INCORPORATED AND DATED APRIL 26, 2019
5. APPROXIMATE BOTTOM OF FOOTING ELEVATION IS ABOUT 8.5 FEET BELOW GRADE SURFACE (ABOUT EL. 12.5 FEET)
6. EXCAVATION WILL EXTEND ABOUT 3 FEET NORTH OF NORTH PROPERTY LINE AND 3 FEET EAST OF EAST PROPERTY LINE. FOUNDATION SLAB WILL ONLY BE INSTALLED INSIDE PROPERTY LINE.

WARNING: IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS ITEM IN ANY WAY.

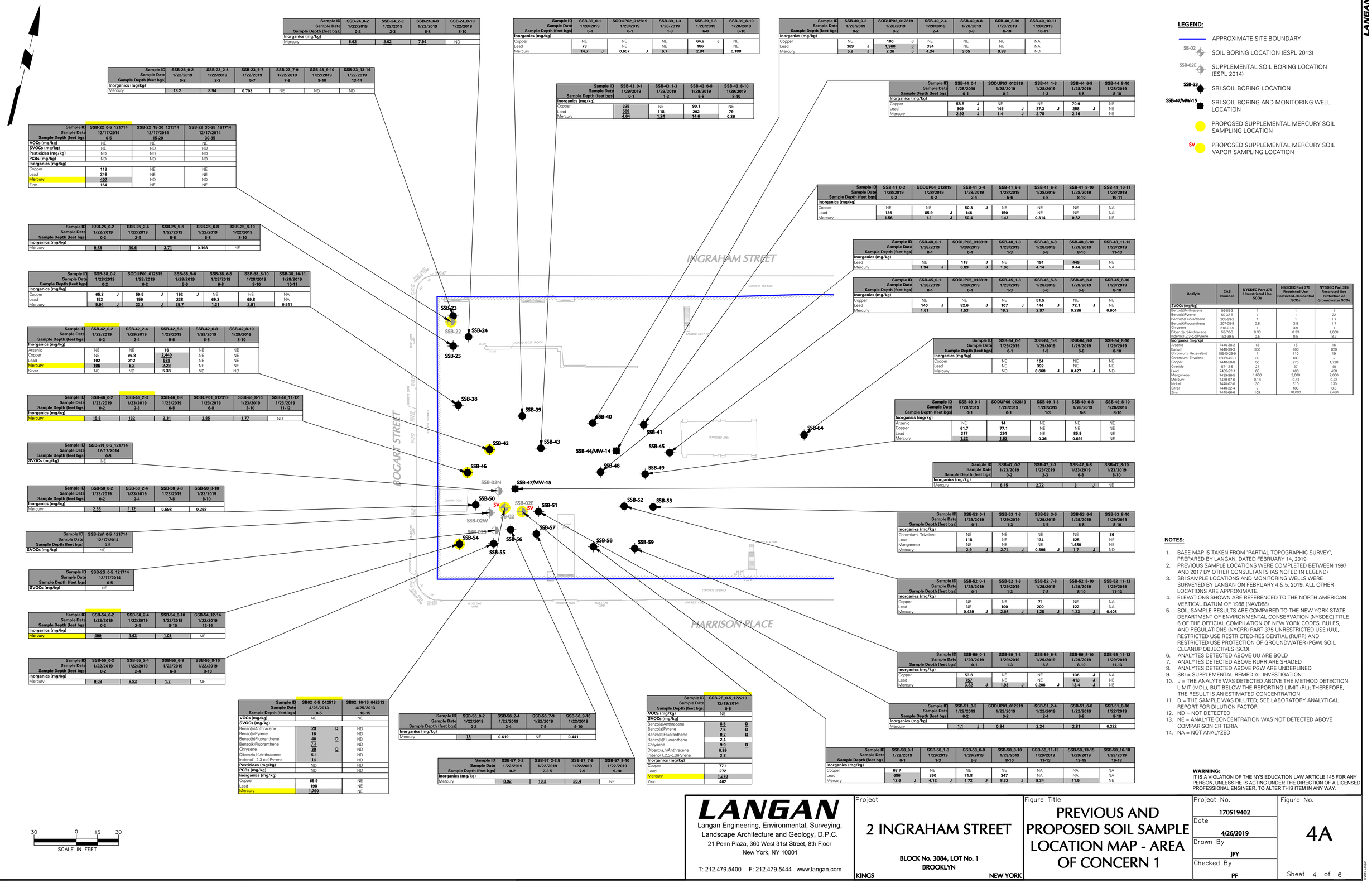
40 0 10 25 40
SCALE IN FEET

STATE OF NEW YORK · JASON JAMES HAYES · LICENSED PROFESSIONAL ENGINEER · 089491
SIGNATURE 9/10 DATE
PROFESSIONAL ENGINEER NY Lic. No. 089491

LANGAN
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
21 Penn Plaza, 360 West 31st Street, 8th Floor
New York, NY 10001
T: 212.479.5400 F: 212.479.5444 www.langan.com

Project	2 INGRAHAM STREET BLOCK No. 3084 LOT No. 1 BROOKLYN KINGS NEW YORK
Figure Title	PROPOSED INTERIM REMEDIAL MEASURES LOCATION PLAN
Project No.	170519402
Date	08/23/2019
Drawn By	KN
Checked By	PF
Figure No.	3
Sheet	3 of 6

Filename: \\langan.com\data\NYC\data4\170519401\Project Data\CAD\01\SheetFiles\Environmental\IRMWP\Figure 3 - Remedial Excavation Plan V2.dwg Date: 8/30/2019 Time: 09:35 User: knagotko Style Table: Langan.stb Layout: ANSIB-BL



Sample ID	SSB-24_0-2	SSB-24_2-3	SSB-24_6-8	SSB-24_8-10
Sample Date	1/22/2019	1/22/2019	1/22/2019	1/22/2019
Sample Depth (feet bgs)	0-2	2-3	6-8	8-10
Inorganics (mg/kg)				
Mercury	**6.62**	**2.02**	**7.94**	ND

Sample ID	SSB-39_0-1	SODUP02_012819	SSB-39_1-3	SSB-39_6-8	SSB-39_8-10
Sample Date	1/28/2019	1/28/2019	1/28/2019	1/28/2019	1/28/2019
Sample Depth (feet bgs)	0-1	0-1	1-3	6-8	8-10
Inorganics (mg/kg)					
Copper	NE	NE	NE	**64.2** J	NE
Lead	**73**	NE	NE	**186**	NE
Mercury	**14.7** J	**0.657** J	**6.7**	**2.84**	**0.188**

Sample ID	SSB-40_0-2	SODUP03_012819	SSB-40_2-4	SSB-40_6-8	SSB-40_8-10	SSB-40_10-11
Sample Date	1/28/2019	1/28/2019	1/28/2019	1/28/2019	1/28/2019	1/28/2019
Sample Depth (feet bgs)	0-2	0-2	2-4	6-8	8-10	10-11
Inorganics (mg/kg)						
Copper	NE	**100** J	NE	NE	NE	NA
Lead	**369** J	**1,960** J	**334**	NE	NE	NA
Mercury	**5.2** J	**2.06** J	**4.34**	**3.05**	**9.88**	ND

Sample ID	SSB-23_0-2	SSB-23_2-3	SSB-23_5-7	SSB-23_7-9	SSB-23_9-10	SSB-23_13-14
Sample Date	1/22/2019	1/22/2019	1/22/2019	1/22/2019	1/22/2019	1/22/2019
Sample Depth (feet bgs)	0-2	2-3	5-7	7-9	9-10	13-14
Inorganics (mg/kg)						
Mercury	**13.2**	**8.94**	**0.703**	NE	ND	ND

Sample ID	SSB-43_0-1	SSB-43_1-3	SSB-43_6-8	SSB-43_8-10
Sample Date	1/29/2019	1/29/2019	1/29/2019	1/29/2019
Sample Depth (feet bgs)	0-1	1-3	6-8	8-10
Inorganics (mg/kg)				
Copper	**325**	NE	**90.1**	NE
Lead	**568**	**118**	**292**	**79**
Mercury	**4.64**	**1.24**	**14.6**	**0.36**

Sample ID	SSB-44_0-1	SODUP07_012819	SSB-44_1-3	SSB-44_6-8	SSB-44_8-10
Sample Date	1/28/2019	1/28/2019	1/28/2019	1/28/2019	1/28/2019
Sample Depth (feet bgs)	0-1	0-1	1-3	6-8	8-10
Inorganics (mg/kg)					
Copper	**58.8** J	NE	NE	**70.9**	NE
Lead	**309** J	**145** J	**87.3** J	**258** J	NE
Mercury	**2.92** J	**1.4** J	**2.78**	**2.16**	NE

Sample ID	SSB-22_0-5_121714	SSB-22_15-20_121714	SSB-22_30-35_121714
Sample Date	12/17/2014	12/17/2014	12/17/2014
Sample Depth (feet bgs)	0-5	15-20	30-35
VOCs (mg/kg)	NE	NE	NE
SVOCs (mg/kg)	NE	ND	ND
Pesticides (mg/kg)	ND	ND	ND
PCBs (mg/kg)	ND	ND	ND
Inorganics (mg/kg)			
Copper	**113**	NE	NE
Lead	**248**	NE	NE
Mercury	**407**	ND	ND
Zinc	**164**	NE	NE

Sample ID	SSB-41_0-2	SODUP04_012819	SSB-41_2-4	SSB-41_5-6	SSB-41_6-8	SSB-41_8-10	SSB-41_10-11
Sample Date	1/28/2019	1/28/2019	1/28/2019	1/28/2019	1/28/2019	1/28/2019	1/28/2019
Sample Depth (feet bgs)	0-2	0-2	2-4	5-6	6-8	8-10	10-11
Inorganics (mg/kg)							
Copper	NE	NE	**50.3** J	NE	NE	NE	NA
Lead	**138**	**85.9** J	**146**	**150**	NE	NE	NA
Mercury	**1.56**	**1.1** J	**50.4**	**1.43**	**0.314**	**0.82**	NE

Sample ID	SSB-25_0-2	SSB-25_2-4	SSB-25_5-6	SSB-25_6-8	SSB-25_8-10
Sample Date	1/22/2019	1/22/2019	1/22/2019	1/22/2019	1/22/2019
Sample Depth (feet bgs)	0-2	2-4	5-6	6-8	8-10
Inorganics (mg/kg)					
Mercury	**9.83**	**10.6**	**3.71**	**0.198**	NE

Sample ID	SSB-48_0-1	SODUP08_012819	SSB-48_1-3	SSB-48_6-8	SSB-48_8-10	SSB-48_11-13
Sample Date	1/28/2019	1/28/2019	1/28/2019	1/28/2019	1/28/2019	1/28/2019
Sample Depth (feet bgs)	0-1	0-1	1-3	6-8	8-10	11-13
Inorganics (mg/kg)						
Lead	NE	**118** J	NE	**191**	**449**	NE
Mercury	**1.94** J	**6.89** J	**1.06**	**4.14**	**0.44**	NA

Sample ID	SSB-38_0-2	SODUP01_012819	SSB-38_5-6	SSB-38_6-8	SSB-38_8-10	SSB-38_10-11
Sample Date	1/28/2019	1/28/2019	1/28/2019	1/28/2019	1/28/2019	1/28/2019
Sample Depth (feet bgs)	0-2	0-2	5-6	6-8	8-10	10-11
Inorganics (mg/kg)						
Copper	**65.3** J	**59.5** J	**192** J	NE	NE	NA
Lead	**153**	**159**	**238**	**69.3**	**69.8**	NA
Mercury	**5.94** J	**23.2** J	**35.7**	**1.31**	**2.91**	**0.511**

Sample ID	SSB-45_0-1	SODUP05_012819	SSB-45_1-3	SSB-45_5-6	SSB-45_6-8	SSB-45_8-10
Sample Date	1/28/2019	1/28/2019	1/28/2019	1/28/2019	1/28/2019	1/28/2019
Sample Depth (feet bgs)	0-1	0-1	1-3	5-6	6-8	8-10
Inorganics (mg/kg)						
Copper	NE	NE	NE	**51.5**	NE	NE
Lead	**140** J	**82.6** J	**107** J	**144** J	**72.1** J	NE
Mercury	**1.61**	**1.53**	**19.3**	**2.97**	**0.286** J	**0.604**

Sample ID	SSB-42_0-2	SSB-42_2-4	SSB-42_5-6	SSB-42_6-8	SSB-42_8-10
Sample Date	1/29/2019	1/29/2019	1/29/2019	1/29/2019	1/29/2019
Sample Depth (feet bgs)	0-2	2-4	5-6	6-8	8-10
Inorganics (mg/kg)					
Arsenic	NE	NE	**16**	NE	NE
Copper	NE	**96.8**	**2,440**	NE	NE
Lead	**102**	**212**	**588**	NE	NE
Mercury	**106**	**6.2**	**2.29**	NE	NE
Silver	NE	ND	**5.38**	ND	ND

Sample ID	SSB-64_0-1	SSB-64_1-3	SSB-64_6-8	SSB-64_8-10
Sample Date	1/29/2019	1/29/2019	1/29/2019	1/29/2019
Sample Depth (feet bgs)	0-1	1-3	6-8	8-10
Inorganics (mg/kg)				
Copper	NE	**104**	NE	NE
Lead	NE	**392**	NE	NE
Mercury	ND	**0.668** J	**0.427** J	ND

Sample ID	SSB-46_0-2	SSB-46_2-3	SSB-46_6-8	SODUP01_012319	SSB-46_8-10	SSB-46_11-12
Sample Date	1/23/2019	1/23/2019	1/23/2019	1/23/2019	1/23/2019	1/23/2019
Sample Depth (feet bgs)	0-2	2-3	6-8	6-8	8-10	11-12
Inorganics (mg/kg)						
Mercury	**15.8**	**132**	**2.31**	**2.85**	**1.77**	ND

Sample ID	SSB-49_0-1	SODUP06_012819	SSB-49_1-3	SSB-49_6-8	SSB-49_8-10
Sample Date	1/28/2019	1/28/2019	1/28/2019	1/28/2019	1/28/2019
Sample Depth (feet bgs)	0-1	0-1	1-3	6-8	8-10
Inorganics (mg/kg)					
Arsenic	NE	**14**	NE	NE	NE
Copper	**61.7**	**77.1**	NE	NE	NE
Lead	**317**	**291**	NE	**85.9**	NE
Mercury	**1.32**	**1.53**	**0.36**	**0.691**	NE

Sample ID	SSB-2N_0-5_121714
Sample Date	12/17/2014
Sample Depth (feet bgs)	0-5
SVOCs (mg/kg)	NE

Sample ID	SSB-47_0-2	SSB-47_2-3	SSB-47_6-8	SSB-47_8-10
Sample Date	1/23/2019	1/23/2019	1/23/2019	1/23/2019
Sample Depth (feet bgs)	0-2	2-3	6-8	8-10
Inorganics (mg/kg)				
Mercury	**6.15**	**2.72**	**3** J	NE

Sample ID	SSB-50_0-2	SSB-50_2-4	SSB-50_7-8	SSB-50_8-10
Sample Date	1/23/2019	1/23/2019	1/23/2019	1/23/2019
Sample Depth (feet bgs)	0-2	2-4	7-8	8-10
Inorganics (mg/kg)				
Mercury	**2.33**	**1.12**	**0.598**	**0.268**

Sample ID	SSB-53_0-1	SSB-53_1-3	SSB-53_3-5	SSB-53_6-8	SSB-53_8-10
Sample Date	1/29/2019	1/29/2019	1/29/2019	1/29/2019	1/29/2019
Sample Depth (feet bgs)	0-1	1-3	3-5	6-8	8-10
Inorganics (mg/kg)					
Chromium, Trivalent	NE	NE	NE	NE	**36**
Lead	**118**	NE	**134**	**125**	NE
Manganese	NE	NE	NE	**1,680**	NE
Mercury	**2.9** J	**2.74** J	**0.396** J	**1.7** J	ND

Sample ID	SSB-2W_0-5_121714
Sample Date	12/17/2014
Sample Depth (feet bgs)	0-5
SVOCs (mg/kg)	NE

Sample ID	SSB-52_0-1	SSB-52_1-3	SSB-52_7-8	SSB-52_8-10	SSB-52_11-13
Sample Date	1/29/2019	1/29/2019	1/29/2019	1/29/2019	1/29/2019
Sample Depth (feet bgs)	0-1	1-3	7-8	8-10	11-13
Inorganics (mg/kg)					
Copper	NE	NE	**71**	NE	NA
Lead	NE	**100**	**200**	**122**	NA
Mercury	**0.429** J	**2.08** J	**1.28** J	**1.23** J	**0.408**

Sample ID	SSB-2S_0-5_121714
Sample Date	12/17/2014
Sample Depth (feet bgs)	0-5
SVOCs (mg/kg)	NE

Sample ID	SSB-59_0-1	SSB-59_1-3	SSB-59_6-8	SSB-59_8-10	SSB-59_11-13
Sample Date	1/29/2019	1/29/2019	1/29/2019	1/29/2019	1/29/2019
Sample Depth (feet bgs)	0-1	1-3	6-8	8-10	11-13
Inorganics (mg/kg)					
Copper	**53.6**	NE	NE	**136** J	NA
Lead	**757**	NE	NE	**413** J	NE
Mercury	**3.82** J	**1.93** J	**0.206** J	**13.4** J	NE

Sample ID	SSB-54_0-2	SSB-54_2-4	SSB-54_8-10	SSB-54_12-14
Sample Date	1/22/2019	1/22/2019	1/22/2019	1/22/2019
Sample Depth (feet bgs)	0-2	2-4	8-10	12-14
Inorganics (mg/kg)				
Mercury	**499**	**1.63**	**1.03**	NE

Sample ID	SSB-51_0-2	SODUP01_012219	SSB-51_2-4	SSB-51_6-8	SSB-51_8-10
Sample Date	1/22/2019	1/22/2019	1/22/2019	1/22/2019	1/22/2019
Sample Depth (feet bgs)	0-2	0-2	2-4	6-8	8-10
Inorganics (mg/kg)					
Mercury	**1.1** J	**0.84**	**3.34**	**2.81**	**0.322**

Sample ID	SSB-55_0-2	SSB-55_2-4	SSB-55_6-8	SSB-55_8-10
Sample Date	1/22/2019	1/22/2019	1/22/2019	1/22/2019
Sample Depth (feet bgs)	0-2	2-4	6-8	8-10
Inorganics (mg/kg)				
Mercury	**9.03**	**8.83**	**1.7**	NE

Sample ID	SB02_0-5_042513	SB02_10-15_042513
Sample Date	4/25/2013	4/25/2013
Sample Depth (feet bgs)	0-5	10-15
VOCs (mg/kg)	NE	NE
SVOCs (mg/kg)		
Benzo(a)Anthracene	**29** D	ND
Benzo(a)Pyrene	**16**	ND
Benzo(b)Fluoranthene	**40** D	ND
Benzo(k)Fluoranthene	**7.4**	ND
Chrysene	**39** D	ND
Dibenz(a,h)Anthracene	**5.1**	ND
Indeno(1,2,3-c,d)Pyrene	**14**	ND
Pesticides (mg/kg)	ND	ND
PCBs (mg/kg)	ND	ND
Inorganics (mg/kg)		
Copper	**65.9**	NE
Lead	**198**	NE
Mercury	**1.790**	NE

Sample ID	SSB-56_0-2	SSB-56_2-4	SSB-56_7-9	SSB-56_9-10
Sample Date	1/22/2019	1/22/2019	1/22/2019	1/22/2019
Sample Depth (feet bgs)	0-2	2-4	7-9	9-10
Inorganics (mg/kg)				
Mercury	**18**	**0.619**	NE	**0.441**

Sample ID	SSB-57_0-2	SSB-57_2-3.5	SSB-57_7-9	SSB-57_9-10
Sample Date	1/22/2019	1/22/2019	1/22/2019	1/22/2019
Sample Depth (feet bgs)	0-2	2-3.5	7-9	9-10
Inorganics (mg/kg)				
Mercury	**8.92**	**10.3**	**20.4**	NE

Sample ID	SSB-2E_0-5_122219
Sample Date	12/19/2014
Sample Depth (feet bgs)	0-5
VOCs (mg/kg)	NE
SVOCs (mg/kg)	
Benzo(a)Anthracene	**8.5** D
Benzo(a)Pyrene	**7.5** D
Benzo(b)Fluoranthene	**9.7** D
Benzo(k)Fluoranthene	**2.4**
Chrysene	**9.9** D
Dibenz(a,h)Anthracene	**0.99**
Indeno(1,2,3-c,d)Pyrene	**3.8**
Inorganics (mg/kg)	
Copper	**77.1**
Lead	**272**
Mercury	**1.270**
Zinc	**402**

Sample ID	SSB-58_0-1	SSB-58_1-3	SSB-58_6-8	SSB-58_8-10	SSB-58_11-13	SSB-58_13-15	SSB-58_16-18
Sample Date	1/29/2019	1/29/2019	1/29/2019	1/29/2019	1/29/2019	1/29/2019	1/29/2019
Sample Depth (feet bgs)	0-1	1-3	6-8	8-10	11-13	13-15	16-18
Inorganics (mg/kg)							
Copper	**63.7**	NE	NE	NE	NA	NA	NA
Lead	**686**	**360**	**71.8**	**347**	NA	NA	NA
Mercury	**12.6** J	**4.12** J	**1.72** J	**8.32** J	**9.34**	**11.5**	NE

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Restricted Use Restricted-Residential SCOs	NYSDEC Part 375 Restricted Use Protection of Groundwater SCOs
SVOCs (mg/kg)				
Benzo(a)Anthracene	56-55-3	1	1	1
Benzo(a)Pyrene	50-32-8	1	1	22
Benzo(b)Fluoranthene	205-99-2	1	1	1.7
Benzo(k)Fluoranthene	207-08-9	0.8	3.9	1.7
Chrysene	218-01-9	1	3.9	1
Dibenz(a,h)Anthracene	53-70-3	0.33	0.33	1,000
Indeno(1,2,3-c,d)Pyrene	193-39-5	0.5	0.5	8.2
Inorganics (mg/kg)				
Arsenic	7440-38-2	13	16	16
Barium	7440-39-3	350	400	820
Chromium, Hexavalent	18540-29-9	1	110	19
Chromium, Trivalent	16065-83-1	30	180	-
Copper	7440-50-8	50	270	1,720
Cyanide	57-12-5	27	27	40
Lead	7439-92-1	63	400	450
Manganese	7439-96-5	1,600	2,000	2,000
Mercury	7439-97-6	0.18	0.81	0.73
Nickel	7440-02-0	30	310	130
Silver	7440-22-4	2	180	8.3
Zinc	7440-66-6	109	10,000	2,480

LEGEND:

- APPROXIMATE SITE BOUNDARY
- SB-02 — SOIL BORING LOCATION (ESPL 2013)
- SSB-02E — SUPPLEMENTAL SOIL BORING LOCATION (ESPL 2014)
- SSB-23 — SRI SOIL BORING LOCATION
- SSB-47/MW-15 — SRI SOIL BORING AND MONITORING WELL LOCATION
- PROPOSED SUPPLEMENTAL MERCURY SOIL SAMPLING LOCATION
- SV — PROPOSED SUPPLEMENTAL MERCURY SOIL VAPOR SAMPLING LOCATION

NOTES:

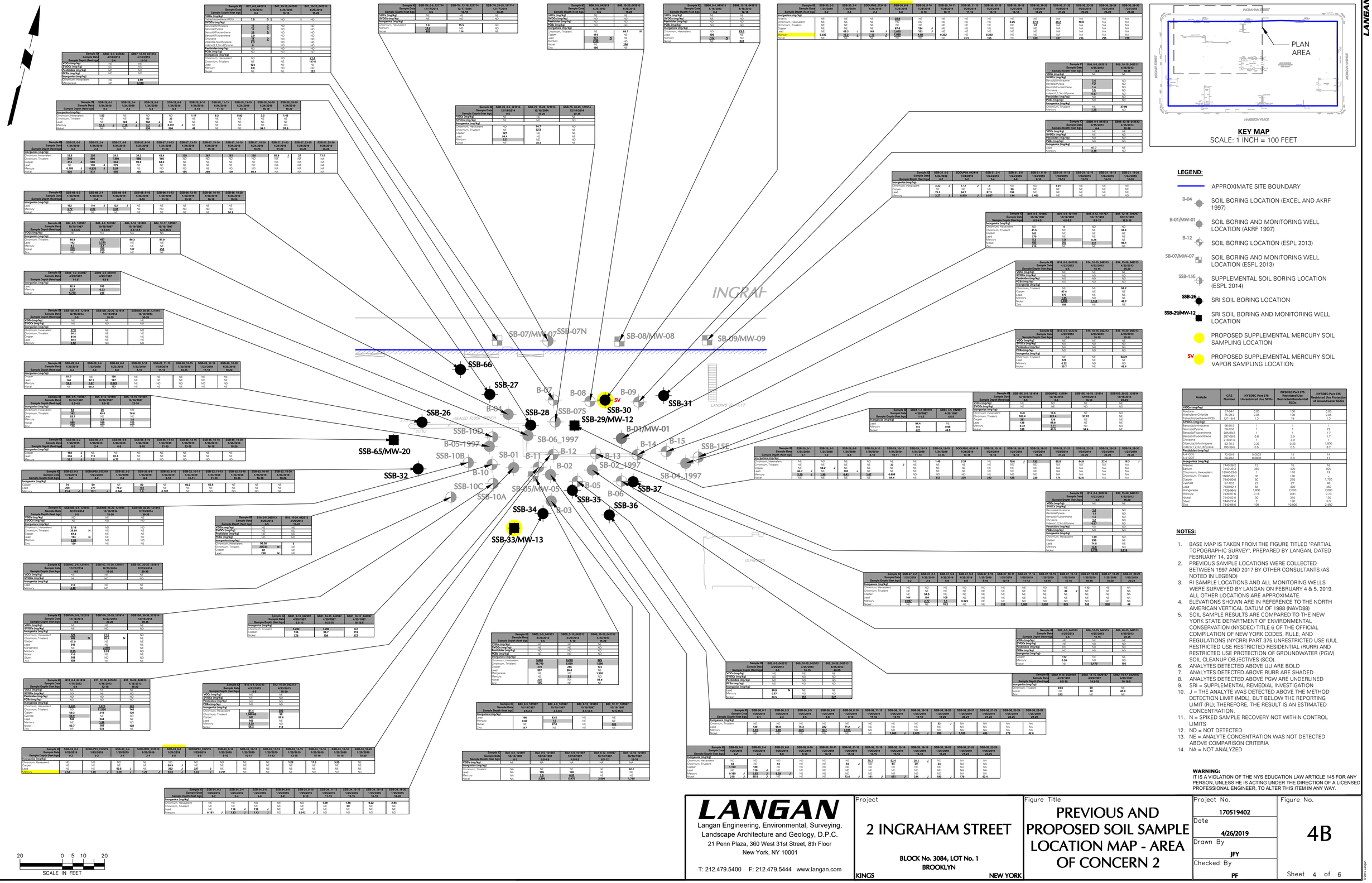
1. BASE MAP IS TAKEN FROM "PARTIAL TOPOGRAPHIC SURVEY", PREPARED BY LANGAN, DATED FEBRUARY 14, 2019
2. PREVIOUS SAMPLE LOCATIONS WERE COMPLETED BETWEEN 1997 AND 2017 BY OTHER CONSULTANTS (AS NOTED IN LEGEND)
3. SRI SAMPLE LOCATIONS AND MONITORING WELLS WERE SURVEYED BY LANGAN ON FEBRUARY 4 & 5, 2019. ALL OTHER LOCATIONS ARE APPROXIMATE.
4. ELEVATIONS SHOWN ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)
5. SOIL SAMPLE 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 (UU), RESTRICTED USE RESTRICTED-RESIDENTIAL (RURR) AND RESTRICTED USE PROTECTION OF GROUNDWATER (PGW) SOIL CLEANUP OBJECTIVES (SCO).
6. ANALYTES DETECTED ABOVE UU ARE BOLD
7. ANALYTES DETECTED ABOVE RURR ARE SHADED
8. ANALYTES DETECTED ABOVE PGW ARE UNDERLINED
9. SRI = SUPPLEMENTAL REMEDIAL INVESTIGATION
10. J = THE ANALYTE WAS DETECTED ABOVE THE METHOD DETECTION LIMIT (MDL), BUT BELOW THE REPORTING LIMIT (RL); THEREFORE, THE RESULT IS AN ESTIMATED CONCENTRATION
11. D = THE SAMPLE WAS DILUTED; SEE LABORATORY ANALYTICAL REPORT FOR DILUTION FACTOR
12. ND = NOT DETECTED
13. NE = ANALYTE CONCENTRATION WAS NOT DETECTED ABOVE COMPARISON CRITERIA
14. NA = NOT ANALYZED

LANGAN
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
21 Penn Plaza, 360 West 31st Street, 8th Floor
New York, NY 10001
T: 212.479.5400 F: 212.479.5444 www.langan.com

Project
2 INGRAHAM STREET
BLOCK No. 3084, LOT No. 1
BROOKLYN
KINGS NEW YORK

Figure Title
PREVIOUS AND PROPOSED SOIL SAMPLE LOCATION MAP - AREA OF CONCERN 1

Project No.	Figure No.
170519402	4A
Date: 4/26/2019	
Drawn By: JFY	
Checked By: PF	Sheet 4 of 6



KEY MAP
SCALE: 1 INCH = 100 FEET

LEGEND:

- APPROXIMATE SITE BOUNDARY
- B-04 — SOIL BORING LOCATION (EXCEL AND AKRF 1997)
- B-01/MW-01 — SOIL BORING AND MONITORING WELL LOCATION (AKRF 1997)
- B-12 — SOIL BORING LOCATION (ESPL 2013)
- SB-07/MW-07 — SOIL BORING AND MONITORING WELL LOCATION (ESPL 2013)
- SSB-15E — SUPPLEMENTAL SOIL BORING LOCATION (ESPL 2014)
- SSB-26 — SRI SOIL BORING LOCATION
- SSB-29/MW-12 — SRI SOIL BORING AND MONITORING WELL LOCATION
- PROPOSED SUPPLEMENTAL MERCURY SOIL SAMPLING LOCATION
- SV — PROPOSED SUPPLEMENTAL MERCURY SOIL VAPOR SAMPLING LOCATION

Analyte	CAS Number	NYSDEC Part 375 Unrestricted Use SCOs	NYSDEC Part 375 Restricted Use Restricted-Residential SCOs	NYSDEC Part 375 Restricted Use Protection of Groundwater SCOs
VOCs (mg/kg)				
Acetone	67-64-1	0.05	100	0.05
Methylene Chloride	75-09-2	0.05	100	0.05
Tetrachloroethene (PCE)	127-18-4	1.3	19	1.3
SVOCs (mg/kg)				
Benzo(a)Anthracene	56-55-3	1	1	1
Benzo(a)Pyrene	50-32-8	1	1	22
Benzo(b)Fluoranthene	205-99-2	1	1	1.7
Benzo(k)Fluoranthene	207-08-9	0.8	3.9	1.7
Chrysene	218-01-9	1	3.9	1
Dibenz(a,h)Anthracene	53-70-3	0.33	0.33	1,000
Indeno(1,2,3-c,d)Pyrene	193-39-5	0.5	0.5	8.2
Pesticides (mg/kg)				
4,4'-DDE	72-55-8	0.0033	13	14
4,4'-DDT	50-29-3	0.0033	8.9	17
Inorganics (mg/kg)				
Arsenic	7440-38-2	13	16	16
Barium	7440-39-3	350	400	820
Chromium, Hexavalent	18540-29-9	1	110	19
Chromium, Trivalent	16065-83-1	30	180	-
Copper	7440-50-8	50	270	1,720
Cyanide	57-12-5	27	27	40
Lead	7439-92-1	63	400	450
Manganese	7439-96-5	1,600	2,000	2,000
Mercury	7439-97-6	0.18	0.81	0.73
Nickel	7440-02-0	30	310	130
Silver	7440-22-4	2	180	8.3
Zinc	7440-66-6	109	10,000	2,480

NOTES:

1. BASE MAP IS TAKEN FROM THE FIGURE TITLED "PARTIAL TOPOGRAPHIC SURVEY", PREPARED BY LANGAN, DATED FEBRUARY 14, 2019
2. PREVIOUS SAMPLE LOCATIONS WERE COLLECTED BETWEEN 1997 AND 2017 BY OTHER CONSULTANTS (AS NOTED IN LEGEND)
3. RI SAMPLE LOCATIONS AND ALL MONITORING WELLS WERE SURVEYED BY LANGAN ON FEBRUARY 4 & 5, 2019. ALL OTHER LOCATIONS ARE APPROXIMATE.
4. ELEVATIONS SHOWN ARE IN REFERENCE TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)
5. SOIL SAMPLE RESULTS ARE COMPARED TO THE NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC) TITLE 6 OF THE OFFICIAL COMPILATION OF NEW YORK CODES, RULE, AND REGULATIONS (NYCRR) PART 375 UNRESTRICTED USE (UU), RESTRICTED USE RESTRICTED RESIDENTIAL (RURR) AND RESTRICTED USE PROTECTION OF GROUNDWATER (PGW) SOIL CLEANUP OBJECTIVES (SCO).
6. ANALYTES DETECTED ABOVE UU ARE BOLD
7. ANALYTES DETECTED ABOVE RURR ARE SHADED
8. ANALYTES DETECTED ABOVE PGW ARE UNDERLINED
9. SRI = SUPPLEMENTAL REMEDIAL INVESTIGATION
10. J = THE ANALYTE WAS DETECTED ABOVE THE METHOD DETECTION LIMIT (MDL), BUT BELOW THE REPORTING LIMIT (RL); THEREFORE, THE RESULT IS AN ESTIMATED CONCENTRATION.
11. N = SPIKED SAMPLE RECOVERY NOT WITHIN CONTROL LIMITS
12. ND = NOT DETECTED
13. NE = ANALYTE CONCENTRATION WAS NOT DETECTED ABOVE COMPARISON CRITERIA
14. NA = NOT ANALYZED

WARNING:
IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS ITEM IN ANY WAY.

LANGAN
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
21 Penn Plaza, 360 West 31st Street, 8th Floor
New York, NY 10001
T: 212.479.5400 F: 212.479.5444 www.langan.com

Project
2 INGRAHAM STREET
BLOCK No. 3084, LOT No. 1
BROOKLYN
KINGS NEW YORK

Figure Title
PREVIOUS AND PROPOSED SOIL SAMPLE LOCATION MAP - AREA OF CONCERN 2

Project No.	Figure No.
170519402	4B
Date	
4/26/2019	
Drawn By	
JFY	
Checked By	
PF	Sheet 4 of 6

3000 0 1500 3000

SCALE IN FEET

AERIAL REFERENCE

LEGEND:

SITE BOUNDARY
TRUCK ROUTE

Legend

Local Truck Route
Trucks with an origin or destination for the purpose of delivery, loading or servicing within the respective Borough, shall only operate on designated local routes, except that an operator may operate on a non-designated street for the purpose of arriving at his/her destination. This shall be accomplished by leaving a designated truck route at the intersection that is nearest to their destination, proceeding by the most direct route, and then returning to the nearest designated truck route by the most direct route. If the operator has additional destinations in the same general area, he/she may proceed by the most direct route to his/her next destination without returning to a designated truck route, provided that the operator's next destination does not require that he/she cross a designated truck route.

Through Truck Route
Trucks having neither an origin nor a destination within the respective Borough shall restrict the operation of such vehicles to those street segments designated as Through Truck Routes.

Through Truck Route on Expressway

Through Truck Route on Tunnel

Exception 53' Trailers Allowed
For definition see information on reverse side.

Industrial Business Zones (IBZ)

Parks and Open Spaces

29A **Highway Exit**

Commercial Vehicles Prohibited

Low Vertical Clearance Area

NOTES:

1. TRUCK ROUTE MAP ADAPTED FROM THE NEW YORK CITY DEPARTMENT OF TRANSPORTATION (NYC DOT) 2015 TRUCK ROUTE MAP.
2. LOCATION OF SITE ACCESS IS SUBJECT TO CHANGE, PENDING CONSTRUCTION LOGISTICS.

WARNING: IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER THIS ITEM IN ANY WAY.

LANGAN
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.
21 Penn Plaza, 360 West 31st Street, 8th Floor
New York, NY 10001
T: 212.479.5400 F: 212.479.5444 www.langan.com

Project	2 INGRAHAM STREET BLOCK No. 3084 LOT No. 1 BROOKLYN KINGS NEW YORK
Figure Title	TRUCK ROUTE MAP
Project No.	170519402
Date	4/11/2019
Drawn By	MSA
Checked By	PF
Figure No.	5
Sheet	6 of 6

Filename: \\langan.com\data\NYC\data4\170519401\Project Data\CAD\01\SheetFiles\Environmental\IRMWP\Figure 4 - Truck Route Map.dwg Date: 8/23/2019 Time: 09:33 User: knagotko Style Table: Langan.stb Layout: ANSIB-BL

APPENDIX A
CONSTRUCTION HEALTH AND SAFETY PLAN (CHASP)

LANGAN

CONSTRUCTION HEALTH AND SAFETY PLAN

FOR

2 INGRAHAM STREET
BROOKLYN, NEW YORK
Brooklyn Borough Tax Map
Block 3084, Lot 1
NYSDEC BCP Site No. C224036

Prepared For

74 Bogart LLC
26 West 27th Street
Suite 801
New York, New York

Prepared By:

Langan Engineering, Environmental, Surveying
Landscape Architecture, and Geology, D.P.C.
21 Penn Plaza
360 West 31st Street, 8th Floor
New York, New York 10001

September 2019
Langan Project No. 170519402

LANGAN

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Page No.

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***** Items to be posted prominently on site, or made readily available to personnel.

1.0 INTRODUCTION

1.1 General

This CONSTRUCTION HEALTH AND SAFETY PLAN (CHASP) was developed to address disturbance of known and reasonably anticipated subsurface contaminants and comply with Occupational Safety and Health Administration (OSHA) Standard 29 CFR 1910.120(b)(4), *Hazardous Waste Operations and Emergency Response* during anticipated site work 2 Ingraham Street, in the borough of Brooklyn, New York (Kings County Tax Map Block 3084, Lot 1) ("the Site"). This CHASP provides the minimum requirements for implementing site operations during future possible remedial measure activities. All contractors performing work on this site shall implement their own CHASP that, at a minimum, adheres to this CHASP. The contractor is responsible for their own health and safety and that of their subcontractors. Langan personnel will implement this CHASP while onsite.

The management of the day-to-day site activities and implementation of this CHASP in the field is the responsibility of the site Langan Field Team Leader (FTL). Assistance in the implementation of this CHASP can also be obtained from the site Langan Health and Safety Officer (HSO) and the Langan Health and Safety Manager (HSM). Contractors operating on the site shall designate their own FTL, HSO and HSM. The content of this CHASP may change or undergo revision based upon additional information made available to health and safety personnel, monitoring results, or changes in the work plan.

1.2 Site Location and Background

The site encompasses Kings County Tax Map Block 3084, Lot 1 and occupies an area of 80,000 square feet at 2 Ingraham Street in the East Williamsburg neighborhood in Brooklyn. The site is currently improved with one one-story building (including a partial cellar) that has been vacant since April 2016. The site was formerly occupied by a laundry, a manufacturing and repair operation (Windsor Manufacturing & Repair Corp), a machine shop, an office, a zipper manufacturer, a chrome and nickel plating operation (Jayar Plating) and an umbrella manufacturer (Macon Umbrella Corporation). Previous environmental investigations have detected multiple heavy metals in site soil and groundwater, and volatile organic compounds (VOCs) in groundwater and soil vapor. Elevated concentrations of metals such as mercury, copper, nickel, manganese, total and hexavalent chromium, and lead have been detected in shallow and deep soil intervals in the western half of the site, with most previous investigations focusing on a trench drain in the northwestern portion of the site that was formerly used to dispose of plating process water and is now filled with concrete. A site location map is included as Figure 1.

1.3 Summary of Work Tasks

1.3.1 Excavation and Soil Screening

Langan personnel will screen excavated material for visual, olfactory, and instrumental indicators suggestive of a potential chemical or petroleum release. Instrument screening for the presence of volatile organic compounds (VOCs) may be performed with a duly calibrated Photoionization detector (PID). Contractors will excavate for utilities, foundation components and potential grading using heavy equipment and hand tools. Contractors will notify Langan personnel if they identify indications suggestive of a potential chemical or petroleum release. Contaminated material shall be handled and property disposed in accordance with federal, state and city regulations, criteria and guidelines.

1.3.2 Waste Characterization - Soil Investigation and Sampling

Langan may retain a drilling contractor to advance soil borings to a depth below grade surface (bgs) specified in the work plan using an indoor drilling device. Borings locations will be based on the results of site inspection and document review. The drilling contractor will contact the appropriate utility mark-out authority and make available to their drilling staff the verification number and effective dates. The borings may be filled with clean soil cuttings after samples are collected.

Langan will screen soil for visual, olfactory, and instrumental indicators suggestive of a potential petroleum release. Instrument screening for the presence of VOCs may be performed with a calibrated PID. Langan will collect soil samples from the two-foot interval exhibiting the greatest degree of visual, olfactory, instrumental impact, and as otherwise specified in the work plan. Soil samples will be submitted to a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP)-certified laboratory and analyzed in accordance with work plan specifications.

1.3.3 Supplemental Mercury Sampling in the Western Portion of the Site

Soil Sampling

An environmental drilling subcontractor will be retained to advance eight soil borings in locations biased toward the maximum mercury concentrations observed during previous investigations.

Soil will be screened continuously to the boring termination depth for total organic vapor (TOV) concentration using a PID equipped with a 10.6 electron volt (eV) bulb, and for visual and olfactory indications of environmental impacts (e.g., staining and odor). Soil will also be screened with a Jerome® J405 mercury vapor analyzer (or equivalent).

Soil samples will be homogenized during sample collection and the sample volume will be split between two laboratories: Alpha Analytical Laboratories (Alpha) and Eurofins Frontier Global

Sciences, Inc. (Eurofins). Alpha, a NYSDOH ELAP-certified laboratory in Westborough, Massachusetts, will analyze samples for total mercury. Mercury speciation will be conducted by Eurofins in Bothell, Washington, a NYSDOH ELAP-certified analytical laboratory, to quantify the concentrations of various mercury species that may be present in the mercury-impacted soil.

Non-disposable, down-hole drilling equipment and sampling apparatus will be decontaminated between locations with Alconox® (or similar) and water where grossly-impacted material is identified. Following sampling, each soil boring will be backfilled with non-impacted soil cuttings and/or clean sand. Grossly-contaminated soil or excess non-impacted soil that cannot fit down the borehole will be containerized in 55-gallon drums for off-site disposal.

Soil Vapor Sampling

The driller will also install three soil vapor points in accordance with the October 2006 NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York, revised May 2017. Each soil vapor point will consist of a dedicated 1-7/8-inch polyethylene implant threaded into polyethylene tubing that will extend to surface grade. The soil vapor points will be installed at the same depth as the corresponding total mercury and mercury speciation soil samples, in a new borehole advanced within about 5 feet of the corresponding soil boring. A clean sand filter pack will be placed around the screen implant and the remaining annular space will be sealed with hydrated bentonite. A seal check will be performed at each installed soil vapor point with a helium tracer gas before and after sample collection. Prior to sampling, three tubing volumes will be purged from the soil vapor point using a multi-gas monitor, with a flow rate of about 0.15 liters per minute. The multi-gas monitor and Jerome® J405 mercury vapor analyzer (or equivalent) will also be used to screen the vapor for the presence of VOCs and mercury vapor.

Soil vapor samples will be collected using laboratory-provided, 6-liter air canisters equipped with 2-hour sample interval flow controllers. Soil vapor samples will be analyzed by Alpha, and for mercury vapor by Modified NIOSH Method 6009.

1.3.4 Supplemental Emerging Contaminant Sampling

At eight locations distributed evenly throughout the site, soil samples will be collected from 0 to 2 feet bgs for analysis for emerging contaminants (per- and polyfluoroalkyl substances [PFAS] and 1,4-dioxane).

1.3.5 Soil Screening

As part of future excavation activities, the Langan personnel will report when they have observed visual and olfactory indications of possible soil impact. Langan personnel will also report concentrations of VOCs above background when using a properly calibrated hand held PID, or equivalent.

1.3.6 Soil Sampling

Soil samples (waste characterization, excavation endpoint, delineation, or quality assurance/quality control [QA/QC]) may be collected during construction, as required. Langan personnel will coordinate with the contractor in sampling soil (in accordance with the SMP, where applicable). If stockpile soil sampling is required from above ground level, suitable excavation equipment (i.e., excavator, front end loader) should be used to collect the sample. Soil samples for excavation endpoint or delineation sampling (along with QA/QC samples) may be collected into laboratory-supplied batch-certified clean glassware and submitted to a NYSDOH ELAP.

1.3.7 Stockpiling

As part of future excavation activities, potentially impacted soil may be stockpiled pending laboratory analysis and determining proper off-site disposal. Visibly contaminated soil, if encountered, shall be segregated and stockpiled on at least 10 millimeters of plastic sheeting; reusable soil and fill shall be segregated and stockpiled separately from unusable fill, concrete and other debris; the stockpiles shall be kept covered with 6 millimeters thick plastic sheeting; the plastic sheeting covering the stockpiles shall be anchored firmly in place by weights, stakes, or both; the Contractor shall maintain the plastic sheeting.

1.3.8 Characterization of Excavated Material

When required by the work plan, Langan personnel will characterize excavated soil or clean backfill in accordance with Langan standards.

1.3.9 Excavation Backfill

Areas of the site that were over-excavated may be backfilled to development grade (i.e., the grade required to complete construction of the foundation and sidewalk extension). Imported material will consist of clean fill that will meet the lower of the 6 New York Codes, Rules and Regulations (NYCRR) Part 375 Protection of Groundwater (PGW) and Restricted Use Restricted-Residential (RURR) Soil Cleanup Objectives (SCO) or other acceptable fill material such as virgin stone from a permitted mine or quarry or recycled concrete aggregate (RCA), from a New York State Department of Environmental Conservation (NYSDEC)-registered facility in compliance with 6 NYCRR Part 360 registration and permitting requirements for the period of RCA acquisition. Imported RCA must be derived from recognizable and uncontaminated concrete. RCA is not acceptable for, and will not be used as, site cover or drainage material.

1.3.10 Decommissioning and Removal of Underground Storage Tank

If an underground storage tank (UST) is encountered, a UST decommissioning and removal contractor shall furnish all labor and materials, equipment and incidentals required for the proper decontamination, removal and closure of any UST in accordance with federal, state and local regulations. Langan personnel will monitor VOCs with a calibrated PID downwind from the UST excavation and record the PID readings.

1.3.11 Construction Dewatering

If construction dewatering is required, the dewatering contractor shall be responsible for handling contaminated dewatering fluids in accordance with federal, state and local regulations. Dewatering fluids are likely to be discharged to the local sanitary sewer system after treatment and under approved regulatory permit. Alternatively, the contractor may provide containerized storage to allow for testing of groundwater prior to, and after, treatment and before disposal. If required, Langan field personnel may sample dewatering treatment system liquids from either a discharge standpipe or a storage tank. Dewatering samples will be submitted to an NYSDOH ELAP-certified laboratory for analysis.

1.3.12 Drum Sampling

Excess or impacted soil and water that is drummed during the remedial action activities must be labeled in accordance with the Langan Drum Labeling Standard Operating Procedure (SOP-#9). Langan personnel will collect drum samples, as required, prior to off-site drum disposal. Samples will be placed into laboratory-supplied batch-certified clean glassware and submitted to a NYSDOH ELAP-certified laboratory.

2.0 IDENTIFICATION OF KEY PERSONNEL/HEALTH AND SAFETY PERSONNEL

The following briefly describes the health and safety (H&S) designations and general responsibilities that may be employed for this site. The titles have been established to accommodate the project needs and requirements and ensure the safe conduct of site activities. The H&S personnel requirements for a given work location are based upon the proposed site activities.

2.1 Langan Project Manager

The Langan Environmental Project Managers (PM) is Patrick Farnham, his responsibilities include:

- Ensuring that this CHASP is developed, current, and approved prior to on-site activities.

- Ensuring that all the tasks in the project are performed in a manner consistent with Langan's comprehensive *Health and Safety Program for Hazardous Waste Operations* and this CHASP.

2.2 Langan Corporate Health and Safety Manager

The Langan Corporate Health and Safety Manager (HSM) is Tony Moffa. His responsibilities include:

- Updating the *Construction Health and Safety Program for Hazardous Waste Operations*.
- Assisting the site Health and Safety Officer (HSO) with development of the CHASP, updating CHASP as dictated by changing conditions, jobsite inspection results, etc. and approving changes to this CHASP.
- Assisting the HSO in the implementation of this CHASP and conducting Jobsite Safety Inspections and assisting with communication of results and correction of shortcomings found.
- Maintaining records on personnel (medical evaluation results, training and certifications, accident investigation results, etc.).

2.3 Langan Site Health & Safety Officer

The Langan site HSO is William Bohrer. His responsibilities include:

- Participating in the development and implementation of this CHASP.
- When on-site, assisting the Langan Field Team Leader in conducting Tailgate Safety Meetings and Jobsite Safety Inspections and correcting any shortcomings in a timely manner.
- Ensuring that proper PPE is available, worn by employees, and properly stored and maintained.
- Controlling entry into and exit from the site contaminated areas or zones.
- Monitoring employees for signs of stress, such as heat stress, fatigue, and cold exposure.
- Monitoring site hazards and conditions.
- Knowing (and ensuring that all site personnel also know) emergency procedures, evacuation routes, and the telephone numbers of the ambulance, local hospital, poison control center, fire department, and police department.
- Resolving conflicts that may arise concerning safety requirements and working conditions.
- Reporting all incidents, injuries and near misses to the Langan Incident/Injury Hotline immediately and the client representative.

2.4 Langan Field Team Leader Responsibilities

The Langan Field Team Leader (FTL) is to be determined prior to the start of the start of field activities. The Field Team Leader's responsibilities include:

- The management of the day-to-day site activities and implementation of this CHASP in the field.
- Participating in and/or conducting Tailgate Safety Meetings and Jobsite Safety Inspections and correcting any shortcomings in a timely manner.
- When a Community Air Monitoring Operating Program (CAMP) is part of the scope, the FTL will set up and maintaining community air monitoring activities and instructing the responsible contractor to implement organic vapor or dust mitigation when necessary.
- Overseeing the implementation of activities specified in the work plan.

2.5 Contractor Responsibilities

The contractor shall develop and implement their own CHASP for their employees, lower-tier subcontractors, and consultants. The contractor is responsible for their own health and safety and that of their subcontractors. Contractors operating on the site shall designate their own FTL, HSO and HSM. The contractor's CHASP will be at least as stringent as this Langan CHASP. The contractor must be familiar with and abide by the requirements outlined in their own CHASP. A contractor may elect to adopt Langan's CHASP as its own provided that it has given written notification to Langan, but where Langan's CHASP excludes provisions pertinent to the contractor's work (i.e., confined space entry); the contractor must provide written addendums to this CHASP. Additionally, the contractor must:

- Ensure their employees are trained in the use of all appropriate personal protection equipment (PPE) for the tasks involved;
- Notify Langan of any hazardous material brought onto the job site or site related area, the hazards associated with the material, and must provide a material safety data sheet (MSDS) or safety data sheet (SDS) for the material;
- Have knowledge of, understand, and abide by all current federal, state, and local health and safety regulations pertinent to the work;
- Ensure their employees handling hazardous materials, if identified at the Site, have received current training in the appropriate levels of 29 CFR 1910.120, *Hazardous Waste Operations and Emergency Response* (HAZWOPER) if hazardous waste is identified at the Site;
- Ensure their employees handling hazardous materials, if identified at the Site, have been fit-tested within the year on the type respirator they will wear; and
- Ensure all air monitoring is in place pertaining to the health and safety of their employees

as required by OSHA 1910.120; and

- All contractors must adherer to all federal, state, and local regulatory requirements.

3.0 TASK/OPERATION SAFETY AND HEALTH RISK ANALYSES

A Task-Hazard Analysis (Table 1) was completed for general construction hazards that may be encountered at the Site. The potential contaminants that might be encountered during the field activities and the exposure limits are listed in Table 2 complete inventory of MSDS/SDS for chemical products used on site is included as Attachment E.

3.1 Specific Task Safety Analysis

3.1.1 Soil Screening and Sampling

Sampling the soil requires the donning of chemical resistant gloves in addition to the standard PPE. Langan personnel are not to operate drilling or excavation equipment nor open sampling devices (acetate liners, sonic sample bags, etc.). These tasks are to be completed by the driller or excavation contractor.

3.1.2 Waste Classification and Supplemental Mercury Sampling

Hand surveying or sampling the soil requires the donning of chemical resistant gloves in addition to the standard PPE. Langan employees are not to operate drilling equipment nor open sampling devices (acetate liners, sonic sample bags, etc.). These tasks are to be completed by the driller contractor.

3.1.3 Supplemental Emerging Contaminants Sampling

Sampling the soil requires the donning of chemical resistant gloves in addition to the standard PPE. Langan personnel are not to operate drilling or excavation equipment nor open sampling devices (acetate liners, sonic sample bags, etc.). These tasks are to be completed by the driller or excavation contractor.

3.1.4 Chromium, Mercury and Nickel Sampling

Chromium, mercury and nickel sampling requires additional precautions to mitigate exposure. As such, Langan and its direct hire drilling contractor must take the following safety steps:

- Dust control – Langan and its contractors must monitor and mitigate dust that might develop as a byproduct of the site work. At a minimum, soil or slab must be wetted to prevent drying that can cause dust if the soil is disturbed by site activities including drilling

and movement of the drilling vehicle or any support vehicles.

- Dust monitoring – Langan will monitor dust using properly calibrated dust monitoring equipment (DustTrack™ or equivalent). The delineation downwind dust monitoring equipment is in addition to the dust monitoring equipment being used in fulfillment of the CAMP requirement of the HASP. Langan will be responsible to insure that the dust monitoring equipment is set directly downwind from the delineation work. Langan will reposition the downwind dust monitoring equipment as site wind direction and work activities dictates.
- The following table outlines the instrument action levels for dust as monitored by a DustTrac™ (or equivalent) to be followed during delineation activities:

	Don ½ face Respirator	**Stop Work**
Chromium	0.27 mg/m^3	2.67 mg/m^3
Mercury	2.79 mg/m^3	27.9 mg/m^3
Nickel	5 mg/m^3	866 mg/m^3

- In addition to monitoring mercury as a portion of air borne dust, Langan will monitor mercury vapor using a Jerome® 431-X (or equivalent). The instrument action levels for vapor mercury are:

	Don ½ face Respirator	**Stop Work**
Mercury	0.005 mg/m^3	0.01 mg/m^3

3.1.5 Stockpile Sampling

The Langan personnel are not to scale or otherwise climb stockpiles. If the soil sampling plan requires sampling from the stockpile above ground level, samples are to be obtained using suitable excavation equipment operated by the contractor (i.e. front end loader).

3.1.6 Indoor Drilling and Excavation

The work scope may require indoor work or work in locations where there may not be adequate ventilation sufficient to safely operate any rig or excavation equipment powered by an internal combustion engine. Where possible, all such work should be done by equipment powered by electricity. If such equipment is used and must be directly wired to the buildings electrical system or to an independent system, this work must be completed by a licensed electrician in

accordance with all electrical codes applicable to the work.

Indoor work which is to be completed with equipment powered by an internal combustion engine must incorporate air monitoring of carbon monoxide (CO) using calibrated air monitoring equipment (MultiRAE or equivalent). In addition, the work plan should incorporate mitigation for venting engine exhaust fumes directly to the outdoors and for circulating fresh air into the work area.

The OSHA Time Weighted Average (TWA) Permissible Exposure Limit (PEL) for CO from 50 to 35 parts per million (ppm). Langan will monitor CO with a suitable monitoring device. If CO levels exceed 5 ppm, Langan will instruct contractors to begin mitigation measures. These measures are at a minimum:

- Increase air circulation using industrial size fans to bring additional fresh air into the building or vent exhaust to the outside;
- Modify the passive exhaust method being used to increase venting circulation by using wider diameter tubing or sealing tubing connections; or
- Modify the work schedule where the rig is turned off to allow time for CO levels to fall back to background

All work must cease if CO levels reach 35 ppm. The Langan engineer is to report to the PM and H&S officer when an action level is reached.

3.1.7 Removal of Underground Storage Tank

If UST excavation and removal activity is initiated, Langan personnel will conduct air monitoring for lower explosion limit (LEL) conditions within the UST excavation itself. This task is to be performed using calibrated air monitoring equipment designed to sound an audio alarm when atmospheric concentrations of VOC are within 10% of the LEL. In normal atmospheric oxygen concentrations, the LEL monitoring may be done with a Wheatstone bridge/catalytic bead type sensor (i.e. MultiRAE). However in oxygen depleted atmospheres (confined space), only an LEL designed to work in low oxygen environments may be used. Best practices require that the LEL monitoring unit be equipped with a long sniffer tube to allow the LEL unit to remain outside the UST excavation. Langan personnel are not to enter the UST excavation nor enter an excavated UST.

In addition to monitoring LEL, Langan personnel will monitor atmospheric VOC concentrations directly downwind of the UST excavation in accordance with standard CAMP procedures using calibrated air monitoring equipment.

3.1.8 Backfilling of Excavated Areas to Development Grade

The backfilling contractor will provide their employees with equivalent PPE to protect them from the specific hazards likely to be encountered on-site. Selection of the appropriate PPE must take into consideration: (1) identification of the hazards or suspected hazards; (2) potential exposure routes; and, (3) the performance of the PPE construction (materials and seams) in providing a barrier to these hazards. Langan personnel may survey backfilling material with a calibrated PID; however, as they are not permitted to climb the material delivery truck, the contractor must provide samples from each truck as required.

3.1.9 Construction Dewatering

Langan may sample dewatering treatment system liquids from either the direct discharge standpipe or from a sample port or valve built into the storage tank, Langan will don the necessary PPE including nitrile gloves and if necessary, facial splash guard. Sample ports and valves may only be sampled if they are accessible at ground level. Sampling from heights over 6 feet is prohibited unless Langan field personnel are fully accredited in fall protection and is wearing approved fall protection safety apparatus. The discharge samples will be submitted to an ELAP-certified laboratory for analysis in accordance with the work plan.

3.1.10 Drum Sampling

Drilling fluid, rinse water, grossly-contaminated soils samples and cuttings may be containerized in 55-gallon drums for transport and disposal off site. Each drum must be labeled in accordance with the Langan Drum Labeling Standard Operating Procedure (SOP-#9). Langan may collect drum samples, as required, prior to off-site drum disposal. Samples will be placed into laboratory-supplied batch-certified clean glassware and submitted to a NYSDOH ELAP-certified laboratory.

Langan employees and contractors are not to move or open any orphaned (unlabeled) drum found on the site without approval of the project manager.

3.2 Radiation Hazards

No radiation hazards are known or expected at the site.

3.3 Physical Hazards

Physical hazards, which may be encountered during site operations for this project, are detailed in Table 1.

3.3.1 Explosion

No explosion hazards are expected for the scope of work at this site.

3.3.2 Heat Stress

The use of Level C protective equipment, or greater, may create heat stress. Monitoring of personnel wearing personal protective clothing should commence when the ambient temperature is 72^{O}F or above. Table 6 presents the suggested frequency for such monitoring. Monitoring frequency should increase as ambient temperature increases or as slow recovery rates are observed. Refer to the Table 7 to assist in assessing when the risk for heat related illness is likely. To use this table, the ambient temperature and relative humidity must be obtained (a regional weather report should suffice). Heat stress monitoring should be performed by the HSO or the FTL, who shall be able to recognize symptoms related to heat stress.

To monitor the workers, be familiar with the following heat-related disorders and their symptoms:

- **Heat Cramps:** Painful spasm of arm, leg or abdominal muscles, during or after work
- **Heat Exhaustion:** Headache, nausea, dizziness; cool, clammy, moist skin; heavy sweating; weak, fast pulse; shallow respiration, normal temperature
- **Heat Stroke**: Headache, nausea, weakness, hot dry skin, fever, rapid strong pulse, rapid deep respirations, loss of consciousness, convulsions, coma. *This is a life threatening condition***.**

Do not permit a worker to wear a semi-permeable or impermeable garment when they are showing signs or symptoms of heat-related illness.

To monitor the worker, measure:

- **Heart rate:** Count the radial pulse during a 30-second period as early as possible in the rest period. If the heart rate exceeds 100 beats per minute at the beginning of the rest period, shorten the next work cycle by one-third and keep the rest period the same. If the heart rate still exceeds 100 beats per minute at the next rest period, shorten the following work cycle by one-third. A worker cannot return to work after a rest period until their heart rate is below 100 beats per minute.
- **Oral temperature:** Use a clinical thermometer (3 minutes under the tongue) or similar device to measure the oral temperature at the end of the work period (before drinking). If oral temperature exceeds 99.6^{O}F (37.6^{O}C), shorten the next work cycle by one-third without changing the rest period. A worker cannot return to work after a rest period until their oral temperature is below 99.6^{O}F. If oral temperature still exceeds 99.6^{O}F (37.6^{O}C)

at the beginning of the next rest period, shorten the following cycle by one-third. Do not permit a worker to wear a semi-permeable or impermeable garment when oral temperature exceeds 100.6°F (38.1°C).

Prevention of Heat Stress - Proper training and preventative measures will aid in averting loss of worker productivity and serious illness. Heat stress prevention is particularly important because once a person suffers from heat stroke or heat exhaustion, that person may be predisposed to additional heat related illness. To avoid heat stress the following steps should be taken:

- Adjust work schedules.
- Mandate work slowdowns as needed.
- Perform work during cooler hours of the day if possible or at night if adequate lighting can be provided.
- Provide shelter (air-conditioned, if possible) or shaded areas to protect personnel during rest periods.
- Maintain worker's body fluids at normal levels. This is necessary to ensure that the cardiovascular system functions adequately. Daily fluid intake must approximately equal the amount of water lost in sweat, id., eight fluid ounces (0.23 liters) of water must be ingested for approximately every eight ounces (0.23 kg) of weight lost. The normal thirst mechanism is not sensitive enough to ensure that enough water will be drunk to replace lost sweat. When heavy sweating occurs, encourage the worker to drink more. The following strategies may be useful:
    - Maintain water temperature 50° to 60°F (10° to 16.6°C).
    - Provide small disposal cups that hold about four ounces (0.1 liter).
    - Have workers drink 16 ounces (0.5 liters) of fluid (preferably water or dilute drinks) before beginning work.
    - Urge workers to drink a cup or two every 15 to 20 minutes, or at each monitoring break. A total of 1 to 1.6 gallons (4 to 6 liters) of fluid per day are recommended, but more may be necessary to maintain body weight.
    - Train workers to recognize the symptoms of heat related illness.

3.3.3 Cold-Related Illness

If work on this project begins in the winter months, thermal injury due to cold exposure can become a problem for field personnel. Systemic cold exposure is referred to as hypothermia. Local cold exposure is generally called frostbite.

- **Hypothermia -** Hypothermia is defined as a decrease in the patient core temperature below 96°F. The body temperature is normally maintained by a combination of central (brain and spinal cord) and peripheral (skin and muscle) activity. Interference with any of these mechanisms can result in hypothermia, even in the absence of what normally is

considered a "cold" ambient temperature. Symptoms of hypothermia include: shivering, apathy, listlessness, sleepiness, and unconsciousness.

- **Frostbite -** Frostbite is both a general and medical term given to areas of local cold injury. Unlike systemic hypothermia, frostbite rarely occurs unless the ambient temperatures are less than freezing and usually less than 20^{O}F. Symptoms of frostbite are: a sudden blanching or whitening of the skin; the skin has a waxy or white appearance and is firm to the touch; tissues are cold, pale, and solid.

Prevention of Cold-Related Illness - To prevent cold-related illness:

- Educate workers to recognize the symptoms of frostbite and hypothermia
- Identify and limit known risk factors:
- Assure the availability of enclosed, heated environment on or adjacent to the site.
- Assure the availability of dry changes of clothing.
- Assure the availability of warm drinks.
- Start (oral) temperature recording at the job site:
- At the FSO or Field Team Leader's discretion when suspicion is based on changes in a worker's performance or mental status.
- At a worker's request.
- As a screening measure, two times per shift, under unusually hazardous conditions (e.g., wind-chill less than 20^{O}F, or wind-chill less than 30^{O}F with precipitation).
- As a screening measure whenever anyone worker on the site develops hypothermia.

Any person developing moderate hypothermia (a core temperature of 92^{O}F) cannot return to work for 48 hours.

3.3.4 Noise

Work activities during the proposed activities may be conducted at locations with high noise levels from the operation of equipment. Hearing protection will be used as necessary.

3.3.5 Hand and Power Tools

The use of hand and power tools can present a variety of hazards, including physical harm from being struck by flying objects, being cut or struck by the tool, fire, and electrocution. All hand and power tools should be inspected for health and safety hazards prior to use. If deemed unserviceable/un-operable, notify supervisor and tag equipment out of service. Ground Fault Circuit Interrupters (GFCIs) are required for all power tools requiring direct electrical service.

3.3.6 Slips, Trips and Fall Hazards

Care should be exercised when walking at the site, especially when carrying equipment. The presence of surface debris, uneven surfaces, pits, facility equipment, and soil piles contribute to tripping hazards and fall hazards. To the extent possible, all hazards should be identified and marked on the site, with hazards communicated to all workers in the area.

3.3.7 Utilities (Electrocution and Fire Hazards)

3.3.7.1 Utility Clearance

The possibility of encountering underground utilities poses fire, explosion, and electrocution hazards. All excavation work will be preceded by review of available utility drawings and by notification of the subsurface work to the N.Y. One –Call--Center.

3.3.7.2 Lockout-Tagout

The potential adverse effects of electrical hazards include burns and electrocution, which could result in death. Therefore, there is a procedure that establishes the requirements for the lockout/tagout (LOTO) of energy isolating devices in accordance with the OSHA electrical lockout and tagging requirements as specified in 29 CFR 1926.417. This procedure will be used to ensure that all machines and equipment are isolated from potentially hazardous energy. If possible, equipment that could cause injury due to unexpected energizing, start-up, or release of stored energy will be locked/tagged, before field personnel perform work activities.

Depending upon the specific work task involved, Langan's SSC or FTL will serve as the authorized lockout/tagout coordinator, implement the lockout/tagout procedure and will be responsible to locate, lock and tag valves, switches, etc.

SPECIAL NOTE: Project personnel will assume that all electrical equipment at surface, subsurface and overhead locations is energized, until equipment has been designated and confirmed as de-energized by a utility company representative. Langan will notify the designated utility representative prior to working adjacent to this equipment and will verify that the equipment is energized or de-energized in the vicinity of the work location.

No project work shall be performed by Langan personnel or subcontractors on or near energized electrical lines or equipment unless hazard assessments are completed in writing, reviewed by Langan's SSHO, and clearly communicated to the field personnel.

The FTL shall conduct a survey to locate and identify all energy isolating devices. They shall be certain which switches, valves or other isolating devices apply to the equipment. The

lockout/tagout procedure involves, but is not limited to, electricity, motors, steam, natural gas, compressed air, hydraulic systems, digesters, sewers, etc.

3.3.8 Physical Hazard Considerations for Material Handling

There are moderate to severe risks associated with moving heavy objects at the Site. The following physical hazards should be considered when handling materials at the Site:

- Heavy objects will be lifted and moved by mechanical devices rather than manual effort whenever possible.
- The mechanical devices will be appropriate for the lifting of moving task and will be operated only by trained and authorized personnel.
- Objects that require special handling or rigging will only be moved under the guidance of a person who has been specifically trained to move such objects.
- Lifting devices will be inspected, certified, and labeled to confirm their weight capacities. Defective equipment will be taken out of service immediately and repaired or destroyed.
- The wheels of any trucks being loaded or unloaded will be chocked to prevent movement. Outriggers will be fully extended on a flat, firm surface during operation.
- Personnel will not pass under a raised load, nor will a suspended load be left unattended.
- Personnel will not be carried on lifting equipment, unless it is specifically designed to carry passengers.
- All reciprocating, rotating, or other moving parts will be guarded at all times.
- Accessible fire extinguishers, currently (monthly) inspected, will be available in all mechanical lifting devices.
- Verify all loads/materials are secure before transportation.

Material handling tasks that are unusual or require specific guidance will need a written addendum to this CHASP. The addendum must identify the lifting protocols before the tasks are performed. Upon approval, the plan must be reviewed with all affected employees and documented. Any deviation from a written plan will require approval by the Langan HSM.

3.3.9 Hearing Conservation

Under the construction industry standard, the maximum permissible occupational noise exposure is 90 dbA (8-hour TWA), and noise levels in excess of 90 dbA must be reduced through feasible administrative and engineering controls. (20 CFR 1926.52). Hearing protection is required when working within 15 feet of vacuum extraction equipment and drill rigs.

3.3.9 Open Water

Employees working over or near water, where the danger of drowning exists, shall be provided with U.S. Coast Guard-approved life jackets or buoyant work vests. Prior to and after each use, the buoyant work vests or life preservers shall be inspected for defects which would alter their strength or buoyancy. Defective units shall not be used.

And should a worker fall into the water, OSHA requires (29 CFR 1926.106(c)) that ring buoys with at least 90 feet of line shall be provided and readily available for emergency rescue operations. The distance between ring buoys shall not exceed 200 feet. Another remedial action required by OSHA (29 CFR 1926.106(d)) is the use of lifesaving skiffs.

OSHA requires that at least one lifesaving skiff shall be immediately available at locations where employees are working over or adjacent to water and must include the following provisions.

- The skiff must be in the water or capable of being quickly launched by one person.
- At least one person must be present and specifically designated to respond to water emergencies and operate the skiff at all times when there are employees above water.
- When the operator is on break another operator must be designated to provide requisite coverage when there are employees above water.
- The designated operator must either have the skiff staffed at all times or have someone remain in the immediate area such that the operator can quickly reach the skiff and perform rescue services.
- The skiff operator maybe assigned other tasks provided the tasks do not interfere with the operator's ability to quickly reach the skiff.
- A communication system, such as a walkie-talkie, must be used to inform the skiff operator of an emergency and to inform the skiff operator where the skiff is needed.
- The skiff must be equipped with both a motor and oars.

With regard to the number of skiffs required and the appropriate maximum response time, the following factors must be evaluated:

- The number of work locations where there is a danger of falling into water;
- The distance to each of those locations;
- Water temperature and currents;
- Other hazards such as, but not limited to, rapids, dams, and water intakes;

Other regulations that present S&H practices and PPE for work on or near water include: 29 CFR 1910, Subpart T (401 – 440)

3.4 Biological Hazards

3.4.1 Animals

There is a possibility of encountering wildlife including reptiles, rodents and other small and medium size mammals. The Langan personnel is to avoid interacting with any wildlife.

3.4.2 Insects

Ticks and other biting or stinging insects may to be encountered during site operations. Langan personnel should take necessary precautions including donning long sleeve shirts and insecticide to prevent bites and stings. After field work, Langan personnel should perform a complete visual inspection of their clothing to insure they are not inadvertently harboring ticks. If they do observe a tick bite, they are to contact the HSM or HSO and report the event.

3.4.3 Plants

Poisonous plants may to be encountered during site operations. Langan personnel should take necessary precautions including donning long sleeve shirts and applying preventative poison Ivy/Sumac lotion to prevent or limit effects of exposure. If after field work, Langan employees do observe a reaction to poisonous plant exposure, they are to contact the HSM or HSO and report the event.

3.5 Additional Safety Analysis

3.5.1 Presence of Non-Aqueous Phase Liquids (NAPL)

There is potential for exposure to NAPL at this site. Special care and PPE should be considered when NAPL is observed as NAPL is a typically flammable fluid and releases VOCs known to be toxic and/or carcinogenic. If NAPL is present in a monitoring well, vapors from the well casing may contaminate the work area breathing zone with concentrations of VOCs potentially exceeding health and safety action levels. In addition, all equipment used to monitor or sample NAPL (or ground water from wells containing NAPL) must be intrinsically safe. Equipment that directly contacts NAPL must also be resistant to organic solvents.

At a minimum, a PID should be used to monitor for VOCs when NAPL is observed. If NAPL is expected to be observed in an excavation or enclosed area, air monitoring must be started using calibrated air monitoring equipment designed to sound an audio alarm when atmospheric concentrations of VOC are within 10% of the LEL. In normal atmospheric oxygen concentrations, the LEL monitoring may be done with a Wheatstone bridge/catalytic bead type sensor (i.e. MultiRAE). However in oxygen depleted atmospheres (confined space), only an LEL designed to work in low oxygen environments may be used. Best practices require that the LEL monitoring

unit be equipped with a long sniffer tube to allow the LEL unit to remain outside the UST excavation.

When NAPL is present, Langan personnel are required to use disposable nitrile gloves at all times to prevent skin contact with contaminated materials. They should also consider having available a respirator and protective clothing (Tyvek® overalls), especially if NAPL is in abundance and there are high concentrations of VOCs.

All contaminated disposables including PPE and sampling equipment must be properly disposed of in labeled 55-gallong drums

3.6 Job Safety Analysis

A Job Safety Analysis (JSA) is a process to identify existing and potential hazards associated with each job or task so these hazards can be eliminated, controlled or minimized. A JSA will be performed at the beginning of each work day, and additionally whenever an employee begins a new task or moves to a new location. All JSAs must be developed and reviewed by all parties involved. A blank JSA form and documentation of completed JSAs are in Attachment G.

4.0 PERSONNEL TRAINING

4.1 Basic Training

Completion of an initial 40-hour HAZWOPER training program as detailed in OSHA's 29 CFR 1910.120(e) is required for all employees working on a site engaged in hazardous substance removal or other activities which expose or potentially expose workers to hazardous substances, health hazards, or safety hazards as defined by 29 CFR 1910.120(a). Annual 8-hour refresher training is also required to maintain competencies to ensure a safe work environment. In addition to these training requirements, all employees must complete the OSHA 10 hour Construction Safety and Health training and supervisory personnel must also receive eight additional hours of specialized management training. Training records are maintained by the HSM.

4.2 Initial Site-Specific Training

Training will be provided to specifically address the activities, procedures, monitoring, and equipment for site operations at the beginning of each field mobilization and the beginning of each discrete phase of work. The training will include the site and facility layout, hazards, and emergency services at the site, and will detail all the provisions contained within this CHASP. For a HAZWOPER operation, training on the site must be for a minimum of 3 days. Specific issues that will be addressed include the hazards described in Section 3.0.

4.3 Tailgate Safety Briefings

Before starting work each day or as needed, the Langan HSO will conduct a brief tailgate safety meeting to assist site personnel in conducting their activities safely. Tailgate meetings will be documented in Attachment H. Briefings will include the following:

- Work plan for the day;
- Review of safety information relevant to planned tasks and environmental conditions;
- New activities/task being conducted;
- Results of Jobsite Safety Inspection Checklist;
- Changes in work practices;
- Safe work practices; and
- Discussion and remedies for noted or observed deficiencies.

5.0 MEDICAL SURVEILLANCE

All personnel who will be performing field work involving potential exposure to toxic and hazardous substances (defined by 29 CFR 1910.120(a)) will be required to have passed an initial baseline medical examination, with follow-up medical exams thereafter, consistent with 29 CFR 1910.120(f). Medical evaluations will be performed by, or under the direction of, a physician board-certified in occupational medicine.

Additionally, personnel who may be required to perform work while wearing a respirator must receive medical clearance as required under CFR 1910.134(e), *Respiratory Protection*. Medical evaluations will be performed by, or under the direction of, a physician board-certified in occupational medicine. Results of medical evaluations are maintained by the HSM.

5.1 Mercury Monitoring

Langan includes medical monitoring for mercury during the initial baseline and annual physical.

6.0 ~~PERSONAL~~ PERSONAL PROTECTIVE EQUIPMENT

6.1 Levels of Protection

Langan will provide PPE to Langan employees to protect them from the specific hazards they are likely to encounter on-site. Direct hired contractors will provide their employees with equivalent PPE to protect them from the specific hazards likely to be encountered on-site. Selection of the appropriate PPE must take into consideration: (1) identification of the hazards or suspected hazards; (2) potential exposure routes; and, (3) the performance of the PPE construction

(materials and seams) in providing a barrier to these hazards.

Based on anticipated site conditions and the proposed work activities to be performed at the site, Level D protection will be used. The upgrading/downgrading of the level of protection will be based on continuous air monitoring results as described in Section 6.0 (when applicable). The decision to modify standard PPE will be made by the site HSO or FTL after conferring with the PM. The levels of protection are described below.

Level D Protection (as needed)

- Safety glasses with side shields or chemical splash goggles
- Safety boots/shoes
- Coveralls (Tyvek® or equivalent)
- Hard hat
- Long sleeve work shirt and work pants
- Nitrile gloves
- Hearing protection
- Reflective safety vest

Level D Protection (Modified, as needed)

- Safety glasses with sideshields or chemical splash goggles
- Safety boots/shoes (toe-protected)
- Disposable chemical-resistant boot covers
- Coveralls (polycoated Tyvek or equivalent to be worn when contact with wet contaminated soil, groundwater, or non-aqueous phase liquids is anticipated)
- Hard hat
- Long sleeve work shirt and work pants
- Nitrile gloves
- Hearing protection (as needed)
- Personal floatation device (for work within 5 ft of the water)
- Reflective traffic vest

Level C Protection (as needed)

- Full or Half face, air-purifying respirator, with NIOSH approved HEPA filter
- Inner (latex) and outer (nitrile) chemical-resistant gloves
- Safety glasses with side shields or chemical splash goggles
- Chemical-resistant safety boots/shoes
- Hard hat

- Long sleeve work shirt and work pants
- Coveralls (Tyvek® or equivalent)
- Hearing protection (as needed)
- Reflective safety vest

The action levels used in determining the necessary levels of respiratory protection and upgrading to Level C are summarized in Table 4. The written Respiratory Protection Program is maintained by the HSM and is available if needed. The monitoring procedures and equipment are outlined in Section 6.0 (when applicable).

6.2 Respirator Fit-Test

All Langan employees who may be exposed to hazardous substances at the work site are in possession of a full or half face-piece, air-purifying respirator and have been successfully fit-tested within the past year. Fit-test records are maintained by the HSM.

6.3 Respirator Cartridge Change-Out Schedule

Respiratory protection is required to be worn when certain action levels (table 2) are reached. A respirator cartridge change-out schedule has been developed in order to comply with 29 CFR 1910.134. The respirator cartridge change-out schedule for this project is as follows:

- Cartridges shall be removed and disposed of at the end of each shift, when cartridges become wet or wearer experiences breakthrough, whichever occurs first.
- If the humidity exceeds 85%, then cartridges shall be removed and disposed of after 4 hours of use.

Respirators shall not be stored at the end of the shift with contaminated cartridges left on. Cartridges shall not be worn on the second day, no matter how short the time period was the previous day they were used.

7.0 AIR QUALITY MONITORING AND ACTIONS LEVELS

7.1 Monitoring During Site Operations

Atmospheric air monitoring results may be collected and used to provide data to determine when exclusion zones need to be established and when certain levels of personal protective equipment are required. For all instruments there are Site-specific action level criteria which are used in making field health and safety determinations. Other data, such as the visible presence of contamination or the steady state nature of air contaminant concentration, are also used in making field health and safety decisions. Therefore, the HSO may establish an exclusion zone

or require a person to wear a respirator even though atmospheric air contaminant concentrations are below established CHASP action levels.

During site work involving disturbance of petroleum-impacted or fill material, real time air monitoring may be conducted for VOCs. A PID and/or flame ionization detector (FID) will be used to monitor concentrations of VOCs at personnel breathing-zone height. Air monitoring will be the responsibility of the HSO or designee. Air monitoring may be conducted during intrusive activities associated with the completion of excavation, debris removal, and soil grading. All manufacturers' instructions for instrumentation and calibration will be available onsite.

Subcontractors' air monitoring plans must be equal or more stringent as the Langan plan.

An air monitoring calibration log is provided in Attachment D of this CHASP.

7.1.1 Volatile Organic Compounds

Monitoring with a PID, such as a MiniRAE 2000 (10.6v) or equivalent may occur during intrusive work in the AOCs. Colormetric Indicator Tubes for benzene may be used as backup for the PID, if measurements remain above background monitor every 2 hours. The HSO will monitor the employee breathing zone at least every 30 minutes, or whenever there is any indication that concentrations may have changed (odors, visible gases, etc.) since the last measurement. If VOC levels are observed above 5 ppm for longer than 5 minutes or if the site PPE is upgraded to Level C, the HSO will begin monitoring the site perimeter at a location downwind of the AOC every 30 minutes in addition to the employee breathing zone. Instrument action levels for monitored gases are provided in Table 4.

7.1.2 Metals

Based upon the site historical fill, there is a potential for the soils to contain PAHs and metals. During invasive procedures which have the potential for creating airborne dust, such as excavation of dry soils, a real time airborne dust monitor such as a Mini-Ram may be used to monitor for air particulates. The HSO will monitor the employee breathing zone at least every 30 minutes, or whenever there is any indication that concentrations may have changed (appearance of visible dust) since the last measurement. If dust levels are observed to be greater than 0.100 mg/m^3 or visible dust is observed for longer than 15 minutes or if the site PPE is upgraded to Level C, the HSO will begin monitoring the site perimeter at a location downwind of the AOC every 30 minutes in addition to the employee breathing zone. Instrument action levels for dust monitoring are provided in Table 4.

7.2 Monitoring Equipment Calibration and Maintenance

Instrument calibration shall be documented and included in a dedicated safety and health logbook or on separate calibration pages of the field book. All instruments shall be calibrated before and after each shift. Calibration checks may be used during the day to confirm instrument accuracy. Duplicate readings may be taken to confirm individual instrument response.

All instruments shall be operated in accordance with the manufacturers' specifications. Manufacturers' literature, including an operations manual for each piece of monitoring equipment will be maintained on site by the HSO for reference.

7.3 Determination of Background Levels

Background (BKD) levels for VOCs and dust will be established prior to intrusive activities within the AOC at an upwind location. A notation of BKD levels will be referenced in the daily monitoring log. BKD levels are a function of prevailing conditions. BKD levels will be taken in an appropriate upwind location as determined by the HSO.

Table 4 lists the instrument action levels.

8.0 COMMUNITY AIR MONITORING PROGRAM

Community air monitoring may be conducted in compliance with the NYSDOH Generic CAMP outlined below:

Monitoring for dust and odors will be conducted during all ground intrusive activities by the FTL. Continuous monitoring on the perimeter of the work zones for odor, VOCs, and dust may be required for all ground intrusive activities such as soil excavation and handling activities. The work zone is defined as the general area in which machinery is operating in support of remediation activities. A portable PID will be used to monitor the work zone and for periodic monitoring for VOCs during activities such as soil and groundwater sampling and .soil excavation. The site perimeter will be monitored for fugitive dust emissions by visual observations as well as instrumentation measurements (if required). When required, particulate or dust will be monitored continuously with real-time field instrumentation that will meet, at a minimum, the performance standards from DER-10 Appendix 1B.

If VOC monitoring is required, the following actions will be taken based on VOC levels measured:

- If total VOC levels exceed 5 ppm above background for the 15-minute average at the perimeter, work activities will be temporarily halted and monitoring continued. If levels readily decrease (per instantaneous readings) below 5 ppm above background, work

activities will resume with continued monitoring.

- If total VOC levels at the downwind perimeter of the hot zone persist at levels in excess of 5 ppm above background but less than 25 ppm, work activities will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps work activities will 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, is below 5 ppm above background for the 15-minute average.
- If the total VOC level is above 25 ppm at the perimeter of the hot zone, activities will be shut down.

If dust monitoring with field instrumentation is required, the following actions will be taken based on instrumentation measurements:

- If the downwind particulate level is 100 micrograms per cubic meter (µg/m³) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression must be employed. Work may continue with dust suppression techniques provided that downwind PM10 levels do not exceed 150 µg/m³ above the background level and provided that no visible dust is migrating from the work area.
- If, after implementation of dust suppression techniques, downwind PM10 levels are greater than 150 µg/m³ above the background level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM10 concentration to within 150 µg/m³ of the upwind level and in preventing visible dust migration.

The following actions will be taken based on mercury vapor concentrations:

- If the downwind mercury vapor level is 3 µg/m³ for the 15-minute period, then boring installation and excavation activities will be halted and all exposed soil will be covered with polyethylene sheeting and/or containerized in closed 55-gallon drums, and work will cease. If levels readily decrease (per instantaneous readings) below 3 µg/m³ above background, work activities will resume with continued monitoring.
- If mercury vapor levels at the downwind perimeter of the work zone persist at levels in excess of 10 µg/m³ above background, work activities will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps work activities will resume provided that the mercury vapor level 200 feet downwind of the work 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, is below 3 µg/m^3 above background for the 15-minute average.

8.1 Vapor Emission Response Plan

This section applies if VOC monitoring is required. If the ambient air concentration of organic vapors exceeds 5 ppm above background at the perimeter of the hot zone, boring and well installation, and excavation activities will be halted or odor controls will be employed, and monitoring continued. When work shut-down occurs, downwind air monitoring as directed by the HSO or FTL will be implemented to ensure that vapor emission does not impact the nearest residential or commercial structure at levels exceeding those specified in the Major Vapor Emission section.

If the organic vapor level decreases below 5 ppm above background, sampling and boring and well installation can resume, provided:

- The organic vapor level 200 feet downwind of the hot zone or half the distance to the nearest residential or commercial structure, whichever is less, is below 1 ppm over background, and
- More frequent intervals of monitoring, as directed by the HSO or FTL, are conducted.

8.2 Major Vapor Emission

This section applies if VOC monitoring is required. If any organic levels greater than 5 ppm over background are identified 200 feet downwind from the work site, or half the distance to the nearest residential or commercial property, whichever is less, all work activities must be halted or odor controls must be implemented.

If, following the cessation of the work activities, or as the result of an emergency, organic levels persist above 5 ppm above background 200 feet downwind or half the distance to the nearest residential or commercial property from the hot zone, then the air quality must be monitored within 20 feet of the perimeter of the nearest residential or commercial structure (20 Foot Zone).

If either of the following criteria is exceeded in the 20 Foot Zone, then the Major Vapor Emission Response Plan shall automatically be implemented.

- Sustained organic vapor levels approaching 5 ppm above background for a period of more than 30 minutes, or
- Organic vapor levels greater than 5 ppm above background for any time period.

8.3 Major Vapor Emission Response Plan

Upon activation, the following activities will be undertaken:

- The local police authorities will immediately be contacted by the HSO or FTL and advised of the situation;
- Frequent air monitoring will be conducted at 30-minute intervals within the 20 Foot Zone. If two successive readings below action levels are measured, air monitoring may be halted or modified by the HSO or FTL; and
- All Emergency contacts will go into effect as appropriate.

8.4 Metal Monitoring

Additional investigative work requires air monitoring for Chromium, mercury and nickel. As such,

- The following table outlines the instrument action levels for dust monitored through CAMP by a DustTrak™ (or equivalent) and are based on 15-minute averages above upwind conditions:

	Stop Work
Chromium	0.27 mg/m^3
Mercury	2.79 mg/m^3
Nickel	5 mg/m^3

When stop work levels are reached, Langan will cease operations and assess the source and implement appropriate engineering controls to reduce the levels to background levels.

In addition to monitoring mercury as a portion of air borne dust, Langan will monitor mercury vapor using a Jerome® 431-X (or equivalent). For mercury vapor monitoring with field instrumentation, the following actions will be taken based on instrumentation measurements:

- If the downwind mercury vapor level is 3 µg/m^3 for the 15-minute period, then boring and well installation, and excavation activities will be halted and all exposed soil will be covered with polyethylene sheeting and/or containerized in closed 55-gallon drums, and work will cease. If levels readily decrease (per instantaneous readings) below 3 µg/m^3 above background, work activities will resume with continued monitoring.
- If mercury vapor levels at the downwind perimeter of the hot zone persist at levels in excess of 10 µg/m^3 above background, work activities will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After

these steps work activities will resume provided that the mercury 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, is below 3 µg/m³ above background for the 15-minute average.

The action level for mercury vapor in a residential setting is 1.0 µg/m³ for a 15-minute average1 above background; this action level will be conservatively used to determine the potential risk to public health represented by mercury vapor at the site. Mercury vapor monitoring will be performed at the site perimeter for two weeks following the start of ground-intrusive activities in the western portion of the site (i.e. in the area of known mercury impacts to soil). If no sustained 15-minute average mercury vapor concentrations exceed 1.0 µg/m³ within the first two weeks, the RE will consult with the NYSDEC and NYSDOH to determine if continued mercury vapor monitoring is required as part of ongoing CAMP implementation.

8.5 Dust Suppression Techniques

Preventative measures for dust generation may include wetting site fill and soil, construction of an engineered construction entrance with gravel pad, a truck wash area, covering soils with tarps, and limiting vehicle speeds to five miles per hour.

Work practices to minimize odors and vapors include limiting the time that the excavations remain open, minimizing stockpiling of contaminated-source soil, and minimizing the handling of contaminated material. Offending odor and organic vapor controls may include the application of foam suppressants or tarps over the odor or VOC source areas. Foam suppressants may include biodegradable foams applied over the source material for short-term control of the odor and VOCs.

If odors develop and cannot be otherwise controlled, additional means to eliminate odor nuisances will include: direct load-out of soils to trucks for off-site disposal; use of chemical odorants in spray or misting systems; and, use of staff to monitor odors in surrounding neighborhoods.

Where odor nuisances have developed during remedial work and cannot be corrected, or where the release of nuisance odors cannot otherwise be avoided due to on-site conditions or close proximity to sensitive receptors, odor control will be achieved by sheltering excavation and handling areas under tented containment structures equipped with appropriate air venting/filtering systems.

[1] Reference to the March 22, 2012 Chemical Specific Health Consultation, prepared for Joint EPA/ATSDR National Mercury Cleanup Policy Workgroup - Action Levels For Elemental Mercury Spills, Section 2.2.1 Residential Settings – Normal Occupancy

9.0 WORK ZONES AND DECONTAMINATION

9.1 Site Control

Work zones are intended to control the potential spread of contamination throughout the site and to assure that only authorized individuals are permitted into potentially hazardous areas.

Any person working in an area where the potential for exposure to site contaminants exists will only be allowed access after providing the HSO with proper training and medical documentation.

Exclusion Zone (EZ) - All activities which may involve exposure to site contaminants, hazardous materials and/or conditions should be considered an EZ. Decontamination of field equipment will also be conducted in the Contaminant Reduction Zone (CRZ) which will be located on the perimeter of the EZ. The EZ and the CRZ will be clearly delineated by cones, tapes or other means. The HSO may establish more than one EZ where different levels of protection may be employed or different hazards exist. The size of the EZ shall be determined by the HSO allowing adequate space for the activity to be completed, field members and emergency equipment.

9.2 Contamination Zone

9.2.1 Personnel Decontamination Station

Personal hygiene, coupled with diligent decontamination, will significantly reduce the potential for exposure.

9.2.2 Minimization of Contact with Contaminants

During completion of all site activities, personnel should attempt to minimize the chance of contact with contaminated materials. This involves a conscientious effort to keep "clean" during site activities. All personnel should minimize kneeling, splash generation, and other physical contact with contamination as PPE is intended to minimize accidental contact. This may ultimately minimize the degree of decontamination required and the generation of waste materials from site operations.

Field procedures will be developed to control over spray and runoff and to ensure that unprotected personnel working nearby are not affected.

9.2.3 Personnel Decontamination Sequence

Decontamination may be performed by removing all PPE used in EZ and placing it in drums/trash cans at the CRZ. Baby wipes should be available for wiping hands and face. Drums/trash cans-

will be labeled by the field crews in accordance with all local, state, and federal requirements. Management plans for contaminated PPE, and tools are provided below.

9.2.4 Emergency Decontamination

If circumstances dictate that contaminated clothing cannot be readily removed, then remove gross contamination and wrap injured personnel with clean garments/blankets to avoid contaminating other personnel or transporting equipment. If the injured person can be moved, he/she will be decontaminated by site personnel as described above before emergency responders handle the victim. If the person cannot be moved because of the extent of the injury (a back or neck injury), provisions shall be made to ensure that emergency response personnel will be able to respond to the victim without being exposed to potentially hazardous atmospheric conditions. If the potential for inhalation hazards exist, such as with open excavation, this area will be covered with polyethylene sheeting to eliminate any potential inhalation hazards. All emergency personnel are to be immediately informed of the injured person's condition, potential contaminants, and provided with all pertinent data.

9.2.5 Hand-Held Equipment Decontamination

Hand-held equipment includes all monitoring instruments as stated earlier, samples, hand tools, and notebooks. The hand-held equipment is dropped at the first decontamination station to be decontaminated by one of the decontamination team members. These items must be decontaminated or discarded as waste prior to removal from the CRZ.

To aid in decontamination, monitoring instruments can be sealed in plastic bags or wrapped in polyethylene. This will also protect the instruments against contaminants. The instruments will be wiped clean using wipes or paper towels if contamination is visually evident. Sampling equipment, hand tools, etc. will be cleaned with non-phosphorous soap to remove any potentially contaminated soil, and rinsed with deionized water. All decontamination fluids will be containerized and stored on-site pending waste characterization sampling and appropriate off-site disposal.

9.2.6 Heavy Equipment Decontamination

All heavy equipment and vehicles arriving at the work site will be free from contamination from offsite sources. Any vehicles arriving to work that are suspected of being impacted will not be permitted on the work site. Potentially contaminated heavy equipment will not be permitted to leave the EZ unless it has been thoroughly decontaminated and visually inspected by the HSO or his designee.

9.3 Support Zone

The support zone or cold zone will include the remaining areas of the job site. Break areas and support facilities (include equipment storage and maintenance areas) will be located in this zone. No equipment or personnel will be permitted to enter the cold zone from the hot zone without passing through the decontamination station in the warm zone (if necessitated). Eating, smoking, and drinking will be allowed only in this area.

9.4 Communications

The following communications equipment will be utilized as appropriate.

- Telephones - A cellular telephone will be located with the HSO for communication with the HSM and emergency support services/facilities.
- Hand Signals - Hand signals shall be used by field teams, along with the buddy system. The entire field team shall know them before operations commence and their use covered during site-specific training. Typical hand signals are the following:

Hand Signal	Meaning
Hand gripping throat	Out of air; cannot breathe
Grip partners wrists or place both hands around waist	Leave immediately without debate
Hands on top of head	Need assistance
Thumbs up	OK; I'm alright; I understand
Thumbs down	No; negative
Simulated "stick" break with fists	Take a break; stop work

9.5 The Buddy System

When working in teams of two or more, workers will use the "buddy system" for all work activities to ensure that rapid assistance can be provided in the event of an emergency. This requires work groups to be organized such that workers can remain close together and maintain visual contact with one another. Workers using the "buddy system" have the following responsibilities:

- Provide his/her partner with assistance.
- Observe his/her partner for signs of chemical or heat exposure.
- Periodically check the integrity of his/her partner's PPE.
- Notify the HSO or other site personnel if emergency service is needed.

10.0 NEAREST MEDICAL ASSISTANCE

The address and telephone number of the nearest hospital:

Wyckoff Heights Medical Center
374 Stockholm Street
Brooklyn, New York
718-963-7272

Map with directions to the hospital are shown in Figure 2. This information will either be posted prominently at the site or will be available to all personnel all of the time. Further, all field personnel, including the HSO & FTL, will know the directions to the hospital.

11.0 STANDING ORDERS/SAFE WORK PRACTICES

The standing orders, which consist of a description of safe work practices that must always be followed while on-site by Langan employees and contractors, are shown in Attachment A. The site HSO and FTL each have the responsibility for enforcing these practices. The standing orders will be posted prominently at the site, or are made available to all personnel at all times. Those who do not abide by these safe work practices will be removed from the site.

12.0 SITE SECURITY

No unauthorized personnel shall be permitted access to the work areas.

13.0 UNDERGROUND UTILITIES

As provided in Langan's Underground Utility Clearance Guidelines, the following safe work practices should be followed by Langan personnel and the contractor before and during subsurface work in accordance with federal, state and local regulations:

- Obtain available utility drawings from the property owner/client or operator.
- Provide utility drawings to the project team.
- In the field, mark the proposed area of subsurface disturbance (when possible).
- Ensure that the utility clearance system has been notified.
- Ensure that utilities are marked before beginning subsurface work.
- Discuss subsurface work locations with the owner/client and contractors.
- Obtain approval from the owner/client and operators for proposed subsurface work locations.
- Use safe digging procedures when applicable.
- Stay at least 10 feet from all equipment performing subsurface work.

14.0 SITE SAFETY INSPECTION

The Langan HSO or alternate will check the work area daily, at the beginning and end of each work shift or more frequently to ensure safe work conditions. The HSO or alternate must complete the Jobsite Safety Inspection Checklist, found in Attachment F. Any deficiencies shall be shared with the FTL, HSM and PM and will be discussed at the daily tailgate meeting.

15.0 HAND AND POWER TOOLS

All hand- and electric-power tools and similar equipment shall be maintained in a safe operating condition. All electric-power tools must be inspected before initial use. Damaged tools shall be removed immediately from service or repaired. Tools shall be used only for the purpose for which they were designed. All users must be properly trained in their safe operation.

16.0 EMERGENCY RESPONSE

16.1 General

This section establishes procedures and provides information for use during a project emergency. Emergencies happen unexpectedly and quickly, and require an immediate response; therefore, contingency planning and advanced training of staff is essential. Specific elements of emergency support procedures that are addressed in the following subsections include communications, local emergency support units, and preparation for medical emergencies, first aid for injuries incurred on site, record keeping, and emergency site evacuation procedures. In case of emergency, in addition to 911, call *Incident Intervention®* at 1-888-479-7787 to report their injuries. For all other communications, contact the Langan Incident Hotline at **(800) 9-LANGAN** (800-952-6426) extension 4699 as soon as possible.

Should outside assistance be needed for accidents, fire, or release of hazardous substances, the emergency numbers will be available and posted at the site (Table 5) where a readily accessible telephone is made available for emergency use.

Also, in the event of an incident where a team member becomes exposed or suffers from an acute symptom from contact with site materials and has to be taken to a hospital, a short medical data sheet (Attachment T) for that individual will be made available to the attending physician. The medical data sheet will include the following:

- Name, address, home phone
- Age, height, weight
- Name of person to be notified in case of an accident
- Allergies

- Particular sensitivities
- Does he/she wear contact lenses
- Short checklist of previous illness
- Name of personal physician and phone
- Name of company physician and phone
- Prescription and non-prescription medications currently used.

A sample medical data sheet is included in Attachment T.

16.2 Responsibilities

16.2.1 Health and Safety Officer (HSO)

The HSO is responsible for ensuring that all personnel are evacuated safely and that machinery and processes are shut down or stabilized in the event of a stop work order or evacuation. The HSO is responsible for ensuring the HSM are notified of all incidents, all injuries, near misses, fires, spills, releases or equipment damage. The HSO is required to immediately notify the HSM of any fatalities or catastrophes (three or more workers injured and hospitalized) so that the HSM can notify OSHA within the required time frame.

16.2.2 Emergency Coordinator

The HSO or their designated alternate will serve as the Emergency Coordinator. The Emergency Coordinator is responsible for ensuring that all personnel are evacuated safely and that machinery and processes are shut down or stabilized in the event of a stop work order or evacuation. They are also responsible for ensuring the HSM are notified of all incidents, all injuries, near misses, fires, spills, releases or equipment damage. The Emergency Coordinator is required to immediately notify the HSM of any fatalities or catastrophes (three or more workers injured and hospitalized.

The Emergency Coordinator shall locate emergency phone numbers and identify hospital routes prior to beginning work on the sites. The Emergency Coordinator shall make necessary arrangements to be prepared for any emergencies that could occur.

The Emergency Coordinator is responsible for implementing the Emergency Response Plan.

16.2.3 Site Personnel

Project site personnel are responsible for knowing the Emergency Response Plan and the procedures contained herein. Personnel are expected to notify the Emergency Coordinator of situations that could constitute a site emergency. Project site personnel, including all

subcontractors will be trained in the Emergency Response Plan.

16.3 Communications

Once an emergency situation has been stabilized, or as soon as practically, the injured Langan personnel should contact *Incident Intervention®* at 1-888-479-7787 to report their injuries. For all other communications, contact the Langan Incident Hotline at **(800) 9-LANGAN** (800-952-6426) extension 4699 as soon as possible.

16.4 Local Emergency Support Units

In order to be able to deal with any emergency that might occur during investigative activities at the site, the Emergency Notification Numbers (Table 5) will be posted and provided to all personnel conducting work within the EZ.

Figure 2 shows the hospital route map. Outside emergency number 911 and local ambulance should be relied on for response to medical emergencies and transport to emergency rooms. Always contact first responders when there are serious or life threatening emergencies on the site. Project personnel are instructed not to drive injured personnel to the Hospital. In the event of an injury, provide first aid and keep the injured party calm and protected from the elements and treat for shock when necessary.

16.5 Pre-Emergency Planning

Langan will communicate directly with administrative personnel from the emergency room at the hospital in order to determine whether the hospital has the facilities and personnel needed to treat cases of trauma resulting from any of the contaminants expected to be found on the site. Instructions for finding the hospital will be posted conspicuously in the site office and in each site vehicle.

16.6 Emergency Medical Treatment

The procedures and rules in this CHASP are designed to prevent employee injury. However, should an injury occur, no matter how slight, it will be reported to the HSO immediately. First-aid equipment will be available on site at the following locations:

- First Aid Kit: Contractor Vehicles
- Emergency Eye Wash: Contractor Vehicles

During the site safety briefing, project personnel will be informed of the location of the first aid station(s) that has been set up. Some injuries, such as severe cuts and lacerations or burns, may require immediate treatment. Any first aid instructions that can be obtained from doctors or paramedics, before an emergency-response squad arrives at the site or before the injured person

can be transported to the hospital, will be followed closely.

16.7 Personnel with current first aid and CPR certification will be identified.

Only in non-emergency situations may an injured person be transported to an urgent care facility. Due to hazards that may be present at the site and the conditions under which operations are conducted, it is possible that an emergency situation may develop. Emergency situations can be characterized as injury or acute chemical exposure to personnel, fire or explosion, environmental release, or hazardous weather conditions.

16.8 Emergency Site Evacuation Routes and Procedures

All project personnel will be instructed on proper emergency response procedures and locations of emergency telephone numbers during the initial site safety meeting. If an emergency occurs as a result of the site investigation activities, including but not limited to fire, explosion or significant release of toxic gas into the atmosphere, the Langan Project Manager will be verbally notified immediately. All heavy equipment will be shut down and all personnel will evacuate the work areas and assemble at the nearest intersection to be accounted for and to receive further instructions.

In the event that an emergency situation arises, the FTL will implement an immediate evacuation of all project personnel due to immediate or impending danger. The FTL will also immediately communicate with the contractor to coordinate any needed evacuation of the property.

The FTL or Site Supervisor will give necessary instructions until the Designated Incident Commander (IC) assumes control. After the emergency has been resolved, the FTL or Site Supervisor will coordinate with the IC and indicate when staff should resume their normal duties. If dangers are present for those at the designated assembly point, another designated location of assembly will be established.

It will be the responsibility of the FTL or Site Supervisor to report a fire or emergency, assess the seriousness of the situation, and initiate emergency measures until the arrival of the local fire fighters or other first responders, should they be necessary. The FTL, working with emergency responders, may also order the closure of the Site for an indefinite period as long as it is deemed necessary.

Under no circumstances will incoming visitors be allowed to proceed to the area of concern, once an emergency evacuation has been implemented. Visitors or other persons present in the area of the emergency shall be instructed to evacuate the area. The FTL will ensure that access roads are not obstructed and will remain on-site to provide stand-by assistance upon arrival of emergency personnel.

If it is necessary to temporarily control traffic in the event of an emergency, those persons controlling traffic will wear proper reflection warning vests until the arrival of police or fire personnel.

16.8.1 Designated Assembly Locations

All personnel will evacuate the site and assemble at a designated assembly location. The assembly location will be designated by Langan personnel and discussed during each shift's pre-job safety briefing.

16.8.2 Accounting for Personnel

All contractor and subcontractor supervisors are responsible for the accounting of all personnel assembled at the designed assembly area. The Designated Incident Commander shall be notified if personnel are not found.

16.9 Fire Prevention and Protection

In the event of a fire or explosion, procedures will include immediately evacuating the site and notification of the Langan Project Manager of the investigation activities. Portable fire extinguishers will be provided at the work zone. The extinguishers located in the various locations should also be identified prior to the start of work. No personnel will fight a fire beyond the stage where it can be put out with a portable extinguisher (incipient stage).

16.9.1 Fire Prevention

Fires will be prevented by adhering to the following precautions:

- Good housekeeping and storage of materials.
- Storage of flammable liquids and gases away from oxidizers.
- Shutting off engines to refuel.
- Grounding and bonding metal containers during transfer of flammable liquids.
- Use of UL approved flammable storage cans.
- Fire extinguishers rated at least 10 pounds ABC located on all heavy equipment, in all trailers and near all hot work activities.

The person responsible for the control of fuel source hazards and the maintenance of fire prevention and/or control equipment is the HSO.

16.10 Significant Vapor Release

Based on the proposed tasks, the potential for a significant vapor release is low. However, if a release occurs, the following steps will be taken:

- Move all personnel to an upwind location. All non-essential personnel shall evacuate.
- Upgrade to Level C Respiratory Protection.
- Downwind perimeter locations shall be monitored for volatile organics.
- If the release poses a potential threat to human health or the environment in the community, the Emergency Coordinator shall notify the Langan Project Manager.
- Local emergency response coordinators will be notified.

16.11 Overt Chemical Exposure

The following are standard procedures to treat chemical exposures. Other, specific procedures detailed on the Material Safety Data Sheet (MSDS) will be followed, when necessary.

SKIN AND EYE: Use copious amounts of soap and water from eye-wash kits and portable hand wash stations.

CONTACT: Wash/rinse affected areas thoroughly, then provide appropriate medical attention. Skin shall also be rinsed for 15 minutes if contact with caustics, acids or hydrogen peroxide occurs. Affected items of clothing shall also be removed from contact with skin.

Providing wash water and soap will be the responsibility of each individual contractor or subcontractor on-site.

16.12 Decontamination during Medical Emergencies

If emergency life-saving first aid and/or medical treatment is required, normal decontamination procedures may need to be abbreviated or omitted. The HSO or designee will accompany contaminated victims to the medical facility to advice on matters involving decontamination when necessary. The outer garments can be removed if they do not cause delays, interfere with treatment or aggravate the problem. Respiratory equipment must always be removed. Protective clothing can be cut away. If the outer contaminated garments cannot be safely removed on site, a plastic barrier placed between the injured individual and clean surfaces should be used to help prevent contamination of the inside of ambulances and/or medical personnel. Outer garments may then be removed at the medical facility. No attempt will be made to wash or rinse the victim if his/her injuries are life threatening, unless it is known that the individual has been contaminated with an extremely toxic or corrosive material which could also cause severe injury or loss of life to emergency response personnel. For minor medical problems or injuries, the normal decontamination procedures will be followed.

16.13 Adverse Weather Conditions

In the event of adverse weather conditions, the HSO will determine if work will continue without potentially risking the safety of all field workers. Some of the items to be considered prior to

determining if work should continue are:

- Potential for heat stress and heat-related injuries.
- Potential for cold stress and cold-related injuries.
- Treacherous weather-related working conditions (hail, rain, snow, ice, high winds).
- Limited visibility (fog).
- Potential for electrical storms.
- Earthquakes.
- Other major incidents.

Site activities will be limited to daylight hours, or when suitable artificial light is provided, and acceptable weather conditions prevail. The HSO will determine the need to cease field operations or observe daily weather reports and evacuate, if necessary, in case of severe inclement weather conditions.

16.14 Spill Control and Response

All small spills/environmental releases shall be contained as close to the source as possible. Whenever possible, the MSDS will be consulted to assist in determining proper waste characterization and the best means of containment and cleanup. For small spills, sorbent materials such as sand, sawdust or commercial sorbents should be placed directly on the substance to contain the spill and aid recovery. Any acid spills should be diluted or neutralized carefully prior to attempting recovery. Berms of earthen or sorbent materials can be used to contain the leading edge of the spills. All spill containment materials will be properly disposed. An exclusion zone of 50 to 100 feet around the spill area should be established depending on the size of the spill.

All contractor vehicles shall have spill kits on them with enough material to contain and absorb the worst-case spill from that vehicle. All vehicles and equipment shall be inspected prior to be admitted on site. Any vehicle or piece of equipment that develops a leak will be taken out of service and removed from the job site.

The following seven steps shall be taken by the Emergency Coordinator:

1. Determine the nature, identity and amounts of major spills.
2. Make sure all unnecessary persons are removed from the spill area.
3. Notify the HSO immediately.
4. Use proper PPE in consultation with the HSO.
5. If a flammable liquid, gas or vapor is involved, remove all ignition sources and use non-sparking and/or explosion-proof equipment to contain or clean up the spill (diesel-only vehicles, air-operated pumps, etc.)
6. If possible, try to stop the leak with appropriate material.

7. Remove all surrounding materials that can react or compound with the spill.

In addition to the spill control and response procedures described in this CHASP, Langan personnel will coordinate with the designated project manager relative to spill response and control actions. Notification to the Project Manager must be immediate and, to the extent possible, include the following information:

- Time and location of the spill.
- Type and nature of the material spilled.
- Amount spilled.
- Whether the spill has affected or has a potential to affect a waterway or sewer.
- A brief description of affected areas/equipment.
- Whether the spill has been contained.
- Expected time of cleanup completion. If spill cleanup cannot be handled by Langan's on-site personnel alone, such fact must be conveyed to the Project Manager immediately.

Langan shall not make any notification of spills to outside agencies. The client will notify regulatory agencies as per their reporting procedures.

16.15 Emergency Equipment

The following minimum emergency equipment shall be kept and maintained on site:

- Industrial first aid kit.
- Fire extinguishers (one per site).

16.16 Restoration and Salvage

After an emergency, prompt restoration of utilities, fire protection equipment, medical supplies and other equipment will reduce the possibility of further losses. Some of the items that may need to be addressed are:

- Refilling fire extinguishers.
- Refilling medical supplies.
- Recharging eyewashes and/or showers.
- Replenishing spill control supplies.

16.17 Documentation

Immediately following an incident or near miss, unless emergency medical treatment is required, either the employee or a coworker must contact the Langan Incident/Injury Hotline at 1-(800)-9-LANGAN (ext. #4699) and the client representative to report the incident or near miss. For emergencies involving personnel injury and/or exposure, the HSO and affected employee will

complete and submit an Employee Exposure/Injury Incident Report (Attachment C) to the Langan Corporate Health and Safety Manager as soon as possible following the incident.

17.0 SPECIAL CONDITIONS

This guideline contains information and requirements for special conditions that may not be routinely encountered.

17.1 Scope

The guideline applies to the specific projects identified within this document. Additional provisions will be addressed in each Site-Specific Construction Health and Safety Plan (CHASP), as needed.

17.2 Responsibilities

Site Personnel - All site personnel must be alert to safety hazards on work sites and take action to minimize such hazards. Personnel must utilize the buddy system, watch for inappropriate behavior, and be alert to changes in site conditions.

Health and Safety Officer (HSO) - The HSO is responsible for considering these procedures in the development of site specific CHASPs. The HSO shall schedule frequent "tail gate" safety briefings to enhance safety awareness and discuss potential problems.

17.3 Procedures

The procedures outlined below shall be followed when such conditions are encountered.

17.3.1 Ladders

Langan safety procedures shall be used to ensure employee safety when using ladders in the office or work sites. All ladders shall be coated or repaired to prevent injury to the employee from punctures or lacerations and to prevent snagging or clothing. Any wood ladders used must have an opaque covering except for identification or warning labels, which may be placed on one face only of a side rail.

17.3.1.1 Ladder Use

Employees shall only use ladders for the purposes, which they were designed and shall not be used as scaffolding. Ladders will be maintained and inspected prior to use for slip hazards including oil and grease. Employees shall use ladders only on stable and level surfaces unless the ladder is secured to prevent possible displacement. Ladders should not be used on slippery

surfaces unless secured or provided with slip resistant feet to prevent accidental displacement. Ladders should not be used in locations where they could be displaced by workplace activities or traffic. Ladder rungs, cleats and steps shall be parallel, level and uniformly spaced when the ladder is in the use position.

Employees should not be carrying anything including equipment that could cause injury if there was a fall while utilizing the ladder. The top and bottom of the ladder area must remain clear while in use. When ascending and descending the ladder, employees must face the ladder.

Ladders shall not be loaded beyond the maximum intended load for which they were built or the manufacturer's rated capacity.

17.3.1.2 Portable Ladders

Rungs, cleats and steps for portable ladders and fixed ladders shall be spaced not less than 10 inches apart, nor more than 14 inches apart, as measured between center lines of the rungs, cleats and steps. When used to access an upper landing surface, the ladder side rails must extend at least three feet above the upper landing surface to which the ladder is used to gain access. If this is not possible, due to the ladders length, then the top of the ladder shall be secured at its top to a rigid support.

17.3.1.3 Step Stools

Rungs, cleats and steps of step stools shall not be less than 8 inches apart, nor more than 12 inches apart, as measured between center lines of the rungs, cleats and steps.

17.3.1.4 Extension Ladders

Rungs, cleats and steps of the base section of extension trestle ladders shall be spaced not less than 8 inches apart, nor more than 18 inches apart, as measured between center lines of the rungs, cleats and steps. The rung spacing on the extension section of the extension trestle ladder shall not be less than 6 inches nor more than 12 inches, as measured between center lines of the rungs, cleats and steps. Ladders shall be used at an angle such that the horizontal distance from the top support to the foot of the ladder is approximately one-quarter of the working length of the ladder (the distance along the ladder between the foot and the top support).

17.3.1.5 Inspection

Ladders will be inspected for visible detects periodically, prior to utilization or after any occurrence that could have negatively affected the ladder. Portable ladders with defects including broken or

missing rungs, cleats, or steps, broken or split rails, corroded components or other faulty or defective components shall not be used. The ladder will be immediately marked as defective, tagged as "Do Not Use" or blocked from being used and removed from service until repaired.

17.3.2 First Aid/Cardiopulmonary Resuscitation (CPR)

Langan field and office personnel will be encouraged to be trained in First Aid and Cardiopulmonary Resuscitation (CPR). Training will be provided free of charge by Langan to all employees. Employees will receive a training certificate that will be kept on file with the Health & Safety Coordinator (HSC). Training and certification will be provided by a credited provider such as American Red Cross or equivalent.

17.3.2.1 Emergency Procedures

Prior to work at sites the Langan employees certified in first aid and CPR will be identified in the site specific CHASP. Langan will endear to have at least one employee at a job site trained and able to render first aid and CPR. The site specific CHASP will contain first aid information on both potential chemical and physical hazards. Emergency procedures to be followed are in case of injury or illnesses are provided in the CHASP. The CHASP will include emergency contact information including local police and fire departments, hospital emergency rooms, ambulance services, on-site medical personnel and physicians. The CHASP will also include directions and contact information to the nearest emergency facility in case immediate medical attention is required. The emergency contact information will be conspicuously posted at the worksite. Employees that are injured and require immediate medical attention shall call either 911 or the local posted emergency contacts. Employees should use ambulatory services to transport injured workers to the nearest facility for emergency medical care. In areas where 911 is not available, the telephone numbers of the physicians, hospitals, or ambulances shall be conspicuously posted.

17.3.2.2 First Aid Supplies

First aid supplies are readily available to all Langan employees when required. First aid kits are located in each Langan office. Portable first aid kits are available for employees to use at work sites. First aid kits should consist of items needed to treat employees for potential chemical and physical injuries. At a minimum, first aid kits should contain items to allow basic first aid to be rendered. Where the eyes or body of an employee may be exposed to corrosive materials, suitable facilities for quick drenching or flushing of the eyes and body shall be provided within the work area for immediate emergency use including eye wash.

First aid kits will be weatherproof with individual sealed packages of each item. All portable first

aid kits shall be inspected by Langan employees before and after use to ensure all used items are replaced. When out in the field, employees shall check first aid kits weekly to ensure used items are replaced.

17.3.3 Hydrogen Sulfide

Langan employees with the potential to be exposed to hydrogen sulfide while at work sites shall have training in hydrogen sulfide awareness. The training will include identification of areas where employees could be exposed to hydrogen sulfide, health effects, permissible exposure limits, first aid procedures and personnel protective equipment. Langan employees could be exposed to hydrogen sulfide while at job sites including petroleum refineries, hazardous waste treatment, storage and disposal facilities, uncontrolled hazardous waste sites and remediation projects.

17.3.3.1 Characteristics

Hydrogen sulfide is a colorless gas with a strong odor of rotten eggs that is soluble in water. Hydrogen sulfide is used to test and make other chemicals. It is also found as a by-product of chemical reactions, such as in sewer treatment. It is a highly flammable gas and a dangerous fire hazard. Poisonous gases are produced in fires including sulfur oxides. Hydrogen sulfide is not listed as a carcinogen.

17.3.3.2 Health Effects

Hydrogen Sulfide can affect employees if inhaled or through contact with skin or eyes. Acute (or short term) health effects of hydrogen sulfide exposure include irritation of the nose and throat, dizziness, confusion, headache and trouble sleeping. Inhalation of hydrogen sulfide can irritate the lungs causing coughing and/or shortness of breath. Higher levels of exposure can cause build-up of fluid in the lungs (pulmonary edema), a medical emergency, with severe shortness of breath.

Chronic (or long term) health effects of low levels of exposure to hydrogen sulfide can cause pain and redness of the eyes with blurred vision. Repeated exposure may cause bronchitis with cough, phlegm and shortness of breath.

17.3.3.3 Protective Clothing and Equipment

Respirators are required for those operations in which employees will be exposed to hydrogen sulfide above OSHA permissible exposure level. The maximum OSHA permissible exposure limit (PEL) for hydrogen sulfide is 20 parts of hydrogen sulfide vapor per million parts of air (20 ppm)

for an 8-hour workday and the maximum short-term exposure limit (STEL) is 10 ppm for any 10-minute period.

Where employees are exposed to levels up to 100 parts of hydrogen sulfide vapor per million parts of air (100 ppm), the following types of respiratory protection are allowed:

- Any powered, air purifying respirator with cartridge(s);
- Any air purifying, full-facepiece respirator (gas mask) with a chin style, front- or back-mounted canister;
- Any supplied air system with escape self-contained breathing apparatus, if applicable; and,
- Any self-contained breathing apparatus with a full facepiece.

Respirators used by employees must have joint Mine Safety and Health Administration and the National Institute for Occupational Safety and Health (NIOSH) seal of approval. Cartridges or canisters must be replaced before the end of their service life, or the end of the shift, whichever occurs first. Langan employees that have the potential to be exposed to hydrogen sulfide will be trained in the proper use of respirators. Respirator training is discussed under– Langan's Respiratory Protection Program.

Employees with potential exposure to hydrogen sulfide, or when required by the client, will wear a portable hydrogen sulfide gas detector. The detector should have an audible, visual and vibrating alarm. The detector may also provide detection for carbon monoxide, sulfur dioxide and oxygen deficient atmospheres. The hydrogen sulfide monitor will, at a minimum, be calibrated to detect hydrogen sulfide at a level of 20 parts of hydrogen sulfide vapor per million parts of air (20 ppm). Many portable gas detectors will have factory defaults with a low level alarm at 10 ppm and a high level alarm at 15 ppm. Langan employees shall consult clients to determine if any site specific threshold levels exist.

If the hydrogen sulfide gas detector sounds and employees are not wearing appropriate respiratory protection, employees must immediately vacate the area and meet at the assigned emergency location. Langan employees may not re- enter the site without proper respiratory protection and approval from the client or property owner, if needed.

Employees shall wear PPE to prevent eye and skin contact with hydrogen sulfide. Employees must wear appropriate protective clothing including boots, gloves, sleeves and aprons, over any parts of their body that could be exposed to hydrogen sulfide. Non-vented, impact resistant goggles should be worn when working with or exposed to hydrogen sulfide.

17.3.3.4 Emergency and First Aid Procedures

Eye and Face Exposure

If hydrogen sulfide comes in contact with eyes, it should be washed out immediately with large amounts of water for 30 minutes, occasionally lifting the lower and upper eye lids. Seek medical attention immediately.

Skin Exposure

If hydrogen sulfide contaminates clothing or skin, remove the contaminated clothing immediately and wash the exposed skin with large amounts of water and soap. Seek medical attention immediately. Contaminated clothing should either be disposed of or washed before wearing again.

Breathing

If a Langan employee or other personnel breathe in hydrogen sulfide, immediately get the exposed person to fresh air. If breathing has stopped, artificial respiration should be started. Call for medical assistance or a doctor as soon as possible.

Safety Precautions

Hydrogen sulfide is a highly flammable gas and a dangerous fire hazard. Containers of hydrogen sulfide may explode in a fire situation. Poisonous gases are produced during fires.

Langan employees should contact property owners and operators prior to conducting work onsite to be aware of any site specific contingency plans, identify where hydrogen sulfide is used at the facility and be informed about additional safety rules or procedures.

19.3.4 Fire Protection/Extinguishers

Langan field personnel that have been provided with portable fire extinguishers for use at worksites will be trained to familiarize employees with general principles of fire extinguisher use and hazards associated with the incipient stage of firefighting. Training will be provided prior to initial assignment for field work and annually thereafter.

Portable fire extinguishers shall be visually inspected monthly and subjected to an annual maintenance check. Langan shall retain records of the annual maintenance date.

17.3.5 Overhead lines

When field work is performed near overhead lines, the lines shall be deenergized and grounded,

or other protective measures shall be provided before the work shall commence. If overhead lines are to be deenergized, arrangements shall be made with the client, property owner or organization that operates or controls the electric circuits involved to deenergize and ground them. If protective measures, such as guarding, isolating, or insulating, are provided, these precautions shall prevent employees from contacting such lines directly with any part of their body or indirectly through conductive materials, tools, or equipment.

When unqualified Langan personnel are working in an elevated position near overhead lines, the location shall be such that the person and the longest conductive object they may contact cannot come closer to any unguarded, energized overhead line than the following distances:

1. For voltages to ground 50kV or below - 10 feet; and
2. For voltages to ground over 50kV - 10 feet, plus 4 inches for every 10kV over 50kV.

As previously indicated, Langan does not retain qualified employees to perform work on energized equipment.

17.3.5.1 Vehicle and Equipment Clearance

Any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines shall be operated so that a clearance of 10 feet is maintained. If the voltage of the overhead lines is higher than 50kV, the clearance shall be increased 4 inches for every 10kV over that voltage.

If any of the following discussed conditions occur, the clearance may be reduced.

- If the vehicle is in transit with its structure lowered, the clearance may be reduced to 4 ft. If the voltage is higher than 50kV, the clearance shall be increased 4 in. for every 10 kV over that voltage.
- If insulating barriers are installed to prevent contact with the lines, and if the barriers are rated for the voltage of the line being guarded and are not a part of or an attachment to the vehicle or its raised structure, the clearance may be reduced to a distance within the designed working dimensions of the insulating barrier.

Employees standing on the ground may not contact the vehicle or mechanical equipment or any of its attachments, unless the employee is using protective equipment rated for the voltage; or the equipment is located so that no uninsulated part of its structure (that portion of the structure that provides a conductive path to employees on the ground) can come closer to the overhead line than permitted.

If any vehicle or mechanical equipment capable of having parts of its structure elevated near

energized overhead lines is intentionally grounded, employees working on the ground near the point of grounding may not stand at the grounding location whenever there is a possibility of overhead line contact. Additional precautions, such as the use of barricades or insulation, shall be taken to protect employees from hazardous ground potentials, depending on earth resistivity and fault currents, which can develop within the first few feet or more outward from the grounding point.

17.3.6 Trade Secret

Langan employees could potentially be provided trade secret information by the client or property owner when site specific information is provided about highly hazardous chemicals. Trade secret means any confidential formula, pattern, process, device, information or compilation of information that is used in an employer's business, and that gives the employer an opportunity to obtain an advantage over competitors who do not know or use it. Langan employees understand that this information should be kept confident and if required, may enter into a confidentially agreement with the client.

17.3.7 Bloodborne Pathogens

Langan employees that can reasonably anticipate exposure to blood or other potentially infectious material while at work sites shall have training in bloodborne pathogens. Applicable employees would include those trained in first aid and serving a designated role as an emergency medical care provider. Bloodborne pathogens are pathogenic microorganisms that are present in human blood and can cause disease in humans. These pathogens include, but are not limited to, hepatitis B virus and human immunodeficiency virus.

17.3.7.1 Training

Langan employees with potential occupational exposure to blood or other potentially infectious material must participate in a training program. Training must be conducted prior to initial assignment where there would be potential for exposure and annually thereafter within one year of previous training. The training program will be provided to Langan employees at no cost to them and during working hours.

Langan will ensure the training program shall consist of the following:

- An accessible copy of the regulatory text of 29 CFR 1910.1030 and an explanation of its contents;
- A general explanation of the epidemiology and symptoms of bloodborne diseases;
- An explanation of the modes of transmission of bloodborne pathogens;

- An explanation of Langan's exposure control plan and the means by which the employee can obtain a copy of the written plan;
- An explanation of the appropriate methods for recognizing tasks and other activities that may involve exposure to blood and other potentially infectious materials;
- An explanation of the use and limitations of personal protective
  - equipment (PPE) to prevent and reduce exposure;
  - Information on the types, proper use, location, removal, handling and disposal of PPE;
  - An explanation of the basis for selection of PPE;
  - Information on the hepatitis B vaccine, including information on its efficacy, safety, method of administration, the benefits of being vaccinated, and that the vaccine and vaccination will be offered free of charge;
  - Information on the appropriate actions to take and persons to contact in an emergency involving blood or other potentially infectious materials;
  - An explanation of the procedure to follow if an exposure incident occurs, including the method of reporting the incident and the medical follow-up that will be made available;
  - Information on the post-exposure evaluation and follow-up that the
  - employer is required to provide for the employee following an exposure incident;
  - An explanation of the signs and labels and/or color coding required by paragraph 29 CFR 1910.1030(g)(1); and
  - An opportunity for interactive questions and answers with the person conducting the training session.

Langan will develop and implement a written Exposure Control Plan, which will be designed to eliminate or minimize employee exposure to bloodborne pathogens. The Exposure Control Plan will contain the following elements:

- An exposure determination for employees;
- The schedule and method of implementation for Methods of Compliance (29 CFR 191.1030(d)), Hepatitis B Vaccination and Post-Exposure Evaluation and Follow-up (29 CFR 1910.1030(f)), Communication of Hazards to Employees (29 CFR 1910.1030(g)) and (h) Recordkeeping (29 CFR 1910.1030(h));
- The procedure for the evaluation of circumstances surrounding exposure incidents;
- Ensure a copy of the Exposure Control Plan will be accessible to employees; and,
- The Exposure Control Plan shall be reviewed and updated at least annually.

Langan employees with occupational exposure to bloodborne pathogens include any employees trained in first aid that would be expected to provide emergency medical care. This determination is made without regards to the use of PPE, which could eliminate or minimize exposure.

Universal precautions shall be observed to prevent contact with blood or other potentially

infectious materials. According to the concept of Universal Precautions, all human blood and certain human body fluids are treated as if known to be infectious for bloodborne pathogens. Under circumstances in which differentiation between body fluid types is difficult or impossible, all body fluids shall be considered potentially infectious materials.

Work practice controls shall be used to eliminate or minimize employee exposure, if applicable. Since Langan employees will have occupational exposure only during rendering of first aid, personnel protective equipment will be utilized to reduce or minimize exposure. PPE that could be available to Langan personnel when administering first aid includes safety glasses, gloves, and Tyvek suits or sleeves. PPE and first aid kits will be provided to employees at no cost to them.

Langan employees that render first aid in office areas will have access to hand washing facilities or restrooms. For first aid rendered at field locations, first aid kits will contain an appropriate antiseptic hand cleanser and clean cloth/paper towels or antiseptic towelettes. After using antiseptic hand cleansers or towelettes, employees shall wash their hands with soap and running water as soon as feasible.

After administering first aid, potentially infectious materials, including towels, personnel protective equipment, clothes and bandages, shall be placed in a container, which prevents leakage during collection, handling, processing, storage, transport, or shipping. All PPE will be dispose of after use. Any equipment or working surfaces which was been exposed to blood or potentially infectious materials due to an injury, will be decontaminated prior to reuse.

Langan will make available the hepatitis B vaccine and vaccination series to all employees who have occupational exposure, and post-exposure evaluation and follow-up to all employees who have had an exposure incident. These services will be available to the employee at no cost to them through a medical provider.

17.3.7.2 Recordkeeping

Langan will maintain training and medical records for each employee with occupational exposure to blood or potentially infectious materials. Medical and training records will be maintained by Langan's H&S Department.

Training records will include the following:

- Dates of the training sessions;
- Contents or a summary of the training sessions;
- Names and qualifications of persons conducting the training; and

- Names and job titles of all persons attending the training sessions.

Training records shall be maintained for 3 years from the date on which the training occurred. Medical records will be will be preserved and maintained for the duration of employment plus 30 years.

All records will be made available upon request to employees, the Assistant Secretary of Labor for Occupational Safety and Health, and Director of National Institute for Occupational Safety and Health Director of OSHA for examination and copying. Medical records must have written consent from employee before releasing.

If Langan ceases to do business, all records shall be transferred to the successor employer. The successor employer shall receive and maintain these records.

If there will not be a successor, Langan will notify current employees of their rights to access records at least three months prior to the cessation of business.

18.0 RECORDKEEPING

The following is a summary of required health and safety logs, reports and recordkeeping.

18.1 Field Change Authorization Request

Any changes to the work to be performed that is not included in the CHASP will require an addendum that is approved by the Langan project manager and Langan HSM to be prepared. Approved changes will be reviewed with all field personnel at a safety briefing.

18.2 Medical and Training Records

Copies or verification of training (40-hour, 8-hour, supervisor, site-specific training, documentation of three-day OJT, and respirator fit-test records) and medical clearance for site work and respirator use will be maintained in the office and available upon request. Records for all subcontractor employees must also be available upon request. All employee medical records will be maintained by the HSM.

18.3 Onsite Log

A log of personnel on site each day will be kept by the HSO or designee.

18.4 Daily Safety Meetings (“Tailgate Talks”)

Completed safety briefing forms will be maintained by the HSO.

18.5 Exposure Records

All personal monitoring results, laboratory reports, calculations and air sampling data sheets are part of an employee exposure record. These records will be maintained by the HSO during site work. At the end of the project they will be maintained according to 29 CFR 1910.1020.

18.6 Hazard Communication Program/MSDS-SDS

Material safety data sheets (MSDS) of Safety Data Sheets (SDS) have been obtained for applicable substances and are included in this CHASP (Attachment D). Langan's written hazard communication program, in compliance with 29 CFR 1910.1200, is maintained by the HSM.

18.7 Documentation

Immediately following an incident or near miss, unless emergency medical treatment is required, either the employee or a coworker must contact the Langan incident/injury hotline at 1-800-952-6426, extension 4699 and the Project Manager to report the incident or near miss. The Project Manager will contact the client or client representative. A written report must be completed and submitted HSM within 24 hours of the incident. For emergencies involving personnel injury and/or exposure, employee will complete and submit the Langan incident/injury report to the Langan corporate health and safety manager as soon as possible following the incident. Accidents will be investigated in-depth to identify all causes and to recommend hazard control measures.

18.7.1 Accident and Injury Report Forms

18.7.1.1 Accident/Incident Report

All injuries, no matter how slight, shall be reported to the FTL and the PM immediately. The accident/incident report forms, attached in Attachment U and Attachment V will be filled out on all accidents by the applicable contractor supervision personnel, the FTL, or the HSO. Copies of all accident/incident reports shall be kept on-site and available for review. Project personnel will be instructed on the location of the first aid station, hospital, and doctor and ambulance service near the job. The emergency telephone numbers will be conspicuously posted in site vehicles near the work zone. First aid supplies will be centrally located and conspicuously posted between restricted and non-restricted areas to be readily accessible to all on the site.

18.7.1.2 First Aid Treatment Record

The forms in will be used for recording all non-lost time injuries treated by the project first-aid attendant, the local physician or hospital will be entered in detail on this record. "Minor" treatment of scratches, cuts, etc. will receive the same recording attention as treatment of more severe injuries.

18.7.1.3 OSHA Form 300

An OSHA Form 300 will be kept at the Langan Corporate Office in Parsippany, New Jersey. All recordable injuries or illnesses will be recorded on this form. Subcontractor employers must also meet the requirements of maintaining an OSHA 300 form. The Incident Report form used to capture the details of work-related injuries/illnesses meets the requirements of the OSHA Form 301 (supplemental record) and must be maintained with the OSHA Form 300 for all recordable injuries or illnesses. Forms for recording OSHA work-related injuries and illnesses are included in Attachment U and Attachment V.

19.0 CONFINED SPACE ENTRY

Confined spaces are not anticipated at the Site during planned construction activities. If confined spaces are identified, the contractor must implement their own confined space program that all applicable federal, state and local regulations. Confined spaces **will not** be entered by Langan personnel.

20.0 CHASP ACKNOWLEDGEMENT FORM

All Langan personnel and contractors will sign this CHASP Compliance Agreement indicating that they have become familiar with this CHASP and that they understand it and agree to abide by it.

Printed Name	Signature	Company	Date

Printed Name	Signature	Company	Date

Printed Name	Signature	Company	Date

Printed Name	Signature	Company	Date

Printed Name	Signature	Company	Date

Printed Name	Signature	Company	Date

TABLES

TABLE 1
TASK HAZARD ANALYSES

Task	Hazard	Description	Control Measures	First Aid
1.3.1 – 1.3.10	Contaminated Soil or Groundwater-Dermal Contact	Contaminated water spills on skin, splashes in eyes; contact with contaminated soil/fill during construction activities or sampling.	Wear proper PPE; follow safe practices, maintain safe distance from construction activities	See Table 2, seek medical attention as required
1.3.1 – 1.3.10	Lacerations, abrasions, punctures	Cutting bailer twine, pump tubing, acetate liners, etc. with knife; cuts from sharp site objects or previously cut piles, tanks, etc.; Using tools in tight spaces	Wear proper PPE; follow safe practices	Clean wound, apply pressure and/or bandages; seek medical attention as required.
1.3.1 – 1.3.10	Contaminated Media Inhalation	Opening drums, tanks, wells; vapors for non-aqueous phase liquids or other contaminated site media; dust inhalation during excavation; vapor accumulation in excavation	Follow air monitoring plan; have quick access to respirator, do not move or open unlabeled drums found at the site, maintain safe distance from construction activities	See Table 2, seek medical attention as required
1.3.1 – 1.3.10	Lifting	Improper lifting/carrying of equipment and materials causing strains	Follow safe lifting techniques; Langan employees are not to carry contractor equipment or materials	Rest, ice, compression, elevation; seek medical attention as required
1.3.1 – 1.3.10	Slips, trips, and falls	Slips, trips and falls due to uneven surfaces, cords, steep slopes, debris and equipment in work areas	Good housekeeping at site; constant awareness and focus on the task; avoid climbing on stockpiles; maintain safe distance from construction activities and excavations; avoid elevated areas over six feet unless fully accredited in fall protection and wearing an approved fall protection safety apparatus	Rest, ice, compression, elevation; seek medical attention as required
1.3.1 – 1.3.10	Noise	Excavation equipment, hand tools, drilling equipment.	Wear hearing protection; maintain safe distance from construction activities	Seek medical attention as required
1.3.1 – 1.3.10	Falling objects	Soil material, tools, etc. dropping from drill rigs, front-end loaders, etc.	Hard hats to be worn at all times while in work zones; maintain safe distance from construction activities and excavations	Seek medical attention as required
1.3.1 – 1.3.10	Underground/ overhead utilities	Excavation equipment, drill rig auger makes contact with underground object; boom touches overhead utility	"One Call" before dig; follow safe practices; confirm utility locations with contractor; wear proper PPE; maintain safe distance from construction activities and excavations	Seek medical attention as required
1.3.1 – 1.3.10	Insects (bees, wasps, hornet, mosquitoes, and spider)	Sings, bites	Insect Repellent; wear proper protective clothing (work boots, socks and light colored pants);field personnel who may have insect allergies (e.g., bee sting) should provide this information to the HSO or FSO prior to commencing work, and will have allergy medication on site.	Seek medical attention as required
1.3.1 – 1.3.10	Vehicle traffic / Heavy Equipment Operation	Vehicles unable to see workers on site, operation of heavy equipment in tight spaces, equipment failure, malfunctioning alarms	Wear proper PPE, especially visibility vest; use a buddy system to look for traffic; rope off area of work with cones and caution tape or devices at points of hazard, maintain safe distance from construction activities and equipment	Seek medical attention as required

TABLE 2
CONTAMINANT HAZARDS OF CONCERN

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.10	1,1,1,2-Tetrachloroethane R-130a	630-20-6	NA	None None	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes (redness, pain), skin (redness, burning sensation, pain); Inhalation: jaundice, enlarged liver, headaches, tremors, dizziness, numbness, and drowsiness. Ingestion: burning sensation, headache, nausea	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	1,1,2-Trichloro-1,2,2-trifluoroethane Chlorofluorocarbon-113 CFC-113 Freon® 113 Genetron® 113 Halocarbon 113 Refrigerant 113 TTE Frigen 113 TR Freon TF Trichlorotrifluoroethane	76-13-1	PID	1000 ppm 2000 ppm	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation skin, throat, drowsiness, dermatitis; central nervous system depression; dizziness, tremor, asphyxia, unconsciousness, cardiac arrhythmias, cardiac arrest; liquid: frostbite. In animals: cardiac arrhythmias, narcosis,	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	1,1,2-Trichloroethane 1,1,2-TCA Ethane trichloride β-Trichloroethane Vinyl trichloride	79-00-5	PID	10 ppm 100 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation eyes, nose; central nervous system depression; liver, kidney damage; dermatitis	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.10	1,1-Dichloroethane Asymmetrical dichloroethane Ethylidene chloride 1,1-Ethylidene dichloride 1,1-DCA	75-34-3	PID	100 ppm 3000 ppm	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the skin; central nervous system depression; liver, kidney, lung damage	Eye: Irrigate immediately Skin: Soap flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	1,2,4-Trichlorobenzene Unsym-Trichlorobenzene 1,2,4-Trichlorobenzol	120-82-1	NA	None None	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation eyes, skin, mucous membrane; In Animals: liver, kidney damage; possible teratogenic effects	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	1,2,4-Trimethylbenzene	95-63-6	PID	None None	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, throat, respiratory system; bronchitis; hypochromic anemia; headache, drowsiness, lassitude (weakness, exhaustion), dizziness, nausea, incoordination; vomiting, confusion; chemical pneumonitis (aspiration liquid)	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.10	1,2-Dichlorobenzene	95-50-1	PID	50 ppm 200 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eye, swelling periorbital (situated around the eye); profuse rhinitis; headache, anorexia, nausea, vomiting; weight loss, jaundice, cirrhosis; in animals: liver, kidney injury; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	1,2-Dichloroethane Ethylene dichloride 1,2-DCA DCE[1] Ethane dichloride Dutch liquid, Dutch oil Freon 150	107-06-2	PID	50 ppm 50 ppm	Groundwater Soil Vapor	inhalation, ingestion, skin absorption, skin and/or eye contact	irritation to the eyes, skin, mucous membrane	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	1,3,5-Trimethylbenzene Mesitylene sym-Trimethylbenzene	108-67-8	PID	None None	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, throat, respiratory system; bronchitis; hypochromic anemia; headache, drowsiness, lassitude (weakness, exhaustion), dizziness, nausea, incoordination; vomiting, confusion; chemical pneumonitis (aspiration liquid)	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	1,3-Butadiene Biethylene Bivinyl Butadiene Divinyl Erythrene Vinylethylene	106-99-0	PID	1 ppm 2000 ppm	Vapor	inhalation, skin and/or eye contact (liquid)	irritation to the eyes, nose, throat; drowsiness, dizziness; liquid: frostbite; teratogenic, reproductive effects; [potential occupational carcinogen]	Eye: Frostbite Skin: Frostbite Breathing: Respiratory support

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.10	1,3-Dichlorobenzene m-Dichlorobenzol; m-Phenylene dichloride m-dichlorobenzene	541-73-1	PID	None None	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, swelling periorbital (situated around the eye); profuse rhinitis; headache, anorexia, nausea, vomiting; weight loss, jaundice, cirrhosis; in animals: liver, kidney injury; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	1,4-Dioxane 1,4-Dioxacyclohexane [1,4]Dioxane p-Dioxane [6]-crown-2 Diethylene dioxide Diethylene ether Dioxan	123-91-1	PID	100 ppm 500 ppm	Groundwater Soil Vapor	Inhalation, ingestion, skin and/or eye contact	Irritant to eyes, skin, mucous membranes and respiratory system. May be harmful by ingestion, skin absorption and inhalation	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	1.2-Dibromoethane Ethylene Dibromide Ethylene bromide Glycol dibromide 1,2-Dibromoethane	106-93-4	PID	20 ppm 100 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation eyes, skin, respiratory system; dermatitis with vesiculation; liver, heart, spleen, kidney damage; reproductive effects; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	1H,1H,2H,2H.Perfluorooctanes ulfonic Acid (6:2FTS) Sodium 1H,1H, 2H, 2H-Perfluorooctane Sulfonate (6:2)(6:2FTS) 6:2 Fluorinated Telomer Sulfonates (6:2FTS) Sodium 1H,1H,2H,2H-Perfluorooctane Sulfonate (6:2)	27619-97-2	NA	NA NA	Groundwater	inhalation, skin or eye contact, ingestion	irritation to eyes with possible eye damage, skin causing rash, redness or burning, irritation to nose, throat and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.10	2,2,4-Trimethylpentane	540-84-1	PID	NA NA	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, throat, respiratory system; bronchitis; hypochromic anemia; headache, drowsiness, lassitude (weakness, exhaustion), dizziness, nausea, incoordination; vomiting, confusion; chemical pneumonitis (aspiration liquid)	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	2,4-Dimethylphenol 2,4-Xylenol m-Xylenol 1-Hydroxy-2,4-dimethylbenzene 2,4-Dimethylphenol 4-Hydroxy-1,3-dimethylbenzene 4,6-Dimethylphenol 1,3-Dimethyl-4-hydroxybenze	105-67-9	None	NA NA	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, mucous membrane; headache, narcosis, coma; dermatitis; in animals: liver, kidney damage	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	2,6-Dinitrotoluene 2-Methyl-1,3-dinitrobenzene 2,6-DNT 2-methyl-1,3-dinitrobenzene 1-Methyl-2,6-dinitrobenzene 2,4-dinitromethylbenzene	606-20-2	PID	1.5 mg/m3	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	headache, weakness, nausea or dizziness, affect the nervous system causing fatigue, nausea, vomiting, drowsiness, and personality changes (irritability, anxiety, confusion and depression); shortness of breath and collapse. Can burn eyes and skin.	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.10	2-Butanone Ethyl methyl ketone MEK Methyl acetone Methyl ethyl ketone	78-93-3	PID	200 ppm 3000 ppm	Soil Groundwater Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose; headache; dizziness; vomiting; dermatitis	Eye: Irrigate immediately Skin: Water wash immediately Breathing: Fresh air Swallow: Medical attention immediately
1.3.1 – 1.3.10	2-Chloronaphthalene	91.58-7	NA	NA MA	Groundwater Soil	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation eyes, nose; skin	Eye: Irrigate immediately , Medical attention Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention
1.3.1 – 1.3.10	2-Methylnaphthalene β-methylnaphthalene	91-57-6	PID	NA NA	Groundwater Soil Vapor	inhalation, ingestion or skin absorption, eye contact	irritation to the skin, eyes, mucous membranes and upper respiratory tract. It may also cause headaches, nausea, vomiting, diarrhea, anemia, jaundice, euphoria, dermatitis, visual disturbances, convulsions and comatose	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.10	4-Isopropyltoulene 1-Methyl-4-(1-methylethyl)benzene 4-Isopropyltoluene; 4-Methylcumene; 1-Methyl-4-isopropylbenzene Dolcymene Camphogen Paracymene Cymene p-Cymene p-Isopropyltoluene	99-87-6	PID	NA NA	Soil Groundwater Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin, mucous membrane; dermatitis; headache, narcosis, coma	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	4-Methyl-2-pentanone Hexone Isobutyl methyl ketone Methyl isobutyl ketone MIBK	108-10-1	PID	100 ppm 500 ppm	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, mucous membrane; headache, narcosis, coma; dermatitis; in animals: liver, kidney damage	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Acenaphthene 1,2-Dihydroacenaphthylene 1,8-Ethylenenaphthalene peri-Ethylenenaphthalene Naphthyleneethylene Tricyclododecapentaene	83-32-9	PID	NA NA	Soil	inhalation, ingestion, skin and/or eye contact,	irritation to the skin, eyes, mucous membranes and upper respiratory tract; If ingested, it can cause vomiting	Eye: Irrigate immediately Skin: Soap wash immediately, if redness or irritation develop, seek medical attention immediately Breathing: Move to fresh air Swallow: do not induce vomiting, seek medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.10	Acenaphthylene Cycopental(de)naphthalene, Acenaphthalene	208-96-8	PID	NA NA	Soil	inhalation, ingestion, skin and/or eye contact	irritation to the skin, eyes, mucous membranes and upper respiratory tract	Eye: Irrigate immediately, seek medical attention immediately, Skin: Soap wash immediately, if redness or irritation develop, seek medical attention immediately Breathing: Move to fresh air Swallow: do not induce vomiting, seek medical attention immediately
1.3.1 – 1.3.10	Acetone Dimethyl ketone Ketone propane 2-Propanone	67-64-1	PID	1000 ppm 2500 ppm	Groundwater Soil	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, nose, throat; headache, dizziness, central nervous system depression; dermatitis	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Acrylonitrile Acrylonitrile monomer AN Cyanoethylene Propenenitrile 2-Propenenitrile VCN, Vinyl cyanide	107-13-1	PID	1 ppm 85 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin; asphyxia; headache; sneezing; nausea, vomiting; lassitude (weakness, exhaustion), dizziness; skin vesiculation; scaling dermatitis; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Water wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.10	Aldrin 1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a-hexahydro-endo-1,4-exo-5,8-dimethanonaphthalene HHDN Octalene	309-00-2	PID	0.25 ppm 5 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	headache, dizziness; nausea, vomiting, malaise (vague feeling of discomfort); myoclonic jerks of limbs; clonic, tonic convulsions; coma; hematuria (blood in the urine), azotemia; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Aluminum	7429-90-5	None	0.5 mg/m3 50 mg/m3	Soil	inhalation, skin and/or eye contact	irritation to the eyes, skin, respiratory system	Eye: Irrigate immediately Breathing: Fresh air
1.3.1 – 1.3.10	Anthracene	120-12-7	PID	0.2 mg/m^3 80 mg/m^3 (Coal Pitch Tar)	Soil	inhalation, skin or eye contact, ingestion	irritation to the skin, eyes, mucous membranes and upper respiratory tract, abdominal pain if ingested.	Eye: Irrigate immediately, seek medical attention immediately, Skin: Soap wash immediately, Breathing: Move to fresh air, refer to medical attention; Swallow: refer to medical attention
1.3.1 – 1.3.10	Antimony	7440-36-0	None	0.5 mg/m^3 50 mg/m^3	Groundwater Soil	inhalation, ingestion, skin and/or eye contact	irritation skin, possible dermatitis; resp distress; diarrhea; muscle tremor, convulsions; possible gastrointestinal tract	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.10	Arsenic	NA	None	0.5 mg/m^3 NA	Groundwater Soil	inhalation, ingestion, skin and/or eye contact	irritation skin, possible dermatitis; resp distress; diarrhea; muscle tremor, convulsions; possible gastrointestinal tract	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Barium	10022-31-8	None	0.5 mg/m^3 50 mg/m^3	Groundwater Soil	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, upper respiratory system; skin burns; gastroenteritis; muscle spasm; slow pulse	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Benzene Benzol Phenyl hydride	71-43-2	PID	3.19 mg/m^3 1,595 mg/mg^3	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, respiratory system; dizziness; headache, nausea, staggered gait; lassitude (weakness, exhaustion) [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Benzo(a)anthracene Benzanthracene Benzanthrene 1,2-Benzanthracene Benzo[b]phenanthrene Tetraphene	56-55-3	PID	0.2 mg/m^3 80 mg/m^3 (Coal Pitch Tar)	Groundwater Soil	inhalation, skin or eye contact, ingestion	dermatitis, bronchitis, [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.10	Benzo(a)pyrene	50-32-8	PID	0.2 mg/m^3 80 mg/m^3 (Coal Pitch Tar)	Soil	inhalation, skin or eye contact, ingestion	dermatitis, bronchitis, [potential occupational carcinogen]	Eye: Irrigate immediately, seek medical attention Skin: Soap wash immediately; Breathing: move to fresh air; Swallow: Induce vomiting if conscious, seek medical attention immediately
1.3.1 – 1.3.10	Benzo(b)fluoranthene	205-99-2	PID	0.2 mg/m^3 80 mg/m^3 (Coal Pitch Tar)	Soil	inhalation, skin or eye contact, ingestion	irritation to eyes and skin, respiratory irritation(dizziness, weakness, fatigue, nausea, headache)	Eye: Irrigate immediately, refer to medical attention Skin: Soap wash immediately Breathing: move to fresh air Swallow: Medical attention immediately
1.3.1 – 1.3.10	Benzo(g,h,i)perylene Benzo(ghi)perylene	191-24-2	PID	0.2 mg/m^3 80 mg/m^3 (Coal Pitch Tar)	Soil	inhalation, skin or eye contact, ingestion	NA	Eye: Irrigate immediately, refer to medical attention Skin: Soap wash immediately Breathing: move to fresh air Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.10	Benzo(k)fluoranthene	207-08-9	PID	0.2 mg/m^3 80 mg/m^3 (Coal Pitch Tar)	Soil	inhalation, skin or eye contact, ingestion	irritation to eyes and skin, respiratory irritation (dizziness, weakness, fatigue, nausea, headache)	Eye: Irrigate immediately, refer to medical attention Skin: Soap wash immediately Breathing: move to fresh air Swallow: Medical attention immediately
1.3.1 – 1.3.10	Benzoic acid Carboxybenzene E210 Dracylic acid Phenylmethanoic acid Benzenecarboxylic acid	65-85-0	None	NA NA	Groundwater Soil Vapor	inhalation, skin or eye contact, ingestion	irritation to eyes with possible eye damage, skin causing rash, redness or burning, irritation to nose, throat and lungs	Eye: Irrigate immediately, refer to medical attention Skin: Soap wash immediately Breathing: move to fresh air
1.3.1 – 1.3.10	Benzyl chloride Chloromethylbenzene α-Chlorotoluene	100-44-7	PID	1 ppm 10 ppm	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation eyes, skin, nose; lassitude (weakness, exhaustion); irritability; headache; skin eruption; pulmonary edema	Eye: Irrigate immediately, refer to medical attention Skin: Soap wash immediately Breathing: move to fresh air Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.10	Beryllium	7440-41-7	None	0.002 mg/m^3 4 mg/m^3	Soil	inhalation, skin and/or eye contact	berylliosis (chronic exposure): anorexia, weight loss, lassitude (weakness, exhaustion), chest pain, cough, clubbing of fingers, cyanosis, pulmonary insufficiency; irritation to the eyes; dermatitis; [potential occupational carcinogen]	Eye: Irrigate immediately Breathing: Fresh air
1.3.1 – 1.3.10	Bis(2-ethylhexyl)phthalate Bis(2-Ethylhexyl) Phthalate Di-sec octyl phthalate DEHP Di(2-ethylhexyl)phthalate Octyl phthalate	117-81-7	None	5 mg/m^3 5000 mg/m^3	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, mucous membrane; in animals: liver damage; teratogenic effects; [potential occupational carcinogen	Eye: Irrigate immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Bromodichloromethane dichlorobromomethane	75-27-4	None	NA NA	Groundwater Soil Vapor	inhalation, skin or eye contact, ingestion	irritation of the skin, eyes, mucous membranes and respiratory tract, narcosis, nausea, dizziness and headache	Eye: Irrigate immediately (liquid) Skin: Water flush immediately (liquid) Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.10	Cadmium	7440-43-9	None	0.005 mg/m³ 9 mg/m³	Soil	inhalation, ingestion	pulmonary edema, dyspnea (breathing difficulty), cough, chest tightness, substernal (occurring beneath the sternum) pain; headache; chills, muscle aches; nausea, vomiting, diarrhea; anosmia (loss of the sense of smell), emphysema, proteinuria, mild anemia; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Calcium	7440-70-2	None	NA	Groundwater Soil	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, upper resp tract; ulcer, perforation nasal septum; pneumonitis; dermatitis	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Carbazole 9-azafluorene Dibenzopyrrole Diphenylenimine diphenyleneimide	86-74-8	None	NA NA	Soil	inhalation, skin absorption (liquid), skin and/or eye contact	irritation to eyes and skin, respiratory irritation	Eye: Irrigate immediately, refer to medical attention Skin: Soap wash immediately Breathing: move to fresh air Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.10	Carbon disulfide	75-15-0	PID	20 ppm 500 ppm	Soil Groundwater Vapor	inhalation, skin or eye contact, ingestion	irritation to the eyes, skin, respiratory system	Eye: Irrigate immediately (liquid) Skin: Water flush immediately (liquid) Breathing: Respiratory support
1.3.1 – 1.3.10	Carbon tetrachloride Carbon chloride Carbon tet Freon® 10 Halon® 104 Tetrachloromethane	56-23-5	PID	10 ppm 200 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin; central nervous system depression; nausea, vomiting; liver, kidney injury; drowsiness, dizziness, incoordination; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Chlorobenzene benzene chloride monochlorobenzene Phenyl chloride Chlorobenzol MCB	108-90-7	PID	75 ppm 1000 ppm	Groundwater Soil Vapor	inhalation, skin or eye contact, ingestion	irritation to the eyes, skin, nose; drowsiness, incoordination; central nervous system depression; in animals: liver, lung, kidney injury	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Chloroform Methane trichloride Trichloromethane	67-66-3	None	50 ppm 500 ppm	Groundwater Soil	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin; dizziness, mental dullness, nausea, confusion; headache, lassitude (weakness, exhaustion); anesthesia; enlarged liver; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.10	Chromium Total Chromium	7440-47-3	None	1.0 mg/m^3 250 mg/m^3	Groundwater Soil	inhalation absorption ingestion	irritation to eye, skin, and respiratory	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Chrysene Benzo[a]phenanthrene 1,2-Benzphenanthrene	218-01-9	PID	0.2 mg/m^3 80 mg/m^3 (Coal Pitch Tar)	Groundwater Soil	inhalation, absorption, ingestion, consumption	irritation to eye, skin, and respiratory, gastrointestinal irritation nausea, vomit, diarrhea [potential occupational carcinogen]	Eyes: Irrigate immediately Skin: Soap wash promptly. Breath: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	cis-1,2-Dichloroethene	156-59-2	PID	200 ppm 1000 ppm	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, respiratory system; central nervous system depression	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Cis-1,3-Dichlorpropene Cis-1,3-Dichlropropylene Cis-1,3-Dichloropropene cis-1,3-Dichloropropylene	10061-01-5	PID	NA NA	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin, respiratory system; eye, skin burns; lacrimation (discharge of tears); headache, dizziness; in animals; liver, kidney damage; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.10	Cobalt	7440-48-4	None	0.1mg/m^3 20 mg/m^3	Soil	inhalation, ingestion, skin and/or eye contact	Cough, dyspnea (breathing difficulty), wheezing, decreased pulmonary function; weight loss; dermatitis; diffuse nodular fibrosis; resp hypersensitivity, asthma	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Copper	7440-50-8	None	1.0 mg/m^3 100 mg/m^3	Groundwater Soil	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, nose, metallic taste; dermatitis; anemia	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Cumene Cumol Isopropylbenzene 2-Phenyl propane	98-82-8	PID	50 ppm 900 ppm	Groundwater Soil	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin, mucous membrane; dermatitis; headache, narcosis, coma	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Cyclohexane Benzene hexahydride Hexahydrobenzene Hexamethylene Hexanaphthene	110-82-7	PID	300 ppm 1300 ppm	Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, respiratory system; drowsiness; dermatitis; narcosis, coma	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.10	DDE 4,4-DDE 1,1-bis-(4-chlorophenyl)-2,2-dichloroethene Dichlorodiphenyldichloroethylene	72-55-9	None	NA NA	Soil	inhalation, skin absorption, ingestion, skin and/or eye contact	Oral ingestion of food is the primary source of exposure for the general population. Acute and chronic ingestion may cause nausea, vomiting, diarrhea, stomach pain, headache, dizziness, disorientation, tingling sensation, kidney damage, liver damage, convulsions, coma, and death. 4,4' DDE may cross the placenta and can be excreted in breast milk	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	DDT 4,4-DDT 4,4'-DDT p,p'-DDT Dichlorodiphenyltrichloroethane 1,1,1-Trichloro-2,2-bis(p-chlorophenyl)ethane	50-29-3	None	1 mg/m^3 500 mg/m^3	Groundwater Soil	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin; paresthesia tongue, lips, face; tremor; anxiety, dizziness, confusion, malaise (vague feeling of discomfort), headache, lassitude (weakness, exhaustion); convulsions; paresis hands; vomiting; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Dibenz(a,h)anthracene Dibenzo(a,h)anthracene	53-70-3	PID	0.2 mg/m^3 80 mg/m^3 (Coal Pitch Tar)	Groundwater Soil	inhalation, absorption, ingestion, consumption	irritation to eyes, skin, respiratory, and digestion [potential occupational carcinogen]	Eyes: Irrigate immediately Skin: Soap wash promptly. Breath: Respiratory support PID Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.10	Dibenzofuran	132-64-9	None	NA NA	Soil	inhalation, absorption	irritation to eyes, and skin	Eyes: Irrigate immediately Skin: Soap wash promptly.
1.3.1 – 1.3.10	Dibromochloromethane Dibromo(chloro)methane Chlorodibromomethane Monochlorodibromomethane	124-48-1	PID	NA NA		inhalation, skin absorption, ingestion, skin and/or eye contact	irritation eyes, skin, respiratory system; dermatitis with vesiculation; liver, heart, spleen, kidney damage; reproductive effects; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Dibutyl phthalate Di-n-butyl phthalate Butyl phthalate n-Butyl phthalate 1,2-Benzenedicarboxylic acid dibutyl ester o-Benzenedicarboxylic acid dibutyl ester DBP Palatinol C, Elaol Dibutyl-1,2-benzene-dicarboxylate Di-n-butyl Phthalate Di-n-butylphthalate	84-74-2	None	5 mg/m^3 4000 mg/m^3	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, upper respiratory system, stomach	Eye: Irrigate immediately Skin: Wash regularly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Dichlorodifluoromethane Difluorodichloromethane, Fluorocarbon 12 Freon 12 Freon® 12 Genetron® 12 Halon® 122 Propellant 12 Refrigerant 12 Dichlorodifluromethane	75-71-8	None	1000 pp, 15,000 ppm	Groundwater Soil Vapor	inhalation, skin and/or eye contact (liquid)	dizziness, tremor, asphyxia, unconsciousness, cardiac arrhythmias, cardiac arrest; liquid: frostbite	Eye: Frostbite Skin: Frostbite Breathing: Respiratory support

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.10	Diesel Fuel automotive diesel fuel oil No. 2 distillate diesoline diesel oil diesel oil light diesel oil No. 1-D summer diesel	68334-30-5	PID	NA NA	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, throat; burning sensation in chest; headache, nausea, lassitude (weakness, exhaustion), restlessness, incoordination, confusion, drowsiness; vomiting, diarrhea; dermatitis; chemical pneumonitis (aspiration liquid)	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Diethyl phthalate DEP Diethyl ester of phthalic acid Ethyl phthalate Diethylphthalate	84-66-2	PID	NA NA	Groundwater Soil	inhalation, ingestion, skin and/or eye contact	irritation eyes, skin, nose, throat; headache, dizziness, nausea; lacrimation (discharge of tears); possible polyneuropathy, vestibular dysfunc; pain, numb, lassitude (weakness, exhaustion), spasms in arms & legs; In Animals: reproductive effects	Eye: Irrigate immediately Skin: Wash regularly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Dimethyl phthalate Dimethylphthalate dimethyl benzene-1,2-dicarboxylate	131-11-3	None	5 mg/m^3 2000 mg/m^3	Groundwater Soil	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, upper respiratory system; stomach pain	Eye: Irrigate promptly Skin: Wash regularly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.10	Ethanol Absolute alcohol Alcohol cologne spirit drinking alcohol ethane monoxide ethylic alcohol EtOH ethyl alcohol ethyl hydrate ethyl hydroxide ethylol grain alcohol hydroxyethane methylcarbinol	64-17-5	PID	1000 ppm 3300 ppm	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose; headache, drowsiness, lassitude (weakness, exhaustion), narcosis; cough; liver damage; anemia; reproductive, teratogenic effects	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Fresh air Swallow: Medical attention immediately
1.3.1 – 1.3.10	Ethyl acetate Acetic ester Acetic ether Ethyl ester of acetic acid Ethyl ethanoate	141-78-6	PID	400 ppm 2000 ppm	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation eyes, skin, nose, throat; narcosis; dermatitis	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Ethyl benzene Ethylbenzene Ethylbenzol Phenylethane	100-40-4	PID	435 mg/m^3 3,472 mg/m^3	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, mucous membrane; headache; dermatitis; narcosis, coma	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.10	Ethyl chloride Chloroethane Hydrochloric ether Monochloroethane Muriatic ether Hydrochloric ether	75-00-3	PID	1000 ppm 3800 ppm	Groundwater Soil Vapor	inhalation, skin absorption (liquid), ingestion (liquid), skin and/or eye contact	incoordination, inebriation; abdominal cramps; cardiac arrhythmias, cardiac arrest; liver, kidney damage	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Fluoranthene Benzo(j, k)fluorene	206-44-0	PID	0.2 mg/m^3 80 mg/m^3 (Coal Pitch Tar)	Groundwater Soil	inhalation, skin or eye contact, ingestion	irritation to eyes and skin, respiratory irritation(dizziness, weakness, fatigue, nausea, headache)	Eye: Irrigate immediately, refer to medical attention Skin: Soap wash immediately Breathing: move to fresh air Swallow: Medical attention immediately
1.3.1 – 1.3.10	Fluorene	86-73-7	PID	0.2 mg/m^3 80 mg/m^3 (Coal Pitch Tar)	Soil	inhalation, skin or eye contact, ingestion	irritation to eyes and skin, respiratory irritation(dizziness, weakness, fatigue, nausea, headache)	Eye: Irrigate immediately, refer to medical attention Skin: Soap wash immediately Breathing: move to fresh air Swallow: Medical attenti

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.10	Fuel Oil No. 2	68476-30-2	PID	NA NA	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, throat; burning sensation in chest; headache, nausea, lassitude (weakness, exhaustion), restlessness, incoordination, confusion, drowsiness; vomiting, diarrhea; dermatitis; chemical pneumonitis (aspiration liquid)	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Gasoline	8006-61-9	PID	NA NA	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin, mucous membrane; dermatitis; headache, lassitude (weakness, exhaustion), blurred vision, dizziness, slurred speech, confusion, convulsions; chemical pneumonitis (aspiration liquid)	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Helium	7440-59-7	Helium Detector	NA NA	NA	inhalation	dizziness, headache, and nausea	Breathing: Respiratory support
1.3.1 – 1.3.10	Heptane n-Heptane	142-82-5	PID	500 ppm 750 ppm	Goundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	dizziness, stupor, incoordination; loss of appetite, nausea; dermatitis; chemical pneumonitis (aspiration liquid); unconsciousness	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.10	Hexachlorobutadiene HCBD Hexachloro-1,3-butadiene 1,3-Hexachlorobutadiene Perchlorobutadiene	87-68-3	PID	NA NA	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	In animals: irritation to the eyes, skin, respiratory system; kidney damage; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Hexavalent Chromium Chromium VI	18540-29-9	None	1.0 mg/m^3 250 mg/m^3	Groundwater Soil	inhalation absorption ingestion	irritation to eye, skin, and respiratory	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Indeno(1,2,3-cd)pyrene Indeno(1,2,3-c,d)Pyrene	193-39-5	None	0.2 mg/m^3 80 mg/m^3 (Coal Pitch Tar)	Groundwater Soil	inhalation, absorption, ingestion, consumption	irritation to eyes, skin, respiratory, and digestion [potential occupational carcinogen]	Eyes: Irrigate immediately Skin: Soap wash promptly. Breath: Respiratory support Swallow: Medical attention immediately, wash mouth with water
1.3.1 – 1.3.10	Iron	7439-89-6	None	10 mg/m^3 NA	Groundwater Soil	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, mucous membrane; abdominal pain, diarrhea, vomiting	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.10	Isopropyl alcohol Iso-Propyl Alcohol Carbinol IPA Isopropanol 2-Propanol sec-Propyl alcohol Rubbing alcohol Isopropylalcohol	67-63-0	PID	400 ppm 2000 ppm	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, nose, throat; drowsiness, dizziness, headache; dry cracking skin; in animals: narcosis	Eye: Irrigate immediately Skin: Water flush Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Lead	7439-92-1	None	0.050 mg/m^3 100 mg/m^3	Groundwater Soil	inhalation, ingestion, skin and/or eye contact	lassitude (weakness, exhaustion), insomnia; facial pallor; anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; paralysis wrist, ankles; encephalopathy; kidney disease; irritation to the eyes; hypertension	Eye: Irrigate immediately Skin: Soap flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Magnesium	7439-95-4	None	15 mg/m^3 NA	Soil	inhalation, skin and/or eye contact	irritation to the eyes, skin, respiratory system; cough	Eye: Irrigate immediately Breathing: Fresh air
1.3.1 – 1.3.10	Manganese	7439-96-5	None	5 mg/m^3 500 mg/m^3	Groundwater Soil	inhalation, ingestion	aerosol is irritating to the respiratory tract	Eye: Irrigate immediately Skin: Soap flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.10	m-Cresol 4 meta-Cresol 3-Cresol m-Cresylic acid 1-Hydroxy-3-methylbenzene 3-Hydroxytoluene 3-Methylphenol	108-39-4	PID	5 ppm 250 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin, mucous membrane; central nervous system effects: confusion, depression, resp failure; dyspnea (breathing difficulty), irreg rapid resp, weak pulse; eye, skin burns; dermatitis; lung, liver, kidney, pancreas damage	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Mercury	7439-97-6	None	0.1 mg/m^3 10 mg/m^3	Groundwater Soil	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin; cough, chest pain, dyspnea (breathing difficulty), bronchitis, pneumonitis; tremor, insomnia, irritability, headache, lassitude (weakness, exhaustion); stomatitis, salivation; gastrointestinal disturbance, anorexia, weight loss; proteinuria	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Methoxychlor p,p'-Dimethoxydiphenyltrichloroethane DMDT Methoxy-DDT 2,2-bis(p-Methoxyphenyl)-1,1,1-trichloroethane 1,1,1-Trichloro-2,2-bis-(p-methoxyphenyl)ethane	72-43-5	None	15 mg/m^3 5000 mg/m^3	Groundwater Soil Vapor	inhalation, ingestion	fasciculation, trembling, convulsions; kidney, liver damage; [potential occupational carcinogen]	Skin: Soap wash Breathing: Fresh air Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.10	Methyl Bromide Bromomethane Monobromomethane	74-83-9	PID	20 ppm 250 ppm	Soil Groundwater Vapor	inhalation, skin absorption (liquid), skin and/or eye contact (liquid)	irritation to the eyes, skin, respiratory system; muscle weak, incoordination, visual disturbance, dizziness; nausea, vomiting, headache; malaise (vague feeling of discomfort); hand tremor; convulsions; dyspnea (breathing difficulty); skin vesiculation; liquid: frostbite; [potential occupational carcinogen]	Eye: Irrigate immediately (liquid) Skin: Water flush immediately (liquid) Breathing: Respiratory support
1.3.1 – 1.3.10	Methyl Chloride Chloromethane Monochloromethane	74-87-3	NA	100 ppm 2000 ppm	Groundwater Soil	inhalation, skin and/or eye contact	dizziness, nausea, vomiting; visual disturbance, stagger, slurred speech, convulsions, coma; liver, kidney damage; liquid: frostbite; reproductive, teratogenic effects; [potential occupational carcinogen]	Eye: Frostbite Skin: Frostbite Breathing: Respiratory support
1.3.1 – 1.3.10	Methyl chloroform Chlorothene 1,1,1-Trichloroethane 1,1,1-Trichloroethane-(stabilized) 1,1,1-TCA	71-55-6	PID	350 ppm 700 ppm	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin; headache, lassitude (weakness, exhaustion), central nervous system depression, poor equilibrium; dermatitis; cardiac arrhythmias; liver damage	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.10	Methyl *tert*-butyl ether MTBE Methyl tertiary-butyl ether Methyl t-butyl ether tert-Butyl methyl ether tBME tert-BuOMe	1634-04-4	PID	NA NA	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, throat; burning sensation in chest; headache, nausea, lassitude (weakness, exhaustion), restlessness, incoordination, confusion, drowsiness; vomiting, diarrhea; dermatitis; chemical pneumonitis (aspiration liquid)	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Methylene Chloride Dichloromethane Methylene dichloride	75-09-2	PID	25 ppm 2300 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin; lassitude (weakness, exhaustion), drowsiness, dizziness; numb, tingle limbs; nausea; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	m-Xylenes 1,3-Dimethylbenzene m-Xylol Metaxylene	108-38-3	PID	100 ppm 900 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; nausea, vomiting, abdominal pain; dermatitis	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.10	N.Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA	24448-09-7	NA	None None	Groundwater	inhalation, skin or eye contact, ingestion	irritation to eyes with possible eye damage, skin causing rash, redness or burning, irritation to nose, throat and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Naphthalene Naphthalin Tar camphor White tar	91-20-3	PID	50 mg/m^3 250 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes; headache, confusion, excitement, malaise (vague feeling of discomfort); nausea, vomiting, abdominal pain; irritation bladder; profuse sweating; hematuria (blood in the urine); dermatitis, optical neuritis	Eye: Irrigate immediately Skin: Molten flush immediately/solid-liquid soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	n-Butylbenzene	104-51-8	PID	NA NA	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin; dry nose, throat; headache; low blood pressure, tachycardia, abnormal cardiovascular system stress; central nervous system, hematopoietic depression; metallic taste; liver, kidney injury	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.10	N-ethyl perfluorooctane sulfonamido acetic acid NEtFOSAA N-Ethylperfluorooctanesulfonamide	4151-50-2	NA	NA NA	Groundwater	inhalation, skin or eye contact, ingestion	irritation to eyes with possible eye damage, skin causing rash, redness or burning, irritation to nose, throat and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	n-Hexane Hexane, Hexyl hydride, normal-Hexane	110-54-3	PID	500 ppm 1100 ppm	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, nose; nausea, headache; peripheral neuropathy: numb extremities, muscle weak; dermatitis; dizziness; chemical pneumonitis (aspiration liquid)	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Nickel	7440-02-0	None	NA 10 mg/m^3	Groundwater Soil	ion, ingestion, skin and/or eye contact	sensitization dermatitis, allergic asthma, pneumonitis; [potential occupational carcinogen]	Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Non-Flammable Gas Mixture CALGAS (Equipment Calibration Gas : Oxygen Methane Hydrogen Sulfide Carbon Monoxide Nitrogen	 7782-44-7 74-82-8 7783-08-4 830-08-0 7727-37-9	Multi-Gas PID	 NA/NA NA/NA 10/100 ppm 50/1200 ppm NA/NA	NA	inhalation	dizziness, headache, and nausea	Breathing: Respiratory support

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.10	Non-Flammable Gas Mixture CALGAS (Equipment Calibration Gas : Oxygen Isobutylene Nitrogen	 7782-44-7 115-11-7 7727-37-9	PID	 NA/NA NA/NA NA/NA	NA	inhalation	dizziness, headache, and nausea	Breathing: Respiratory support
1.3.1 – 1.3.10	n-Propylbenzene Isocumene Propylbenzene 1-Phenylpropane 1-Propylbenzene Phenylpropane	103-65-1	PID	NA NA	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin; dry nose, throat; headache; low blood pressure, tachycardia, abnormal cardiovascular system stress; central nervous system, hematopoietic depression; metallic taste; liver, kidney injury	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	o-Cresol ortho-Cresol 2-Cresol o-Cresylic acid 1-Hydroxy-2-methylbenzene 2-Hydroxytoluene 2-Methyl phenol 2-Methylphenol 2-Metyhlphenol	95-48-7	PID	5 ppm 250 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin, mucous membrane; central nervous system effects: confusion, depression, resp failure; dyspnea (breathing difficulty), irreg rapid resp, weak pulse; eye, skin burns; dermatitis; lung, liver, kidney, pancreas damage	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediatelyethylphhhhhhhhhh

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.10	o-Xylenes 1,2-Dimethylbenzene ortho-Xylene o-Xylol	95-47-6	PID	100 ppm 900 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; nausea, vomiting, abdominal pain; dermatitis	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	p-Cresol para-Cresol 4-Cresol p-Cresylic acid 1-Hydroxy-4-methylbenzene 4-Hydroxytoluene 4-Methylphenol	106-44-5	PID	5 ppm 250 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin, mucous membrane; central nervous system effects: confusion, depression, resp failure; dyspnea (breathing difficulty), irreg rapid resp, weak pulse; eye, skin burns; dermatitis; lung, liver, kidney, pancreas damage	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	p-Dichlorobenzene p-DCB 1,4-Dichlorobenzene para-Dichlorobenzene Dichlorocide	106-46-7	PID	75 ppm 150 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, swelling periorbital (situated around the eye); profuse rhinitis; headache, anorexia, nausea, vomiting; weight loss, jaundice, cirrhosis; in animals: liver, kidney injury; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.10	Perfluorobutanesulfonic acid FC-98 Nonaflate Nonafluorobutanesulphonic acid Perfluorobutanesulfonic Acid Perfluorobutane sulfonate PFBS	375-73-5	NA	None None	Groundwater	inhalation, skin or eye contact, ingestion	irritation to eyes with possible eye damage, skin causing rash, redness or burning, irritation to nose, throat and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Perfluorobutanoic Acid Heptafluorobutyric acid Heptafluorobutanoic acid Perfluorobutyric acid PFBA	375-22-4	NA	None None	Groundwater	inhalation, skin or eye contact, ingestion	irritation to eyes with possible eye damage, skin causing rash, redness or burning, irritation to nose, throat and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Perfluorododecanoic acid Perfluoralauric acid Tricosafluorododecanoic acid PFDoA	307-55-1	NA	None None	Groundwater	inhalation, skin or eye contact, ingestion	irritation to eyes with possible eye damage, skin causing rash, redness or burning, irritation to nose, throat and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Perfluoroheptane sulfonic Acid Perfluoroheptane sulfonate Perfluoroheptanesulfonic acid PFHpS	375-92-8	NA	None None	Groundwater	inhalation, skin or eye contact, ingestion	irritation to eyes with possible eye damage, skin causing rash, redness or burning, irritation to nose, throat and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.10	Perfluoroheptanoic Acid PFHpA	375-85-9	NA	None None	Groundwater	inhalation, skin or eye contact, ingestion	irritation to eyes with possible eye damage, skin causing rash, redness or burning, irritation to nose, throat and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Perfluorohexanesulfonic Acid perfluorohexanesulfonate perfluorohexanesulfonic acid PFHxS	355-46-4	NA	None None	Groundwater	inhalation, skin or eye contact, ingestion	irritation to eyes with possible eye damage, skin causing rash, redness or burning, irritation to nose, throat and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Perfluorohexanoic Acid PFHxA	307-24-4	NA	None None	Groundwater	inhalation, skin or eye contact, ingestion	irritation to eyes with possible eye damage, skin causing rash, redness or burning, irritation to nose, throat and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Perfluorononanoic Acid Perfluorononanoic Acid PFNA perfluoro-n-nonanoic acid perfluorononanoate	375-95-1	NA	None None	Groundwater	Groundwater	inhalation, skin or eye contact, ingestion; strong acid	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.10	Perfluorooctanesulfonic Acid PFOS	1763-23-1	NA	None None	Groundwater	inhalation, skin or eye contact, ingestion	irritation to eyes with possible eye damage, skin causing rash, redness or burning, irritation to nose, throat and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Perfluorooctanoic Acid PFOA pentadecafluorooctanoic acid perfluorooctanoate perfluorocaprylic acid	335-67-1	NA	None None	Groundwater	inhalation, skin or eye contact, ingestion	irritation to eyes with possible eye damage, skin causing rash, redness or burning, irritation to nose, throat and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Perfluoropentanoic Acid PFPeA	2706-90-3	NA	None None	Groundwater	inhalation, skin or eye contact, ingestion	irritation to eyes with possible eye damage, skin causing rash, redness or burning, irritation to nose, throat and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Perfluoroundecanoic Acid PFUnA PFUnDA Perfluoroundecanoic Acid Henicosafluoroundecanoic Acid	4234-23-5	NA	None None	Groundwater	inhalation, skin or eye contact, ingestion	irritation to eyes with possible eye damage, skin causing rash, redness or burning, irritation to nose, throat and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.10	Perfluorotridecanoic Acid PFTrDA Sodium 1H,1H,2H,2H-Perfluorodecane Sulfonate (8:2)	72629-94-8	NA	None None	Groundwater	inhalation, skin or eye contact, ingestion	irritation to eyes with possible eye damage, skin causing rash, redness or burning, irritation to nose, throat and lungs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	p-Ethyltoluene 4-Ethyltoluene 1-ethyl-4-methyl-benzene 1-methyl-4-ethylbenzene	622-96-8	NA	NA NA	Soil	ingestion, skin and/or eye contact	irritation to the eyes, skin, mucous membrane; headache; dermatitis; narcosis, coma	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Phenanthrene	85-01-8	PID	0.2 mg/m^3 80 mg/m^3 (Coal Pitch Tar)	Groundwater Soil	inhalation, skin or eye contact, ingestion	irritation to eyes and skin, respiratory irritation(dizziness, weakness, fatigue, nausea, headache)	Eye: Irrigate immediately, refer to medical attention Skin: Soap wash immediately Breathing: move to fresh air Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.10	Potassium	7440-09-7	None	NA NA	Soil	inhalation, skin absorption, ingestion, skin and/or eye contact inhalation, ingestion, skin and/or eye contact	eye: Causes eye burns. Skin: Causes skin burns. Reacts with moisture in the skin to form potassium hydroxide and hydrogen with much heat. ingestion: Causes gastrointestinal tract burns. inhalation: May cause irritation of the respiratory tract with burning pain in the nose and throat, coughing, wheezing, shortness of breath and pulmonary edema. Causes chemical burns to the respiratory tract. inhalation may be fatal as a result of spasm, inflammation, edema of the larynx and bronchi, chemical pneumonitis and pulmonary edema.	Eyes: Get medical aid immediately Skin: Get medical aid immediately. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Ingestion: If victim is conscious and alert, give 2-4 full cups of milk or water. Get medical aid immediately. inhalation: Get medical aid immediately.
1.3.1 – 1.3.10	Propylene Propene Methyl ethylene	115-07-1	PID	NA NA	Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, nose, throat, skin burns asphyxiation	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.10	Propylene dichloride Dichloro-1,2-propane 1,2-Dichloropropane	78-87-5	PEL	75 ppm 400 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin, respiratory system; drowsiness, dizziness; liver, kidney damage; in animals: central nervous system depression; [potential occupational carcinogen]	irritation to the eyes, skin, respiratory system; drowsiness, dizziness; liver, kidney damage; in animals: central nervous system depression; [potential occupational carcinogen]
1.3.1 – 1.3.10	p-Xylenes 1,4-Dimethylbenzene para-Xylene p-Xylol	106-42-3	PID	100 ppm 900 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; nausea, vomiting, abdominal pain; dermatitis	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Pyrene benzo[def]phenanthrene	129-00-0	PID	0.2 mg/m^3 80 mg/m^3 (Coal Pitch Tar)	Groundwater Soil	inhalation, skin or eye contact, ingestion	irritation to eyes and skin, respiratory irritation(dizziness, weakness, fatigue, nausea, headache)	Eye: Irrigate immediately, refer to medical attention Skin: Soap wash immediately Breathing: move to fresh air Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.10	Pyridine Azabenzene Azine	110-86-1	PID	5 ppm 1000 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation eyes; headache, anxiety, dizziness, insomnia; nausea, anorexia; dermatitis; liver, kidney damage	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	sec-Butylbenzene	135-98-8	PID	10 ppm 100 ppm	Groundwater Soil	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, nose, throat; inhalation: nausea or vomiting	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Selenium	7782-49-2	None	1 mg/m^3 0.2 mg/m^3	Soil	inhalation, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, throat; visual disturbance; headache; chills, fever; dyspnea (breathing difficulty), bronchitis; metallic taste, garlic breath, gastrointestinal disturbance; dermatitis; eye, skin burns; in animals: anemia; liver necrosis, cirrhosis; kidney, spleen damage	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.10	Silver	7440-22-4	None	0.01 mg/m³ 10 mg/m³	Soil	inhalation, ingestion, skin and/or eye contact	blue-gray eyes, nasal septum, throat, skin; irritation, ulceration skin; gastrointestinal disturbance	Eye: Irrigate immediately Skin: Water flush Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Sodium	7440-23-5	None	NA NA	Groundwater Soil	ion, ingestion, skin and/or eye contact	sensitization dermatitis, allergic asthma, pneumonitis; [potential occupational carcinogen]	Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Styrene Ethenyl benzene Phenylethylene Styrene monomer Styrol Vinyl benzene	100-42-5	PID	100 ppm 700 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, nose, respiratory system; headache, lassitude (weakness, exhaustion), dizziness, confusion, malaise (vague feeling of discomfort), drowsiness, unsteady gait; narcosis; defatting dermatitis; possible liver injury; reproductive effects	Eye: Irrigate immediately Skin: Water flush Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Tetrachloroethane 1,1,2,2-Tetrachloroethane Acetylene tetrachloride Symmetrical tetrachloroethane	79-34-5	PID	5 ppm 100 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	nausea, vomiting, abdominal pain; tremor fingers; jaundice, hepatitis, liver tenderness; dermatitis; leukocytosis (increased blood leukocytes); kidney damage; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.10	Tetrachloroethylene Perchlorethylene Perchloroethylene PCE Perk Tetrachlorethylene Tetrachloroethene	127-18-4	PID	100 ppm 150 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, throat, respiratory system; nausea; flush face, neck; dizziness, incoordination; headache, drowsiness; skin erythema (skin redness); liver damage; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Tetrahydrofuran Diethylene oxide 1,4-Epoxybutane Tetramethylene oxide THF	109-99-9	PID	200 ppm 2000 ppm	Groundwater Soil Vapor	inhalation, skin and/or eye contact, ingestion	irritation to the eyes, upper respiratory system; nausea, dizziness, headache, central nervous system depression	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immedi
1.3.1 – 1.3.10	Thallium	7440-28-0	None	0.1 mg/m^3 15 mg/m^3	Groundwater Soil	inhalation, skin absorption, ingestion, skin and/or eye contact	nausea, diarrhea, abdominal pain, vomiting; ptosis, strabismus; peri neuritis, tremor; retrosternal (occurring behind the sternum) tightness, chest pain, pulmonary edema; convulsions, chorea, psychosis; liver, kidney damage; alopecia; paresthesia legs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.10	Toluene Methyl benzene Methyl benzol Phenyl methane Toluol	108-88-3	PID	200 ppm 500 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, nose; lassitude (weakness, exhaustion), confusion, euphoria, dizziness, headache; dilated pupils, lacrimation (discharge of tears); anxiety, muscle fatigue, paresthesia; dermatitis	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Total PCBs Chlorodiphenyl (42% chlorine) Aroclor® 1242 PCB Polychlorinated biphenyl	53469-21-9	None	0.5 mg/m^3 5 mg/m^3	Groundwater Soil	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, chloracne	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Total Xylenes Dimethylbenzene Xylol	1330-20-7	PID	100 ppm 900 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; nausea, vomiting, abdominal pain; dermatitis	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.10	Trans-1,3-dichloropropylene trans-1,3-Dichloropropene Propene 1,3-dichloro- (E) (E)-1,3-Dichloropropene trans-1,3-Dichloro-1-Propene trans-1,3-Dichloropropene trans-1,3-Dichloropropylene (1E)-1,3-Dichloro-1-propene	10061-02-6	None	Na NA	Groundwater Soil Vapor	inhalation, ingestion, skin absorption, skin and/or eye contact	irritation to the eyes, skin, mucous membrane	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Trichloroethylene Ethylene trichloride TCE Trichloroethene Trilene	79-01-6	PID	100 ppm 1000 ppm	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin; headache, visual disturbance, lassitude (weakness, exhaustion), dizziness, tremor, drowsiness, nausea, vomiting; dermatitis; cardiac arrhythmias, paresthesia; liver injury; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Trichlorofluoromethane Fluorotrichloromethane Freon® 11 Monofluorotrichloromethane Refrigerant 11 Trichloromonofluoromethane	75-69-4	PID	1000 ppm 2000 ppm	Groundwater Soil Vapor	inhalation, ingestion, skin and/or eye contact	incoordination, tremor; dermatitis; cardiac arrhythmias, cardiac arrest; asphyxia; liquid: frostbite	Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Trivalent Chromium Chromium III	NA	None	1.0 mg/m^3 250 mg/m^3	Groundwater Soil	inhalation absorption ingestion	irritation to eye, skin, and respiratory	Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.10	Vanadium	7440-62-2	None	0.1 mg/m3 15 mg/m3	Groundwater Soil	inhalation, skin absorption, ingestion, skin and/or eye contact	nausea, diarrhea, abdominal pain, vomiting; ptosis, strabismus; peri neuritis, tremor; retrosternal (occurring behind the sternum) tightness, chest pain, pulmonary edema; convulsions, chorea, psychosis; liver, kidney damage; alopecia; paresthesia legs	Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately
1.3.1 – 1.3.10	Vinyl Chloride Chloroethene Chloroethylen Ethylene monochloride Monochloroethene Monochloroethylene VC Vinyl chloride monomer (VCM)	75-01-4	PID	1 ppm NA	Groundwater Soil Vapor	inhalation, skin and/or eye contact (liquid)	lassitude (weakness, exhaustion); abdominal pain, gastrointestinal bleeding; enlarged liver; pallor or cyanosis of extremities; liquid: frostbite; [potential occupational carcinogen]	Eye: Frostbite Skin: Frostbite Breathing: Respiratory support
1.3.1 – 1.3.10	Vinylidene chloride 1,1-DCE 1,1-Dichloroethene 1,1-Dichloroethylene VDC Vinylidene chloride monomer Vinylidene dichloride	75-35-4	PID	NA NA	Groundwater Soil Vapor	inhalation, skin absorption, ingestion, skin and/or eye contact	irritation to the eyes, skin, throat; dizziness, headache, nausea, dyspnea (breathing difficulty); liver, kidney disturbance; pneumonitis; [potential occupational carcinogen]	Eye: Irrigate immediately Skin: Soap flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Task	Contaminant	CAS Number	Monitoring Device	PEL/ IDLH	Source of Concentration on Site	Route of Exposure	Symptoms	First Aid
1.3.1 – 1.3.10	Zinc	7440-62-2	None	15 mg/m³ 500 mg/m³	Groundwater Soil	inhalation	chills, muscle ache, nausea, fever, dry throat, cough; lassitude (weakness, exhaustion); metallic taste; headache; blurred vision; low back pain; vomiting; malaise (vague feeling of discomfort); chest tightness; dyspnea (breathing difficulty), rales, decreased pulmonary function	Breathing: Respiratory support`

EXPLANATION OF ABBREVIATIONS

PID = Photoionization Detector
PEL = Permissible Exposure Limit (8-hour Time Weighted Average)
IDLH = Immediately Dangerous to Life and Health
ppm = part per million
mg/m^3 = milligrams per cubic meter
500 mg/m^3

TABLE 3
Summary of Monitoring Equipment

Instrument	Operation Parameters
Photoionization Detector (PID)	**Hazard Monitored:** Many organic and some inorganic gases and vapors. **Application:** Detects total concentration of many organic and some inorganic gases and vapors. Some identification of compounds is possible if more than one probe is measured. **Detection Method:** Ionizes molecules using UV radiation; produces a current that is proportional to the number of ions. **General Care/Maintenance:** Recharge or replace battery. Regularly clean lamp window. Regularly clean and maintain the instrument and accessories. **Typical Operating Time:** 10 hours. 5 hours with strip chart recorder.
Oxygen Meter	**Hazard Monitored:** Oxygen (O_2). **Application:** Measures the percentage of O_2 in the air. **Detection Method:** Uses an electrochemical sensor to measure the partial pressure of O_2 in the air, and converts the reading to O_2 concentration. **General Care/Maintenance:** Replace detector cell according to manufacturer's recommendations. Recharge or replace batteries prior to explanation of the specified interval. If the ambient air is less than 0.5% C O_2, replace the detector cell frequently. **Typical Operating Time:** 8 – 12 hours.
Additional equipment (if needed, based on site conditions)	
Combustible Gas Indicator (CGI)	**Hazard Monitored:** Combustible gases and vapors. **Application:** Measures the concentration of combustible gas or vapor. **Detection Method:** A filament, usually made of platinum, is heated by burning the combustible gas or vapor. The increase in heat is measured. Gases and vapors are ionized in a flame. A current is produced in proportion to the number of carbon atoms present. **General Care/Maintenance:** Recharge or replace battery. Calibrate immediately before use. **Typical Operating Time:** Can be used for as long as the battery lasts, or for the recommended interval between calibrations, whichever is less.
Flame Ionization Detector (FID) with Gas Chromatography Option *(i.e., Foxboro Organic Vapor Analyzer (OVA))*	**Hazard Monitored:** Many organic gases and vapors (approved areas only). **Application:** In survey mode, detects the concentration of many organic gases and vapors. In gas chromatography (GC) mode, identifies and measures specific compounds. In survey mode, all the organic compounds are ionized and detected at the same time. In GC mode, volatile species are separated. **General Care/Maintenance:** Recharge or replace battery. Monitor fuel and/or combustion air supply gauges. Perform routine maintenance as described in the manual. Check for leaks. **Typical Operating Time:** 8 hours; 3 hours with strip chart recorder.
Potable Infrared (IR) Spectrophotometer	**Hazard Monitored:** Many gases and vapors. **Application:** Measures concentration of many gases and vapors in air. Designed to quantify one or two component mixtures. **Detection Method:** Passes different frequencies of IR through the sample. The frequencies absorbed are specific for each compound. **General Care/Maintenance:** As specified by the manufacturer.

Instrument	Operation Parameters
Direct Reading Colorimetric Indicator Tube	**Hazard Monitored:** Specific gas and vapors. **Application:** Measures concentration of specific gases and vapors. **Detection Method:** The compound reacts with the indicator chemical in the tube, producing a stain whose length or color change is proportional to the compound's concentration. **General Care/Maintenance:** Do not use a previously opened tube even if the indicator chemical is not stained. Check pump for leaks before and after use. Refrigerate before use to maintain a shelf life of about 2 years. Check expiration dates of tubes. Calibrate pump volume at least quarterly. Avoid rough handling which may cause channeling.
Aerosol Monitor	**Hazard Monitored:** Airborne particulate (dust, mist, fume) concentrations **Application:** Measures total concentration of semi-volatile organic compounds, PCBs, and metals. **Detection Method:** Based on light-scattering properties of particulate matter. Using an internal pump, air sample is drawn into the sensing volume where near infrared light scattering is used to detect particles. **General Care/Maintenance:** As specified by the mfr. Also, the instrument must be calibrated with particulates of a size and refractive index similar to those to be measured in the ambient air.
Monitox	**Hazard Monitored:** Gases and vapors. **Application:** Measures specific gases and vapors. **Detection Method:** Electrochemical sensor relatively specific for the chemical species in question. **General Care/Maintenance:** Moisten sponge before use; check the function switch; change the battery when needed.
Gamma Radiation Survey Instrument	**Hazard Monitored:** Gamma Radiation. **Application:** Environmental radiation monitor. **Detection Method:** Scintillation detector. **General Care/Maintenance:** Must be calibrated annually at a specialized facility. **Typical Operating Time:** Can be used for as long as the battery lasts, or for the recommended interval between calibrations, whichever is less.

TABLE 4
INSTRUMENTATION ACTION LEVELS

Photoionization Detector Action Levels	**Action Required**
Background to 5 ppm	No respirator; no further action required
> 1 ppm but < 5 ppm for > 5 minutes	1. Temporarily discontinue all activities and evaluate potential causes of the excessive readings. If these levels persist and cannot be mitigated (i.e., by slowing drilling or excavation activities), contact HSO to review conditions and determine source and appropriate response action. 2. If PID readings remain above 1 ppm, temporarily discontinue work and upgrade to Level C protection. 3. If sustained PID readings fall below 1 ppm, downgrading to Level D protection may be permitted.
> 5 ppm but < 150 ppm for > 5 minutes	1. Discontinue all work; all workers shall move to an area upwind of the jobsite. 2. Evaluate potential causes of the excessive readings and allow work area to vent until VOC concentrations fall below 5 ppm. 3. Level C protection will continue to be used until PID readings fall below 1 ppm.
> 150 ppm	Evacuate the work area
Jerome® J405	**Action Required**
Background to 5 $\mu g/m^3$	No respirator; no further action required
> 5 $\mu g/m^3$ but < 10 $\mu g/m^3$	1. Temporarily discontinue all activities and evaluate potential causes of the excessive readings. If these levels persist and cannot be mitigated (i.e., all exposed soil will be covered with polyethylene sheeting and/or containerized in closed 55-gallon drums), contact HSO to review conditions and determine source and appropriate response action.
> 10 $\mu g/m^3$	1. Discontinue all work; all workers shall move to an area upwind of the jobsite.

2. Evaluate potential causes of the excessive readings, activate mitigation measures until levels fall below 10 µg/m^3.

Notes:

1. 1 ppm level based on OSHA Permissible Exposure Limit (PEL) for benzene.
2. 5 ppm level based on OSHA Short Term Exposure Limit (STEL) maximum exposure for benzene for any 15 minute period.
3. 150 ppm level based on NIOSH Immediately Dangerous to Life and Health (IDLH) for tetrachloroethylene.

TABLE 5
EMERGENCY NOTIFICATION LIST

ORGANIZATION	CONTACT	TELEPHONE
Local Police Department	NYPD	911
Local Fire Department	NYFD	911
Ambulance/Rescue Squad	NYFD	911
Hospital		
Langan Incident Hotline		800-952-6426 ex 4699
Medical Treatment Hotline	Incident Intervention	888-449-7787
Langan Environmental Project Manager	Patrick Farnham	917-613-7234 (cell)
Langan Health and Safety Manager (HSM)	Tony Moffa	215-756-2523 (cell)
Langan Health & Safety Officer (HSO)	William Bohrer	410-984-3068 (cell)
Langan Field Team Leader (FTL)	To Be Determined	
Client's Representative	Joseph Brunner	718-302-2171
National Response Center (NRC)		800-424-8802
Chemical Transportation Emergency Center (Chemtrec)		800-424-9300
Center for Disease Control (CDC)		404-639-3534
EPA (RCRA Superfund Hotline)		800-424-9346
TSCA Hotline		202-554-1404
Poison Control Center		800-222-1222

Immediately following an injury, unless immediate emergency medical treatment is required, the injured employee must contact Incident Intervention® at 888-449-7787.

For all other incidents or near misses, unless emergency response is required, either the employee or a coworker must contact the Langan Incident Hotline at 1-(800)-9-LANGAN (ext. #4699).

TABLE 6
SUGGESTED FREQUENCY OF PHYSIOLOGICAL MONITORING FOR FIT AND ACCLIMATED WORKERS[A]

Adjusted Temperature[b]	Normal Work Ensemble[c]	Impermeable Ensemble
90°F or above (32.2°C) or above	After each 45 min. of work	After each 15 min. of work
87.5°F (30.8°-32.2°C)	After each 60 min. of work	After each 30 min. of work
82.5°-87.5°F (28.1°-30.8°C)	After each 90 min. of work	After each 60 min. of work
77.5°-82.5°F (25.3°-28.1°C)	After each 120 min. of work	After each 90 min. of work
72.5°-77.5°F (22.5°-25.3°C)	After each 150 min. of work	After each 120 min. of work

a For work levels of 250 kilocalories/hour.

b Calculate the adjusted air temperature (ta adj) by using this equation: ta adj ^{o}F = ta ^{o}F + (13 x % sunshine). Measure air temperature (ta) with a standard mercury-in-glass thermometer, with the bulb shielded from radiant heat. Estimate percent sunshine by judging what percent time the sun is not covered by clouds that are thick enough to produce a shadow. (100 percent sunshine = no cloud cover and a sharp, distinct shadow; 0 percent sunshine = no shadows.)

c A normal work ensemble consists of cotton coveralls or other cotton clothing with long sleeves and pants.

TABLE 7

HEAT INDEX

	ENVIRONMENTAL TEMPERATURE (Fahrenheit)										
	70	**75**	**80**	**85**	**90**	**95**	**100**	**105**	**110**	**115**	**120**
RELATIVE HUMIDITY	**APPARENT TEMPERATURE***										
0%	64	69	73	78	83	87	91	95	99	103	107
10%	65	70	75	80	85	90	95	100	105	111	116
20%	66	72	77	82	87	93	99	105	112	120	**130**
30%	67	73	78	84	90	96	104	113	123	**135**	**148**
40%	68	74	79	86	93	101	110	123	**137**	**151**	
50%	69	75	81	88	96	107	120	**135**	**150**		
60%	70	76	82	90	100	114	**132**	**149**			
70%	70	77	85	93	106	124	**144**				
80%	71	78	86	97	113	**136**					
90%	71	79	88	102	122						
100%	72	80	91	108							

*Combined Index of Heat and Humidity...what it "feels like" to the body
Source: National Oceanic and Atmospheric Administration

How to use Heat Index:
1. Across top locate Environmental Temperature
2. Down left side locate Relative Humidity
3. Follow across and down to find Apparent Temperature
4. Determine Heat Stress Risk on chart at right

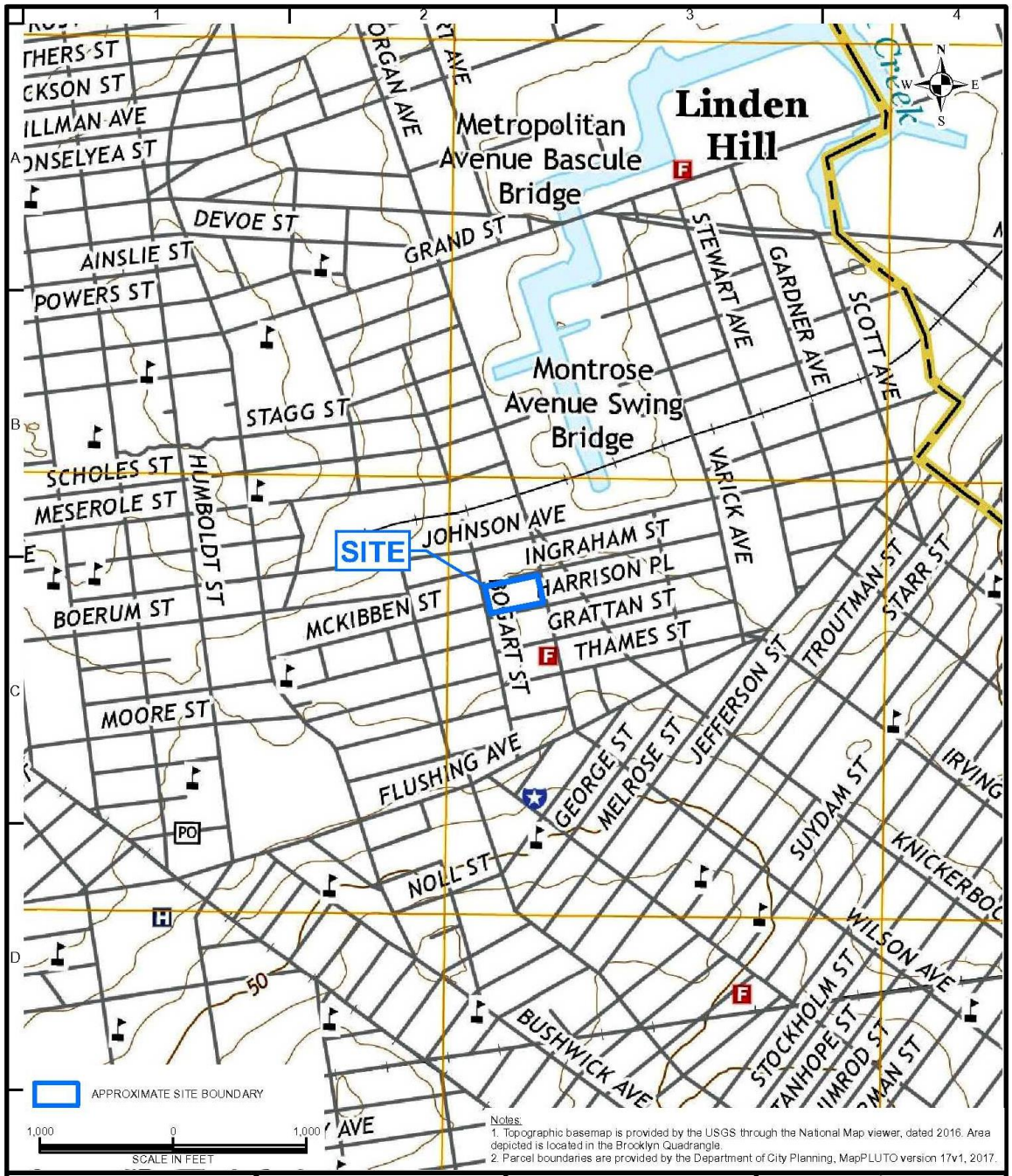
Note: Exposure to full sunshine can increase Heat Index values by up to 15 degrees F.

Apparent Temperature	**Heat Stress Risk with Physical Activity and/or Prolonged Exposure**
90-105	Heat Cramps or Heat Exhaustion Possible
105-130	Heat Cramps or Heat Exhaustion Likely, Heat Stroke Possible
>130	Heatstroke Highly Likely

FIGURES

FIGURE 1

Site Location Map



LANGAN 21 Penn Plaza, 360 West 31st Street, 6th Floor New York, NY 10001-2727 T: 212.479.5400 F: 212.479.5444 www.langan.com Langan Engineering & Environmental Services, Inc. Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C. Langan International LLC Collectively known as Langan	Project 2 INGRAHAM STREET BLOCK No. 3084, LOT No. 1 KINGS COUNTY NEW YORK	Drawing Title SITE LOCATION MAP	Project No. 170519401 Date 4/24/2018 Scale 1" = 1,000' Drawn By AB Submission Date	Figure 1 Sheet 1 of 1

Path: \\langan.com\data\NYC\data4\170519401\Project Data\ArcGIS\MXD\Environmental_Figures\Figure 1 - Site Location Map.mxd Date: 4/24/2018 User: abakhtin Time: 11:15:02 AM

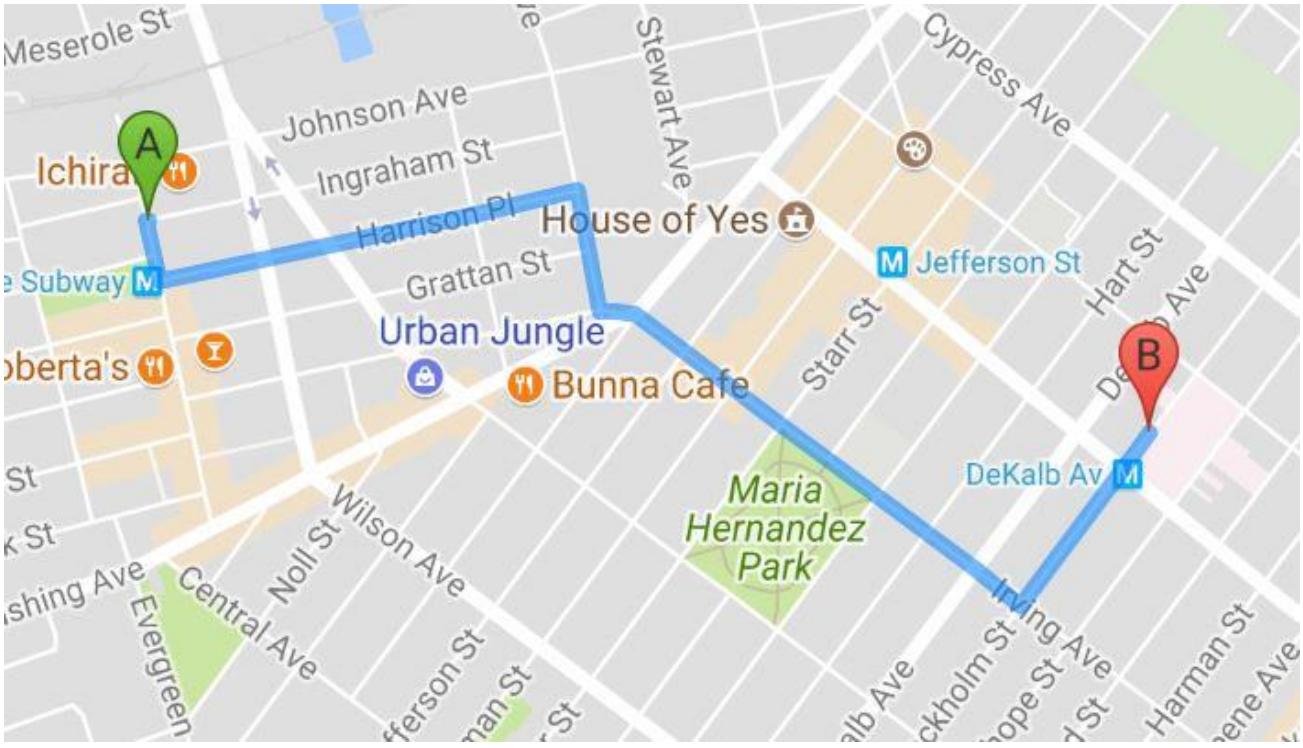
FIGURE 2
HOSPITAL ROUTE PLAN

Hospital Location: **Wyckoff Heights Medical Center**
374 Stockholm Street
Brooklyn, New York
718-963-7272

START: 2 Ingraham Street, Brooklyn, NY

1. Head west on Ingraham Street toward Bogart Street
2. Turn left onto Bogart Street
3. Turn left onto Harrison Place
4. Turn right onto Varick Street
5. Turn left onto Thames Street
6. Continue onto Irving Avenue
7. Turn left onto Stockholm Street, destination will be on the right.

END: Wyckoff Heights Medical Center, 374 Stockholm Street, Brooklyn, NY



ATTACHMENT A

STANDING ORDERS

STANDING ORDERS

GENERAL

- No smoking, eating, or drinking in this work zone.
- Upon leaving the work zone, personnel will thoroughly wash their hands and face.
- Minimize contact with contaminated materials through proper planning of work areas and decontamination areas, and by following proper procedures. Do not place equipment on the ground. Do not sit on contaminated materials.
- No open flames in the work zone.
- Only properly trained and equipped personnel are permitted to work in potentially contaminated areas.
- Always use the appropriate level of personal protective equipment (PPE).
- Maintain close contact with your buddy in the work zone
- Contaminated material will be contained in the Exclusion Zone (EZ).
- Report any unusual conditions.
- Work areas will be kept clear and uncluttered. Debris and other slip, trip, and fall hazards will be removed as frequently as possible.
- The number of personnel and equipment in the work zone will be kept to an essential minimum.
- Be alert to the symptoms of fatigue and heat/cold stress, and their effects on the normal caution and judgment of personnel.
- Conflicting situations which may arise concerning safety requirements and working conditions must be addressed and resolved quickly by the site HSO.

TOOLS AND HEAVY EQUIPMENT

- Do not, under any circumstances, enter or ride in or on any backhoe bucket, materials hoist, or any other device not specifically designed to carrying passengers.
- Loose-fitting clothing or loose long hair is prohibited around moving machinery.
- Ensure that heavy equipment operators and all other personnel in the work zone are using the same hand signals to communicate.
- Drilling/excavating within 10 feet in any direction of overhead power lines is prohibited.
- The locations of all underground utilities must be identified and marked out prior to initiating any subsurface activities.
- Check to insure that the equipment operator has lowered all blades and buckets to the ground before shutting off the vehicle.
- If the equipment has an emergency stop device, have the operator show all personnel its location and how to activate it.
- Help the operator ensure adequate clearances when the equipment must negotiate in tight quarters; serve as a signalman to direct backing as necessary.
- Ensure that all heavy equipment that is used in the Exclusion Zone is kept in that zone until the job is done, and that such equipment is completely decontaminated before moving it into the clean area of the work zone.
- Samplers must not reach into or get near rotating equipment such as the drill rig. If personnel must work near any tools that could rotate, the equipment operator must completely shut down the rig prior to initiating such work. It may be necessary to use a remote sampling device.

ATTACHMENT B

DECONTAMINATION PROCEDURES

PERSONNEL DECONTAMINATION

LEVEL C DECONTAMINATION

Station 1:	Equipment Drop	1. Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, cool down stations may be set up within this area.
Station 2:	Outer Garment, Boots, and Gloves Wash and Rinse	2. Scrub outer boots, outer gloves and chemical-resistant splash suit with decon solution or detergent and water. Rinse off using copious amounts of water.
Station 3:	Outer Boot and Glove Removal	3. Remove outer boots and gloves. Deposit in container with plastic liner.
Station 4:	Canister or Mask Change	4. If worker leaves Exclusion Zone to change canister (or mask), this is the last step in the decontamination procedure. Worker's canister is exchanged, new outer gloves and boot covers donned, joints taped, and worker returns to duty.
Station 5:	Boot, Gloves and Outer Garment Removal	5. Boots, chemical-resistant splash suit, inner gloves removed and deposited in separate containers lined with plastic.
Station 6:	Face piece Removal	6. Face piece is removed (avoid touching face with fingers). Face piece deposited on plastic sheets.
Station 7:	Field Wash	7. Hands and face are thoroughly washed. Shower as soon as possible.

LEVEL D DECONTAMINATION

Station 1:	Equipment Drop	1. Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, cool down stations may be set up within this area.
Station 2:	Outer Garment, Boots, and Gloves Wash and Rinse	2. Scrub outer boots, outer gloves and chemical-resistant splash suit with decon solution or detergent and water. Rinse off using copious amounts of water.
Station 3:	Outer Boot and Glove Removal	3. Remove outer boots and gloves. Deposit in container with plastic liner.
Station 4:	Boot, Gloves and Outer Garment Removal	4. Boots, chemical-resistant splash suit, inner gloves removed and deposited in separate containers lined with plastic.
Station 5:	Field Wash	5. Hands and face are thoroughly washed. Shower as soon as possible.

EQUIPMENT DECONTAMINATION

GENERAL:

Equipment to be decontaminated during the project may include tools, monitoring equipment, respirators, sampling containers, laboratory equipment and drilling equipment.

All decontamination will be done by personnel in protective gear, appropriate for the level of decontamination, as determined by the site HSO. The decontamination work tasks will be split or rotated among support and work crews.

Depending on site conditions, backhoe and pumps may be decontaminated over a portable decontamination pad to contain wash water; or, wash water may be allowed to run off into a storm sewer system. Equipment needed may include a steam generator with high-pressure water, empty drums, screens, screen support structures, and shovels. Drums will be used to hold contaminated wash water pumped from the lined pit. These drums will be labeled as such.

Miscellaneous tools and equipment will be dropped into a plastic pail, tub, or other container. They will be brushed off and rinsed with a detergent solution, and finally rinsed with clean water.

MONITORING EQUIPMENT:

Monitoring equipment will be protected as much as possible from contamination by draping, masking, or otherwise covering as much of the instruments as possible with plastic without hindering the operation of the unit. The PID, HNu or OVA meter, for example, can be placed in a clear plastic bag, which allows reading of the scale and operation of knobs. The probes can be partially wrapped keeping the sensor tip and discharge port clear.

The contaminated equipment will be taken from the drop area and the protective coverings removed and disposed in the appropriate containers. Any dirt or obvious contamination will be brushed or wiped with a disposable paper wipe.

RESPIRATORS:

Respirators will be cleaned and disinfected after every use. Taken from the drop area, the masks (with the cartridges removed and disposed of with other used disposable gear) will be immersed in a cleaning solution and scrubbed gently with a soft brush, followed by a rinse in plain warm water, and then allowed to air dry. In the morning, new cartridges will be installed. Personnel will inspect their own masks for serviceability prior to donning them. And, once the mask is on, the wearer will check the respirator for leakage using the negative and positive pressure fit check techniques.

ATTACHMENT C

EMPLOYEE EXPOSURE/ INJURY INCIDENT REPORT

EMPLOYEE INCIDENT/INJURY REPORT
LANGAN ENGINEERING & ENVIRONMENTAL SERVICES

(Complete and return to Tony Moffa in the Doylestown Office)

Affected Employee Name: _____ Date: _____

Incident type: ☐ Injury ☐ Report Only/No Injury
☐ Near Miss ☐ Other: _____

EMPLOYEE INFORMATION (Person completing Form)

Employee Name: _____ Employee No: _____

Title: _____ Office Location: _____

Length of time employed or date of hire: _____

Mailing address: _____

_____

Sex: M ☐ F ☐ Birth date: _____

Business phone & extension: _____ Residence/cell phone: _____

ACCIDENT INFORMATION

Project: _____ Project #: _____

Date & time of incident: _____ Time work started & ended: _____

Site location: _____

Incident Type: Possible Exposure ☐ Exposure ☐ Physical Injury ☐

Names of person(s) who witnessed the incident:_____

Exact location incident occurred:

Describe work being done:_____

Describe what affected employee was doing prior to the incident occurring:

Describe in detail how the incident occurred:

Nature of the incident (List the parts of the body affected):

Person(s) to whom incident was reported (Time and Date):

List the names of other persons affected during this incident:

Possible causes of the incident (equipment, unsafe work practices, lack of PPE, etc.):

Weather conditions during incident:

MEDICAL CARE INFORMATION

Did affected employee receive medical care? Yes ☐ No ☐

If Yes, when and where was medical care received:

Provide name of facility (hospital, clinic, etc.):

Length of stay at the facility?

Did the employee miss any work time? Yes ☐ No ☐ Undetermined ☐

Date employee last worked: Date employee returned to work:

Has the employee returned to work? Yes ☐ No ☐

Does the employee have any work limitations or restrictions from the injury? : Yes ☐ No ☐

If Yes, please describe:

Did the exposure/injury result in permanent disability? Yes ☐ No ☐ Unknown ☐

If Yes, please describe:

HEALTH & SAFETY INFORMATION

Was the operation being conducted under an established site specific CONSTRUCTION HEALTH AND SAFETY PLAN?
Yes ☐ No ☐ Not Applicable: ☐

Describe protective equipment and clothing used by the employee:

Did any limitations in safety equipment or protective clothing contribute to or affect exposure / injury? If so, explain:

Employee Signature Date

Langan Representative Date

ATTACHMENT D

CALIBRATION LOG

DATE:________________ **PROJECT:____________________**

CALIBRATION LOG

Date & Time	Inst Type	Inst #	Media	Initial Reading	Span #	Calibrat. Reading	Performed By:

DATE:________________ **PROJECT:____________________**

CALIBRATION LOG

Date & Time	Inst Type	Inst #	Media	Initial Reading	Span #	Calibrat. Reading	Performed By:

DATE:________________ **PROJECT:____________________**

CALIBRATION LOG

Date & Time	Inst Type	Inst #	Media	Initial Reading	Span #	Calibrat. Reading	Performed By:

DATE:________________ PROJECT:____________________

CALIBRATION LOG

Date & Time	Inst Type	Inst #	Media	Initial Reading	Span #	Calibrat. Reading	Performed By:

ATTACHMENT E

MATERIAL SAFETY DATA SHEETS

SAFETY DATA SHEETS

All Langan Field Personnel Completing This Work Plan Are To Have Real Time Accessibility To Material Safety Data Sheet (MSDs) or Safety Data Sheet (SDSs) Through Their Smart Phone.

The link is http://www.msds.com/
The login name is "drapehead"
The password is "2angan987"

If You Are Unable To Use the Smart Phone App, You Are To Bring Printed Copies of the MSDs/SDSs to the Site

ATTACHMENT F

JOBSITE SAFETY INSPECTION CHECKLIST

Jobsite Safety Inspection Checklist

Date: _____ **Inspected By:** _____

Location: _____ **Project #:** _____

Check one of the following: **A:** Acceptable **NA**: Not Applicable **D**: Deficiency

	A	NA	D	Remark
1. CHASP available onsite for inspection?				
2. Health & Safety Compliance agreement (in CHASP) appropriately signed by Langan employees and contractors?				
3. Hospital route map with directions posted on site?				
4. Emergency Notification List posted on site?				
5. First Aid kit available and properly stocked?				
6. Personnel trained in CPR/First Aid on site?				
7. MSDSs readily available, and all workers knowledgeable about the specific chemicals and compounds to which they may be exposed?				
8 Appropriate PPE being worn by Langan employees and contractors?				
9. Project site safe practices ("Standing Orders") posted?				
10. Project staff have 40-hr./8-hr./Supervisor HAZWOPER training?				
11. Project staff medically cleared to work in hazardous waste sites and fit-tested to wear respirators, if needed?				
12. Respiratory protection readily available?				
13. Health & Safety Incident Report forms available?				
14. Air monitoring instruments calibrated daily and results recorded on the Daily Instrument Calibration check sheet?				
15. Air monitoring readings recorded on the air monitoring data sheet/field log book?				
16. Subcontract workers have received 40-hr./8-hr./Spvsr. HAZWOPER training, as appropriate?				
17. Subcontract workers medically cleared to work on site, and fit-tested for respirator wear?				
18. Subcontract workers have respirators readily available?				
19. Mark outs of underground utilities done prior to initiating any subsurface activities?				
20. Decontamination procedures being followed as outlined in CHASP?				
21. Are tools in good condition and properly used?				
22. Drilling performed in areas free from underground objects including utilities?				

23. Adequate size/type fire extinguisher supplied?				
24. Equipment at least 20 feet from overhead powerlines?				
25. Evidence that drilling operator is responsible for the safety of his rig.				
26. Trench sides shored, layer back, or boxed?				
27. Underground utilities located and authorities contacted before digging?				
28. Ladders in trench (25-foot spacing)?				
29. Excavated material placed more than 2 feet away from excavation edge?				
30. Public protected from exposure to open excavation?				
31. People entering the excavation regarding it as a permit-required confined space and following appropriate procedures?				
32. Confined space entry permit is completed and posted?				
33. All persons knowledgeable about the conditions and characteristics of the confined space?				
34. All persons engaged in confined space operations have been trained in safe entry and rescue (non-entry)?				
35. Full body harnesses, lifelines, and hoisting apparatus available for rescue needs?				
36. Attendant and/or supervisor certified in basic first aid and CPR?				
37. Confined space atmosphere checked before entry and continuously while the work is going on?				
38. Results of confined space atmosphere testing recorded?				
39. Evidence of coordination with off-site rescue services to perform entry rescue, if needed?				
40. Are extension cords rated for this work being used and are they properly maintained?				
41. Are GFCIs provided and being used?				

Unsafe Acts: _____

_____

_____

_____

Notes: _____

_____

_____

_____

ATTACHMENT G

JOB SAFETY ANALYSIS FORM

LANGAN	Job Safety Analysis (JSA) Health and Safety
JSA TITLE: **JSA NUMBER:**	**DATE CREATED:** **CREATED BY**: **REVISION DATE:** **REVISED BY:**

Langan employees must review and revise the Job Safety Analysis (JSA) as needed to address the any site specific hazards not identified. Employees must provide their signatures on the last page of the JSA indicating they have review the JSA and are aware the potential hazards associated with this work and will follow the provided preventive or corrective measures.

PERSONAL PROTECTIVE EQUIPMENT REQUIRED: (PPE): ■ Required ☒ As Needed		
☐ Steel-toed boots	☐ Nitrile gloves	☐ Dermal Protection (Specify)
☐ Long-sleeved shirt	☐ Leather/ Cut-resistant gloves	☐ High visibility vest/clothing
☐ Safety glasses	☐Face Shield	☐ Hard hat
ADDITIONAL PERSONAL PROTECTIVE EQUIPMENT NEEDED (Provide specific type(s) or descriptions)		
☐ Air Monitoring:	☐ Respirators:	☐ Other:

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE OR CORRECTIVE ACTION
1.	1. 2.	1a. 1b. 2a. 2b.
2.	1.	1
Additional items identified in the field.		
Additional Items.		

If additional items are identified during daily work activities, please notify all relevant personnel about the change and document on this JSA.

LANGAN

Job Safety Analysis (JSA)
Health and Safety

JSA Title: General Construction Activities

JSA Number: JSA010-01

A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions.

PERSONAL PROTECTIVE EQUIPMENT (Required or to be worn as needed):				
☒ Safety Shoes	☒ Long Sleeves	☒ Safety Vest (Class 2)	☒ Hard Hat	☒ Hearing Protection
☒ Safety Glasses	☐ Safety Goggles	☒ Face Shield	☒ Nitrile Gloves	☐ PVC Gloves
☒ Leather Gloves	☐ Cut Resist. Gloves	☐ Fall Protection	☐ Fire Resistant Clothing	☐ Rubber Boots
☐ Insect/Animal Repellent	☐ Ivy Blocker/Cleaner	☒ Traffic Cones/Signs	☐ Life Vest/Jacket	
☐ Other:				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
1. Transport equipment to work area	1. Back Strain 2. Slips/ Trips/ Falls 3. Traffic 4. Cuts/abrasions from equipment 5. Contusions from dropped equipment	1. Use proper lifting techniques / Use wheeled transport 2. Minimize distance to work area / Have unobstructed path to work area / Follow good housekeeping procedures 3. Wear proper PPE (high visibility vest or clothing) 4. Wear proper PPE (leather gloves, long sleeves) 5. Wear proper PPE (safety shoes)
2. Installation of piping from vapor wells to skid connections and from discharge piping to effluent stack	1. Pinch fingers when connecting pipes 2. Slips/ Trips/ Falls 3. Machinery Hazards	1. Wear proper PPE (leather gloves) 2. Be aware of potential trip hazards / Practice good housekeeping procedures / Mark significant below-grade hazards (i.e. holes, trenches) with safety cones or spray paint 3. Wear proper PPE (safety vest) / Maintain safe distance from operating machinery
3. Remediation equipment installation	1. Back strain when lifting heavy equipment 2. Slips/ Trips/ Falls 3. Traffic	1. Use proper lifting techniques / Use wheeled transport / Minimize distance to vehicle 2. Be aware of potential trip hazards / Practice good housekeeping procedures / Mark significant below-grade hazards (i.e. holes, trenches) with safety cones or spray pain 3. Wear proper PPE (safety vest)
4. All activities	1. Slips/ Trips/ Falls 2. Hand injuries, cuts or lacerations during manual handling of materials 3. Foot injuries 4. Back injuries 5. Traffic 6. Wildlife: Stray dogs, Mice/rats, Vectors (i.e. mosquitoes, bees, etc.) 7. High Noise levels	1. Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards 2. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery or dirty objects before handling / Wear leather/ cut-resistant gloves 3. Wear Langan approved safety shoes 4. Use proper lifting techniques / Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift / Obtain assistance when possible

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
4. All activities (cont'd)	8. Overhead hazards 9. Heat Stress/ Cold Stress 10. Eye Injuries	5. Wear high visibility clothing & vest / Use cones or signs to designate work area 6. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray dogs / Carry/use dog/animal repellant / Use bug spray when needed 7. Wear hearing protection 8. Wear hard hat / Avoid areas were overhead hazards exist. 9. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Takes breaks as necessary to avoid heat/cold stress 10. Wear safety glasses
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

Print Name	Sign Name	Date
Prepared by:		
Reviewed by:		

LANGAN

Job Safety Analysis (JSA)
Health and Safety

JSA Title: **Subsurface Investigation**

JSA Number: **JSA030-01**

A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions.

PERSONAL PROTECTIVE EQUIPMENT (Required or to be worn as needed):

☒ Safety Shoes	☒ Long Sleeves	☒ Safety Vest (Class 2)	☒ Hard Hat	☒ Hearing Protection
☒ Safety Glasses	☒ Safety Goggles	☐ Face Shield	☐ Nitrile Gloves	☐ PVC Gloves
☒ Leather Gloves	☒ Cut Resist. Gloves	☐ Fall Protection	☐ Fire Resistant Clothing	☐ Rubber Boots
☐ Insect/Animal Repellent	☐ Ivy Blocker/Cleaner	☐ Traffic Cones/Signs	☐ Life Vest/Jacket	
☒ Other: Dielectric Overshoes, Sun Block				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
5. Transport equipment to work area	1. Back/strain 2. Slip/Trip/Falls 3. Traffic 4. Cuts/abrasions/contusions from equipment 5. Accidents due to vehicle operations	1. Use proper lifting techniques/Use wheeled transport 2. Minimize distance to work area/unobstructed path to work area/follow good housekeeping procedures 3. Wear proper PPE (high visibility vest or clothing) 4. Wear proper PPE (leather gloves, long sleeves, Langan approved safety shoes) 5. Observe posted speed limits/ Wear seat belts at all times
6. Traffic	1. Hit by moving vehicle	1. Use traffic cones and signage/ Use High visibility traffic vests and clothing/ Caution tape when working near active roadways.
7. Field Work (drilling, resistivity testing, and inspection)	1. Biological Hazards: insects, rats, snakes, poisonous plants, and other animals 2. Heat stress/injuries 3. Cold Stress/injuries 4. High Energy Transmission Lines 5. Underground Utilities 6. Electrical (soil resistivity testing)	11. Inspect work area to identify biological hazards. Wear light colored long sleeve shirt and long pants/ Use insect repellant as necessary/ Beware of tall grass, bushes, woods and other areas where ticks may live/ Avoid leaving garbage on site to prevent attracting animals/ Identify and avoid contact with poisonous plants/Beware of rats, snakes, or stray animals. 12. Wear proper clothing (light colored)/ drink plenty of water/ take regular breaks/use sun block 13. Wear proper clothing/ dress in layers/ take regular breaks. 14. Avoid direct contact with high energy transmission lines/ position equipment at least 15 feet or as required by PSE&G from the transmission lines/ wear proper PPE (dielectric overshoes 15 kV minimum rating). 15. Call one-call service before performing intrusive field work/ Review utility mark-outs and available utility drawings (with respect to proposed work locations)/ Follow Underground Utility Guidelines

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
		16. See AGI Sting R1 operating manual for specific concerns during operating instrument
8. All activities	11. Slips/ Trips/ Falls 12. Hand injuries, cuts or lacerations during manual handling of materials 13. Foot injuries 14. Back injuries 15. Traffic 16. Wildlife: Stray dogs, Mice/rats, Vectors (i.e. mosquitoes, bees, etc.) 17. High Noise levels 18. Overhead hazards 19. Heat Stress/ Cold Stress 20. Eye Injuries	17. Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards 18. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery or dirty objects before handling / Wear leather/ cut-resistant gloves 19. Wear Langan approved safety shoes 20. Use proper lifting techniques / Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift / Obtain assistance when possible 21. Wear high visibility clothing & vest / Use cones or signs to designate work area 22. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray dogs / Carry/use dog/animal repellant / Use bug spray when needed 23. Wear proper hearing protection 24. Wear hard hat / Avoid areas were overhead hazards exist. 25. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Takes breaks as necessary to avoid heat/cold stress 26. Wear safety glasses
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

Print Name	Sign Name	Date
Prepared by:		
Reviewed by:		

LANGAN

Job Safety Analysis (JSA)
Health and Safety

JSA Title: Field Sampling

JSA Number: JSA022-01

A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions.

PERSONAL PROTECTIVE EQUIPMENT (Required or to be worn as needed):

☒ Safety Shoes	☒ Long Sleeves	☐ Safety Vest (Class 2)	☒ Hard Hat	☒ Hearing Protection
☒ Safety Glasses	☐ Safety Goggles	☐ Face Shield	☒ Nitrile Gloves	☐ PVC Gloves
☒ Leather Gloves	☐ Cut Resist. Gloves	☐ Fall Protection	☐ Fire Resistant Clothing	☐ Rubber Boots
☐ Insect/Animal Repellent	☐ Ivy Blocker/Cleaner	☒ Traffic Cones/Signs	☐ Life Vest/Jacket	
☐ Other:				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
9. Unpack/Transport equipment to work area.	6. Back Strains 7. Slip/Trips/Falls 8. Cuts/Abrasions from equipment 9. Contusions from dropped equipment	6. Use proper lifting techniques/Use wheeled transport 7. Minimize distance to work area/Unobstructed path to work area/follow good housekeeping procedures. Mark slip/trip/fall hazards with orange safety cones. 8. Wear proper PPE (leather gloves, long sleeves). 9. Wear proper PPE (Langan approved safety shoes).
10. Initial Site Arrival-Site Assessment	1. Traffic	1. Situational awareness (be alert of your surroundings). Secure area from through traffic.
11. Surface Water Sampling	4. Contaminated media. Skin/eye contact with biological agents and/or chemicals.	1. Wear appropriate PPE (Safety glasses, appropriate gloves). Review (M)SDS for all chemicals being.
12. Sampling from bridges	1. Struck by vehicles	1. Wear appropriate PPE (Safety Vest). Use buddy system and orange safety cones.
13. Icing of Samples/ Transporting coolers/equipment from work area.	21. Back Strains 22. Slips/Trips/Falls 23. Cuts/Abrasions from equipment 24. Pinch/Crushing Hazards.	27. Drain coolers of water. Use proper lifting techniques. Use wheeled transport. 28. Have unobstructed path from work area. Aware of surroundings. 29. Wear proper PPE (Leather gloves, long sleeves) 30. Wear proper PPE (Leather gloves, long sleeves)
14. Site Departure	1. Contaminated PPE/Vehicle	1. Contaminated PPE should be disposed of on-site. Remove boots and soiled clothing for secure storage in trunk. Wash hands promptly.
15. All activities	1. Slips/ Trips/ Falls 2. Hand injuries, cuts or lacerations during manual handling of materials	1. Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
	3. Foot injuries 4. Back injuries 25. Traffic 26. Wildlife: Stray dogs, Mice/rats, Vectors (i.e. mosquitoes, bees, etc.) 27. High Noise levels 28. Overhead hazards 29. Heat Stress/ Cold Stress 30. Eye Injuries	2. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery or dirty objects before handling / Wear leather/ cut-resistant gloves 3. Wear Langan approved safety shoes 4. Use proper lifting techniques / Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift / Obtain assistance when possible 31. Wear high visibility clothing & vest / Use cones or signs to designate work area 32. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray dogs / Carry/use dog/animal repellant / Use bug spray when needed 33. Wear hearing protection 34. Wear hard hat / Avoid areas were overhead hazards exist. 35. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Takes breaks as necessary to avoid heat/cold stress 36. Wear safety glasses
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

Print Name	**Sign Name**	**Date**
Prepared by:		
Reviewed by:		

LANGAN

Job Safety Analysis (JSA)
Health and Safety

JSA Title: **Equipment Transportation and Set-Up**

JSA Number: **JSA012-01**

A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions.

PERSONAL PROTECTIVE EQUIPMENT (Required or to be worn as needed):

☒ Safety Shoes	☒ Long Sleeves	☒ Safety Vest (Class 2)	☒ Hard Hat	☒ Hearing Protection
☒ Safety Glasses	☐ Safety Goggles	☐ Face Shield	☐ Nitrile Gloves	☐ PVC Gloves
☒ Leather Gloves	☐ Cut Resist. Gloves	☐ Fall Protection	☐ Fire Resistant Clothing	☐ Rubber Boots
☐ Insect/Animal Repellent	☐ Ivy Blocker/Cleaner	☐ Traffic Cones/Signs	☐ Life Vest/Jacket	
☐ Other:				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
16. Transport equipment to work area	10. Back Strain 11. Slips/ Trips/ Falls 12. Traffic 13. Cuts/abrasions from equipment 14. Contusions from dropped equipment	6. Use proper lifting techniques / Use wheeled transport 7. Minimize distance to work area / Have unobstructed path to work area / Follow good housekeeping procedures 8. Wear proper PPE (high visibility vest or clothing) 9. Wear proper PPE (leather gloves, long sleeves) 10. Wear proper PPE (safety shoes)
17. Moving equipment to its planned location	2. Pinch Hazard 3. Slips/ Trips/ Falls	4. Wear proper PPE (leather gloves) 5. Be aware of potential trip hazards / Practice good housekeeping procedures / Mark significant below-grade hazards (i.e. holes, trenches) with safety cones or spray paint
18. Equipment Set-up	5. Pinch Hazard 6. Cuts/abrasions to knuckles/hands 7. Back Strain	4. Wear proper PPE (leather gloves) 5. Wear proper PPE (leather gloves) 6. Use proper lifting techniques / Use wheeled transport
19. All activities	31. Slips/ Trips/ Falls 32. Hand injuries, cuts or lacerations during manual handling of materials 33. Foot injuries 34. Back injuries 35. Traffic 36. Wildlife: Stray dogs, Mice/rats, Vectors (i.e. mosquitoes, bees, etc.) 37. High Noise levels 38. Overhead hazards 39. Heat Stress/ Cold Stress 40. Eye Injuries	37. Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards 38. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery or dirty objects before handling / Wear leather/ cut-resistant gloves 39. Wear Langan approved safety shoes 40. Use proper lifting techniques / Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift / Obtain assistance when possible 41. Wear high visibility clothing & vest / Use cones or signs to designate work area

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
7. All activities (cont'd)		42. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray dogs / Carry/use dog/animal repellant / Use bug spray when needed 43. Wear hearing protection 44. Wear hard hat / Avoid areas were overhead hazards exist. 45. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Takes breaks as necessary to avoid heat/cold stress 46. Wear safety glasses
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

Print Name	Sign Name	Date
Prepared by:		
Reviewed by:		

LANGAN

Job Safety Analysis (JSA)
Health and Safety

JSA Title: Excavation Oversight

JSA Number: JSA041-01

A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions.

PERSONAL PROTECTIVE EQUIPMENT (Required or to be worn as needed):				
☒ Safety Shoes	☒ Long Sleeves	☒ Safety Vest (Class 2)	☒ Hard Hat	☒ Hearing Protection
☒ Safety Glasses	☐ Safety Goggles	☐ Face Shield	☒ Nitrile Gloves	☐ PVC Gloves
☒ Leather Gloves	☒ Cut Resist. Gloves	☐ Fall Protection	☐ Fire Resistant Clothing	☐ Rubber Boots
☐ Insect/Animal Repellent	☐ Ivy Blocker/Cleaner	☐ Traffic Cones/Signs	☐ Life Vest/Jacket	
☐ Other:				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
20. Transport equipment to work area	15. Back Strain 16. Slips/Trips/Falls 17. Traffic 18. Cuts/abrasions/contusions from equipment	10. Use proper lifting techniques / Use wheeled transport 11. Minimize distance to work area / Have unobstructed path to work area / Follow good housekeeping procedures 12. Wear proper PPE (high visibility vest or clothing) 13. Wear proper PPE (leather gloves, long sleeves, safety shoes)
21.Earth Moving Equipment	4. Equipment running over employee	2. Ensure you have direct line of sight with operator of equipment; don't walk behind equipment; maintain a safe distance away from equipment. 3. Wear proper PPE (high vis vest/clothing)
22.Excavation	8. Excavation collapse 9. Confined space 10. Soil	2. Use proper shoring/benching/sloping techniques; Ladder is properly situated in excavation; no water in excavation; competent person has inspected excavation prior to allow employees to enter. 3. Langan employees are not authorized to enter a confined space; 4. Soil and equipment is kept at least 2 feet from edge of excavation
23.Excavated soil	1. Hazardous substances	1. Use proper equipment to monitor excavated soil for contaminates; ensure levels do not exceed PEL's for contaminates; Wear proper PPE
24. All activities	41. Slips/ Trips/ Falls 42. Hand injuries, cuts or lacerations during manual handling of materials 43. Foot injuries 44. Back injuries 45. Traffic 46. Wildlife: Stray dogs, Mice/rats, Vectors (i.e. mosquitoes, bees, etc.) 47. High Noise levels 48. Overhead hazards 49. Heat Stress/ Cold Stress	47. Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards 48. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery or dirty objects before handling / Wear leather/ cut-resistant gloves 49. Wear proper PPE (Langan approved safety shoes) 50. Use proper lifting techniques / Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift / Obtain assistance when possible 51. Wear high visibility clothing & vest / Use cones or signs to designate work area

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
	50. Eye Injuries	52. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray dogs / Carry/use dog/animal repellant / Use bug spray when needed 53. Wear hearing protection 54. Wear hard hat / Avoid areas were overhead hazards exist. 55. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Takes breaks as necessary to avoid heat/cold stress 56. Wear safety glasses
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

Print Name	Sign Name	Date
Prepared by:		
Reviewed by:		

LANGAN

Job Safety Analysis (JSA)
Health and Safety

JSA Title: **55-gallon Drum Sampling**

JSA Number: **JSA043-01**

A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions.

PERSONAL PROTECTIVE EQUIPMENT (Required or to be worn as needed):

☒ Safety Shoes	☒ Long Sleeves	☒ Safety Vest (Class 2)	☒ Hard Hat	☐ Hearing Protection
☒ Safety Glasses	☒ Safety Goggles	☒ Face Shield	☒ Nitrile Gloves	☒ PVC Gloves
☒ Leather Gloves	☐ Cut Resist. Gloves	☐ Fall Protection	☐ Fire Resistant Clothing	☐ Rubber Boots
☐ Insect/Animal Repellent	☐ Ivy Blocker/Cleaner	☐ Traffic Cones/Signs	☐ Life Vest/Jacket	

☒ Other: All Drums are required to be labeled. Langan employees do not open or move undocumented drums or unlabeled drums without proper project manager authorization.

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
25. Unpack/Transport equipment to work area.	19. Back Strains 20. Slip/Trips/Falls 21. Cuts/Abrasions from equipment 4. Contusions from dropped equipment	14. Use proper lifting techniques/Use wheeled transport 15. Minimize distance to work area/Unobstructed path to work area/follow good housekeeping procedures. Mark slip/trip/fall hazards with orange safety cones. 16. Wear proper PPE (leather gloves, long sleeves). 4. Wear proper PPE (Langan approved safety shoes).
26. Open Drums	1. Hand Injuries, cuts or lacerations when untightening drum locking bolt, removing drum lid strap, or removing lid. 2. Pressure from drums.	1. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery or dirty objects before handling / Wear leather/ cut-resistant gloves. Use non-metallic mallet and non-sparking tools/wrenches. 2. Open drum slowly to relieve pressure. Wear proper PPE: face shield and goggles; correct gloves; and over garments.
27. Collecting Soil/Fluid Sample	5. Irritation to eye from vapor, soil dust, or splashing 6. Irritation to exposed skin	4. Wear proper eye protection including safety glasses/ face shield/googles and when necessary, splash guard. If dust or vapor phase is present, wear appropriate safety breathing gear (1/2 mask or full face mask with correct filter) 5. Wear proper skin protection including nitrile gloves.
28. Closing Drums	1. Hand Injuries, cuts or lacerations when untightening drum locking bolt, removing drum lid strap, or removing lid.	5. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery or dirty objects before handling / Wear leather/ cut-resistant gloves. Use non-metallic mallet and non-sparking tools/wrenches.
29. Moving Drums	2. Hand Injuries, cuts or lacerations when untightening drum locking bolt, removing drum lid strap, or removing lid. 3. Back Strains	2. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery or dirty objects before handling / Wear leather/ cut-resistant gloves. Use non-metallic mallet and non-sparking tools/wrenches. 3. Use proper lifting techniques/Use wheeled transport

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
30. All activities	51. Slips/ Trips/ Falls 52. Hand injuries, cuts or lacerations during manual handling of materials 53. Foot injuries 54. Back injuries 55. Traffic 56. Wildlife: Stray dogs, Mice/rats, Vectors (i.e. mosquitoes, bees, etc.) 57. High Noise levels 58. Overhead hazards 59. Heat Stress/ Cold Stress 60. Eye Injuries	57. Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards 58. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery or dirty objects before handling / Wear leather/ cut-resistant gloves 59. Wear Langan approved safety shoes 60. Use proper lifting techniques / Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift / Obtain assistance when possible 61. Wear high visibility clothing & vest / Use cones or signs to designate work area 62. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray dogs / Carry/use dog/animal repellant / Use bug spray when needed 63. Wear hearing protection 64. Wear hard hat / Avoid areas were overhead hazards exist. 65. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Takes breaks as necessary to avoid heat/cold stress 66. Wear safety glasses
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

Print Name	Sign Name	Date
Prepared by:		
Reviewed by:		

LANGAN

Job Safety Analysis (JSA)
Health and Safety

JSA Title: Site Inspection

JSA Number: JSA024-01

A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions.

PERSONAL PROTECTIVE EQUIPMENT (Required or to be worn as needed):				
☒ Safety Shoes	☒ Long Sleeves	☒ Safety Vest (Class 2)	☒ Hard Hat	☒ Hearing Protection
☒ Safety Glasses	☐ Safety Goggles	☐ Face Shield	☒ Nitrile Gloves	☐ PVC Gloves
☒ Leather Gloves	☐ Cut Resist. Gloves	☐ Fall Protection	☐ Fire Resistant Clothing	☒ Rubber Boots
☒ Insect/Animal Repellent	☐ Ivy Blocker/Cleaner	☒ Traffic Cones/Signs	☐ Life Vest/Jacket	
☐ Other:				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
31. Jobsite Pre-briefing	22. None	17. Review JSA, SOP's, and discuss hazards that may be present and control measures for present hazards while on-site.
2. Working near railroads	1. Passing Trains. 2. Slip/Trips/Falls.	1. Wear reflective vest/ Stay away from tracks/ Do not cross tracks within 10 ft. of train car or when there is a train within view/listen for train horn. 2. Be aware of tripping hazards/ Follow good housekeeping procedures/ Mark significant hazards with spray paint or cones.
3. Walking around site	4. Uneven terrain 5. Wildlife: Stray animals, mice/rats, vectors (i.e. mosquitoes, bees, etc.) 6. Weather: Heat/cold stress 7. Slip/Trips/Falls 8. Foot injuries 9. Eye injuries	4. Pay attention to surrounding area (puddles, wet, frozen, uneven areas); Mark with cones or spray paint. 5. Use bug spray/ Avoid stray animals/Use repellant when needed. 6. Dress for the correct weather situation/ Use sunscreen or protective clothing in sunlight, layers in cold weather/ Drink plenty of fluids/ Take breaks when needed. 4. Be aware of tripping hazards/ Follow good housekeeping procedures/ Mark significant hazards with spray paint or cones. 5. Wear proper PPE (Langan approved safety shoes)/ Change wet socks during cold weather. 6. Wear proper PPE (safety glasses/goggles).
4. Working near road	1. Passing vehicles 2. Slip/Trips/Falls	1. Wear reflective vest/ Stay away from roadway/ Use buddy system/ Place signage or cones when needed. 2. Be aware of tripping hazards/ Follow good housekeeping procedures/ Mark significant hazards with spray paint or cones.
5. All activities	61. Slips/ Trips/ Falls 62. Hand injuries, cuts or lacerations during manual handling of materials 63. Foot injuries 64. Back injuries 65. Traffic	67. Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards 68. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery or dirty objects before handling / Wear leather/ cut-resistant gloves 69. Wear Langan approved safety shoes

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
	66. Wildlife: Stray dogs, Mice/rats, Vectors (i.e. mosquitoes, bees, etc.) 67. High Noise levels 68. Overhead hazards 69. Heat Stress/ Cold Stress 70. Eye Injuries	70. Use proper lifting techniques / Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift / Obtain assistance when possible 71. Wear high visibility clothing & vest / Use cones or signs to designate work area 72. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray dogs / Carry/use dog/animal repellant / Use bug spray when needed 73. Wear hearing protection 74. Wear hard hat / Avoid areas were overhead hazards exist. 75. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Takes breaks as necessary to avoid heat/cold stress 76. Wear safety glasses
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

Print Name	Sign Name	Date
Prepared by:		
Reviewed by:		

LANGAN

Job Safety Analysis (JSA)
Health and Safety

JSA Title: Direct-Push Soil Borings
JSA Number: JSA004-01

A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions.

PERSONAL PROTECTIVE EQUIPMENT REQUIRED:				
☒ Safety Shoes	☒ Long Sleeves	☒ Safety Vest (Class 2)	☒ Hard Hat	☒ Hearing Protection
☒ Safety Glasses	☐ Safety Goggles	☐ Face Shield	☒ Nitrile Gloves	☐ PVC Gloves
☒ Leather Gloves	☒ Cut Resist. Gloves	☐ Fall Protection	☐ Fire Resistant Clothing	☐ Rubber Boots
☐ Insect/Animal Repellent	☐ Ivy Blocker/Cleaner	☐ Traffic Cones/Signs	☐ Life Vest/Jacket	
☒ Other: Half-face respirator, dust cartridges, PID (if applicable)				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
32. Move equipment to work site	23. Back strain when lifting equipment 24. Slips/ Trips/ Falls while moving equipment 25. Traffic (if applicable) 26. Pinched fingers or running over toes during geoprobe set-up 27. Overturn drilling rig while transporting to loading dock on flat-bed tow truck	18. Use proper lifting technique (use legs for bending and lifting and not the back)/ Use wheeled transport for heavy equipment / Get assistance when handling loads greater than 50 lbs. / Minimize distance to vehicle 19. Use proper lifting technique (use legs for bending and lifting and not the back) / Use wheeled transport for heavy equipment / Get assistance when handling loads greater than 50 lbs. / Minimize distance to vehicle / Have unobstructed path to vehicle or collection point / Do not lift/walk with boxes that are heavy/difficult to lift 20. Wear high visibility safety vests or clothing / Exercise caution 21. Wear proper PPE (cut-resistant gloves) / Stay alert, be aware of geoprobe rig at all times 22. Drill rig should be parked in center of flat-bed tow truck / Emergency brake shall be used at all times during transport on the flat-bed truck/ All unnecessary personnel should stay away from the flat-bed truck during moving activities
33. Calibration of monitoring equipment	7. Skin or eye contact with calibration chemicals 8. Pinch fingers in monitoring equipment	6. Wear proper PPE (safety glasses/ goggles) 7. Wear proper PPE (leather gloves)
34. Set-up geoprobe rig	11. Geoprobe rig movement	6. All field personnel should stay clear of the geoprobe rig while moving / Use a spotter when backing up the geoprobe
35. Advance geoprobe rods below ground surface to desired depth	10. Underground utilities 11. High noise levels	7. Clean all subsurface soil borings to a minimum of 5 feet below grade 8. Wear proper PPE (hearing protection)
36. Remove and open acetate liner	71. Pinched fingers while removing macrocore 72. Cuts/lacerations when cutting acetate liner open 73. Exposure to hazardous vapors	1. Wear proper PPE (nitrile gloves, cut-resistant or leather gloves 2. Wear proper PPE (cut-resistant or leather gloves) 3. Do not place face over acetate liner when opening / Monitor hazardous vapors in air with PID / Upgrade PPE as necessary based on levels contained in the Health and Safety Plan

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
5. Remove and open acetate liner (cont'd)	74. Skin contact with contaminated soil	4. Wear proper PPE (nitrile gloves)
37. Sample Collections a) Monitor parameters b) Prepare sample containers and labels	1. Contact with potentially contaminated soil 2. Lacerations from broken sample bottles 3. Back strain while transporting full coolers 4. Internal exposure to contaminants and metals through inhalation of dust 5. Slips/ Trips/ Falls	1. Use monitoring devices / Wear proper PPE (safety glasses, nitrile gloves) 2. Do not over-tighten bottle caps / Handle bottles safely to prevent breakage 9. Use proper lifting techniques / Do not lift heavy loads without assistance 10. Avoid creating dust / If necessary, wear a half mask respirator with applicable dust cartridge / Inspect respirator for damage and cleanliness prior to use / Clean respirator after each use and store in a clean, secure location 11. Be alert / Follow good housekeeping procedures
38. Remove excess soil from acetate liner and place in 55-gallon drum (IF NOT PERFORMED BY LANGAN, REMOVE!)	1. Cuts/lacerations from acetate liner 2. Pinched fingers/hand while opening/closing drum 3. Skin contact with contaminated soil 4. Soil debris in eyes	1. Wear proper PPE (cut-resistant or leather gloves) 2. Wear proper PPE (cut-resistant or leather gloves) 3. Wear proper PPE (nitrile gloves) 4. Wear proper PPE (safety glasses)
8. Transport drums to central staging location (IF NOT PERFORMED BY LANGAN, REMOVE!)	1. Back, arm or shoulder strain from moving drums 2. Pinch fingers/hand in drum cart when moving drums 3. Pinch fingers/hand when operating lift-gate on vehicle 4. Contact with potentially contaminated groundwater when moving improperly sealed drums 5. Slips when moving drums 6. Drop drum on feet/toes	77. Use drum cart for moving drums / Use proper lifting techniques / Do not lift heavy loads without assistance 78. Wear proper PPE (cut-resistant or leather gloves) 79. Wear proper PPE (cut-resistant or leather gloves) 80. Wear proper PPE (nitrile gloves underneath work gloves) 81. Follow good housekeeping procedures / Ensure route to move drum and storage space is free from obstructions 82. Wear proper PPE (safety shoes) / Work in a safe manner to prevent dropped drum
9. All activities	1. Slips/ Trips/ Falls 2. Hand injuries, cuts or lacerations during manual handling of materials 3. Foot injuries 4. Back injuries 5. Traffic 6. Wildlife: Stray dogs, Mice/rats, Vectors (i.e. mosquitoes, bees, etc.) 7. High Noise levels 8. Overhead hazards 9. Heat Stress/ Cold Stress	1. Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards 2. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery or dirty objects before handling / Wear leather/ cut-resistant gloves 3. Wear Langan approved safety shoes 4. Use proper lifting techniques / Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift / Obtain assistance when possible 5. Wear high visibility clothing & vest / Use cones or signs to designate work area 6. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray dogs / Carry/use dog/animal repellant / Use bug spray when needed 7. Wear hearing protection 8. Wear hard hat / Avoid areas were overhead hazards exist. 9. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Takes breaks as necessary to avoid heat/cold stress

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
9. All activities (cont'd)	10. Eye Injuries	10. Wear safety glasses
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

Print Name	Sign Name	Date
Prepared by:		
Reviewed by:		

LANGAN

Job Safety Analysis (JSA)
Health and Safety

JSA Title: **Building Construction Oversight**

JSA Number: **JSA006-01**

A Job Safety Analysis (JSA) must identify all job steps required to complete the task, the potential hazards employees could be exposed to while performing the job step and the preventative/corrective actions required to reduce/mitigate the identified potential hazards. Employees must certify that they have either prepared the JSA or have reviewed the JSA and are aware of the potential hazards associated with this task and will follow the provided preventive/corrective actions.

PERSONAL PROTECTIVE EQUIPMENT (Required or to be worn as needed):

☒ Safety Shoes	☒ Long Sleeves	☒ Safety Vest (Class 2)	☒ Hard Hat	☒ Hearing Protection
☒ Safety Glasses	☐ Safety Goggles	☒ Face Shield	☒ Nitrile Gloves	☐ PVC Gloves
☒ Leather Gloves	☐ Cut Resist. Gloves	☐ Fall Protection	☐ Fire Resistant Clothing	☐ Rubber Boots
☐ Insect/Animal Repellent	☐ Ivy Blocker/Cleaner	☒ Traffic Cones/Signs	☐ Life Vest/Jacket	
☐ Other:				

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
39. Transport equipment to work area	28. Back Strain 29. Slips/ Trips/ Falls 30. Traffic 31. Cuts/abrasions from equipment 32. Contusions from dropped equipment	11. Use proper lifting techniques / Use wheeled transport 12. Minimize distance to work area / Have unobstructed path to work area / Follow good housekeeping procedures 13. Wear proper PPE (high visibility vest or clothing) 14. Wear proper PPE (leather gloves, long sleeves) 15. Wear proper PPE (safety shoes)
40. Drilling/anchor bolt installation	9. Hazards associated with drilling, flying objects, heavy equipment, ground level hazards and dust 10. Slips/ Trips/ Falls 11. Hazards associated with concrete work	6. Maintain a safe distance from drilling operation / Wear proper PPE (hard hat, safety glasses, safety shoes, safety vest) 7. Be aware of potential trip hazards / Follow good housekeeping procedures / Mark significant below-grade hazards (i.e. holes, trenches) with safety cones or spray paint / Wear the proper PPE (safety shoes) 8. Maintain a safe distance from pouring operation
41. Steel building erection	12. Overhead hazards, falling objects 13. Pinching/crushing hazards	8. Wear proper PPE (hard had, safety glasses, safety vest) / Be aware of overhead hazards and maintain a safe distance of at least 10 ft. 9. All personnel should make others aware of moving objects or their inten to move objects / Avoid areas where pinching and crushing hazards are possible
42. All activities	75. Slips/ Trips/ Falls 76. Hand injuries, cuts or lacerations during manual handling of materials 77. Foot injuries 78. Back injuries 79. Traffic 80. Wildlife: Stray dogs, Mice/rats, Vectors (i.e. mosquitoes, bees, etc.)	83. Be aware of potential trip hazards / Follow good housekeeping procedures/ Mark significant hazards 84. Inspect for jagged/sharp edges, and rough or slippery surfaces / Keep fingers away from pinch points / Wipe off greasy, wet, slippery or dirty objects before handling / Wear leather/ cut-resistant gloves 85. Wear Langan approved safety shoes

JOB STEPS	POTENTIAL HAZARDS	PREVENTATIVE / CORRECTIVE ACTION
4. All activities (cont'd)	81. High Noise levels 82. Overhead hazards 83. Heat Stress/ Cold Stress 84. Eye Injuries	86. Use proper lifting techniques / Consider load location, task repetition, and load weigh when evaluating what is safe or unsafe to lift / Obtain assistance when possible 87. Wear high visibility clothing & vest / Use cones or signs to designate work area 88. Be aware of surroundings at all times, including the presence of wildlife/ Do not approach stray dogs / Carry/use dog/animal repellant / Use bug spray when needed 89. Wear hearing protection 90. Wear hard hat / Avoid areas were overhead hazards exist. 91. Wear proper attire for weather conditions (sunscreen or protective clothing in sunlight, layers for cold weather) / Drink plenty of fluids to avoid dehydration / Takes breaks as necessary to avoid heat/cold stress 92. Wear safety glasses
Additional items.		
Additional Items identified while in the field. (Delete row if not needed.)		

Print Name	Sign Name	Date
Prepared by:		
Reviewed by:		

ATTACHMENT H

TAILGATE SAFETY BRIEFING FORM

LANGAN TAILGATE SAFETY BRIEFING

Date:_____ Time: _____

Leader:_____ Location:_____

Work Task:

_____

_____

SAFETY TOPICS (*provide some detail of discussion points*)

Chemical Exposure Hazards and Control:_____

_____

Physical Hazards and Control: _____

Air Monitoring: _____

PPE: _____

_____

Communications:_____

Safe Work Practices: _____

_____

Emergency Response: _____

Hospital/Medical Center Location: _____

Phone Nos.: _____

Other: _____

FOR FOLLOW-UP (the issues, responsibilities, due dates, etc.**)**

_____

_____

_____

ATTENDEES

PRINT NAME	COMPANY	SIGNATURE

APPENDIX B
DEMOLITION AND SUPPORT-OF-EXCAVATION (SOE) DRAWINGS

FULL DEMOLITION OF

LOT 1, BLOCK 3084

74 BOGART STREET BOROUGH OF BROOKLYN KINGS COUNTY CITY & STATE OF NEW YORK

BUILDING DEMOLITION NOTES

THE FOLLOWING GENERAL DEMOLITION PLAN OUTLINES THE PROPOSED DEMOLITION PROCEDURES FOR THE DEMOLITION OF THE BUILDINGS IN LOT 1, BLOCK 3084 IN 74 BOGART STREET, BOROUGH OF BROOKLYN, KINGS COUNTY CITY & STATE OF NEW YORK

1. THESE BUILDINGS ARE MASONRY,AND STEEL BUILDINGS. THE HEIGHT OF THE BUILDINGS ARE +/– 23'–2" AT THE HIGHEST POINT. IT IS PROPOSED TO DEMOLISH THIS BUILDING DOWN TO GRADE. TO BE DEMOLISHED VIA MECHANICAL METHODS UTILIZING AN EXCAVATOR FROM GRADE AND CONVENTIONAL HAND METHODS AT THE TOP FLOORS. THIS DEMO PROCEDURE IS ONLY A CONCEPTUAL PROCESS OF THE DISMANTLING OF THE STRUCTURE. ACTUAL FIELD CONDITIONS MAY ALTER PROCEDURE. REPORT ANY INCONSISTENCIES OR UNUSUAL CONDITION THAT MAY ALTER PROCEDURE AS REQUIRED.

2. CONTRACTOR PRIOR TO START OF WORK SHALL OBTAIN ALL REQUIRED PERMITS FROM THE DEPARTMENT OF BUILDINGS AND ANY OTHER CITY AGENCIES HAVING JURISDICTION.

 2.1. WHICH SHALL INCLUDE THE FOLLOWING APPLICABLE
 2.2. DEPARTMENT OF BUILDINGS
  –DEMO PERMIT (FULLY MECHANICAL MEANS PERMIT)
  –CONSTRUCTION FENCE PERMIT (SHALL BE FILED PRIOR THE DEMOLITION UNDER BUILDING LOTS 15,25 BLOCK 768 IN 22–25 46th STREET BOROUGH & COUNTY OF QUEENS CITY&STATE OF NEW YORK

3. THE CONTRACTOR IS TO DISCONNECT AND CAP ALL EXISTING UTILITIES AND SERVICE LINES AND PROVIDE CERTIFICATIONS TO THAT EFFECT BY THE REPRESENTATIVE UTILITY COMPANIES OR CITY AGENCIES HAVING JURISDICTION IN ACCORDANCE WITH NEW YORK CITY BUILDING CODE BC 3303.2.

 3.1. TEMPORARY ELECTRIC SERVICE (IF NEEDED) SHALL BE OBTAINED FROM THE ADJACENT PROPERTY. ALL TEMPORARY ELECTRICAL SERVICE SHALL MEET ALL REQUIREMENTS OF THE NEW YORK CITY ELECTRICAL CODE, AND SHALL BE IN COMPLIANCE WITH SUCH REQUIREMENTS PER BC 3303.2.3
 3.2. SANITARY FACILITIES SHALL BE PROVIDED DURING DEMOLITION ACTIVITIES IN ACCORDANCE WITH THE NEW YORK CITY PLUMBING CODE PER BC 3303.2.4
 3.3. TEMPORARY WATER SERVICE SHALL BE PROVIDED UTILIZING THE ADJACENT PROPERTY. CONTRACTOR SHALL ACQUIRE ALL REQUIRED PERMITS AND APPROVALS AS REQUIRED FROM ALL CITY AGENCIES HAVING JURISDICTION.

4. THE CONTRACTOR SHALL PROVIDE CERTIFICATION THAT THE STRUCTURE HAS BEEN TREATED EFFECTIVELY FOR RAT EXTERMINATION BY A LICENSED EXTERMINATOR IN ACCORDANCE WITH NEW YORK CITY BUILDING CODE.

5. THE CONTRACTOR SHALL ESTABLISH PROTECTED SAFE ZONES/BUFFERS AROUND THE ENTIRE PERIMETER OF THE BUILDING PER BC 3306.2.1 AND SHALL CONSIST OF:
 5.1. A CONSTRUCTION FENCE, PER BC 3307.7.

6. A SAFE ZONE SHALL BE ESTABLISHED AROUND ALL BUILDINGS BEING DEMOLISHED (SEE PLAN) SAFE ZONES SHALL BE ESTABLISHED UTILIZING APPROPRIATE SOLID MATERIAL FENCE IN ACCORDANCE WITH NEW YORK CITY BUILDING BC 3306.2.1. THE CONTRACTOR SHALL MAINTAIN AND MONITOR THE SAFE ZONE AS REQUIRED THROUGHOUT THE DURATION OF THE WORK. LIMITING ACCESS ONLY TO AUTHORIZED WORKERS.

7. CONTRACTOR SHALL INSTALL ALL REQUIRED SITE PROTECTED AS INDICATED ON SAFETY ZONE PLAN AS FOLLOWS,
 7.1. CONTRACTOR IS TO PROVIDE A 8' HIGH CONSTRUCTION FENCE AS REQUIRED AROUND THE ENTIRE PROPERTY PER BC 3307.7
 7.2. CONTRACTOR SHALL UTILIZE FLAG MEN AT ALL SIDEWALK CROSSING PER BC 3307.5
 7.3. CONTRACTOR SHALL PROVIDE WATCHPERSON(S) WHERE BUILDINGS BEING DEMOLISHED OCCUPIES A GROUND AREA BETWEEN 5,000 SQ.FT. AND 40,000 SQ FT. AND ONE ADDITIONAL WATCH–PERSON FOR EACH ADDITIONAL 40,000 SQ.FT. OR FRACTION THEREFORE. A COMPETENT WATCH–PERSON SHALL BE ON DUTY AT THE SITE DURING LL HOURS WHEN OPERATIONS ARE NOT IN PROGRESS, AS PER BC 3307.5.1.

8. CONTRACTOR SHALL IMPLEMENT ALL REQUIRED SITE LOGISTICS, TRUCK ROUTING, SAFETY ZONES, CONTAINER PLACEMENT ETC. PRIOR TO START OF DEMOLITION.

 A 8' HIGH CONSTRUCTION FENCE WITH A SITE ACCESS GATE SHALL BE PROVIDED ALONG FRONTAGE OF SITE, AS REQUIRED. THE CONTRACTOR SHALL MAINTAIN AND MONITOR SAFE ZONE AS REQUIRED THROUGHOUT THE DURATION OF THE WORK, LIMITING ACCESS TO AREA ONLY TO AUTHORIZED WORKERS.

9. CONTRACTOR TO PROVIDE FLAG MEN AT ALL SIDEWALK CROSSINGS FOR PUBLIC SAFETY AS REQUIRED PER BC 3307.5. CONTRACTOR SHALL MAINTAIN SAFE AND CLEAR ACCESS AROUND AND FROM SITE AT ALL TIMES.

10. DURING AND THROUGHOUT ALL DEMOLITION ACTIVITIES CONTRACTOR SHALL IMPLEMENT ALL DUST CONTROL MEASURES AS REQUIRED UTILIZING WATER SPRAY/MISTING PER BC 3306.9.3

11. ONCE ALL SITE AND SAFETY MEASURES HAVE BEEN IMPLEMENTED DEMOLITION MAY PROCEED.

12. CONTRACTOR SHALL INSTALL ALL REQUIRED SOIL EROSION AND SEDIMENTATION CONTROLS AS REQUIRED PRIOR TO START OF ANY DEMOLITION ACTIVITIES.

13. ALL INTERIOR DEMOLITION OF BUILDING SHALL BE COMPLETED. DAILY CONTRACTOR WILL REMOVE ALL EXISTING RUBBISH, AND DEBRIS DURING THE PROGRESS OF THE DEMOLITION. ALL RUBBISH AND DEBRIS IS TO BE TRANSPORTED VIA MINI CONTAINER AND/OR SKID STEER LOADER TO AN APPROVED DEBRIS CONTAINER AND DISPOSED OF IN AN APPROVED MANNER.

14. ONCE ALL INTERIOR DEMOLITION HAS BEEN COMPLETED, STRUCTURAL DEMOLITION OF THE BUILDING WILL PROCEED.

15. THE CONTRACTOR PROPOSES TO UTILIZE THE FOLLOWING EQUIPMENT DURING THE COURSE OF DEMOLITION OF THE EXISTING BUILDINGS AS FOLLOWS:

NO.	EQUIPMENT	DESCRIPTION
2	EXCAVATORS (PC350)	– WITH GRAPPLE, BUCKET, SHEAR, OR HAMMER FOR MECHANICAL DEMO, AND LOAD OUT OF WALLS AND SLAB ON GRADE
3	SKID STEER LOADERS	– WITH EXCAVATOR BUCKET FOR LOADING AND TRANSPORT
AS REQ.	ROLL–OFF TRUCKS	– DEBRIS REMOVAL
2	OXYGEN/ACET TORCHES	– CUTTING STEEL, ETC.
2	ELECT. CHIPPING HAMMERS	– SLAB AND MASONRY WALL REMOVAL
2	SAWSALL	– CUTTING WOOD
3	16" CHAIN SAWS	– CUTTING WOOD
AS REQ.	MISC. HAND TOOLS	

17. CONTRACTOR SHALL COMPLY WITH BC 3306.5 (4) AND BC 3306.9 AS FOLLOWS:

3306.91 – THE CONTRACTOR IS TO DISCONNECT AND CAP ALL EXISTING UTILITIES AND SERVICE LINES AND PROVIDE CERTIFICATIONS TO THAT EFFECT BY THE REPRESENTATIVE UTILITY COMPANIES OR CITY AGENCIES HAVING JURISDICTION. IN ACCORDANCE WITH NEW YORK CITY BUILDING CODE BC 3303.2 AND BC 3306.9.1

3306.9.2 – BOT APPLICABLE NO PARTY WALLS OR BALCONIES, NO HORIZONTAL FIRE EXIT IS BEING DEMOLISHED OR OBSTRUCTED THAT WILL DESTROY ITS FULL EFFECTIVENESS AS A MEANS OF EGRESS. WHEN MECHANICAL DEMOLITION IS IN PROGRESS NO ONE IS TO BE ALLOWED IN BUILDING AT ANY TIME.

3306.9.3 – DURING AND THROUGHOUT ALL DEMOLITION ACTIVATES CONTRACTOR SHALL IMPLEMENT ALL DUST CONTROL MEASURES AS REQUIRED UTILIZING WATER SPRAY/MISTING

3306.9.4 – CONTRACTOR TO LEAVE EXISTING GRADE IN PLACE AND FILL IN EXCAVATIONS WITH APPROVED MATERIAL TO MAINTAIN DRAINAGE PATTERN.

3306.9.8 – (1) CONTRACTOR TO REMOVE ALL GLASS FROM WINDOWS, DOORS, SKYLIGHTS, FIXTURES, ETC... (2) IN STRUCTURES MORE THAN 25' HIGH, ALL EXTERIOR WALL OPENINGS WITHIN 20' OF A FLOOR OPENING USED FOR THE PASSAGE OF DEBRIS FROM THE FLOOR ABOVE SHALL BE SOLIDLY BOARDED UP. (3) BEFORE DEMOLITION STARTS CONTRACTOR SHALL REMOVE ALL COMBUSTIBLE MATERIALS AND DEBRIS FROM ALL FLOORS AND CELLAR. (4) ALL ASBESTOS SHALL BE REMOVED AND CERTIFICATIONS TO THAT EFFECT SHALL BE FILLED WITH THE BUILDING DEPARTMENT AND THE DEPARTMENT OF ENVIRONMENTAL PROTECTIONS AS REQUIRED.

3306.9.9 – CONTRACTOR TO DEMOLISH WALLS IN A SYSTEMATIC MANNER FROM TOP DOWN TIER BY TIER. NOW ALL SHALL BE DEMOLISHED UNTIL THE FLOOR OR ROOF ITS SUPPORTING HAVE BEEN REMOVED. MASONRY WALL SHALL NOT BE PERMITTED TO FALL ONTO ANY FLOORS OR STRUCTURAL ELEMENTS WHERE THEY WILL EFFECT THE LOAD CARRYING CAPACITY OF THESE ELEMENTS. NO WALL, CHIMNEY OR OTHER STRUCTURAL ELEMENT SHALL BE LEFT IN SUCH A CONDITION THAT IT MAY COLLAPSE BY WIND, VIBRATION OR OTHER CAUSE. NO SECTION OF WALL SHALL BE LEFT AT A HEIGHT OF MORE THAN 22 TIMES ITS THICKNESS WITHOUT PROPER SHORING / BRACING. ALL BRICK AND CHIMNEYS DEBRIS SHALL BE DROPPED DOWN ON THE INSIDE OF SUCH CHIMNEY. ALL ENCLOSED VERTICAL SHAFTS AND STAIRS SHALL BE MAINTAINED ENCLOSED AT ALL FLOORS EXCEPT THE UPPERMOST FLOOR BEING DEMOLISHED. ALL WORK ON THE UPPER MOST FLOOR SHALL BE COMPLETED BEFORE THE STAIR / SHAFT MAY BE DISTURBED ON THE FLOOR BELOW. ALL HAND RAILS AND BALUSTERS SHALL BE LEFT IN PLACE UNTIL ACTUAL DEMOLITION OF SUCH FLOOR IS IN PROGRESS

3306.9.10 – NO BEARING WALL OR STRUCTURAL ELEMENT SHALL BE REMOVED UNTIL THE FLOOR OR ROOF THAT IT SUPPORTS HAS BEEN REMOVED. CONTRACTOR IS TO CONTINUALLY INSPECT AS THE WORK PROGRESSES TO DETECT ANY HAZARD THAT MAY DEVELOP.

3306.9.11 – CONTRACTOR SHALL NOT STORE ANY MATERIALS ON THE FLOOR OR THE ROOF AT ANY TIME. ALL DEBRIS SHALL BE REMOVED DAILY.

3306.9.12 – MECHANICAL DEMO WILL ACCESS THE ENTIRE DEMO PROJECT FROM AROUND THE EXISTING BUILDING (PROPOSED DEMOLISHED BUILDING). HOWEVER, ALL DEBRIS, BRICKS, AND SIMILAR MATERIAL SHALL BE REMOVED BY MEANS OF CHUTES, BUCKETS, OR HOISTS THAT COMPLY WITH THE PROVISIONS OF THIS CHAPTER. LOADER AND TRUCKS TO BE WORKING IN THE REMOVAL OF THE DEBRIS TO PROVIDE A CLEAN ACCESS TO THE REMAINING OF THE PROJECT.

3306.9.13 – A LICENSED EXTERMINATOR SHALL EFFECTIVELY TREAT THE PREMISES FOR RODENT EXTERMINATION AS PER THE REQUIREMENTS OF THE DEPARTMENT OF HEALTH AND MENTAL HYGIENE.

3303.7.3 – SMOKING SHALL BE PROHIBITED AT ALL CONSTRUCTION AND DEMOTION SITES. CONTRACTOR SHALL POST "NO SMOKING" SIGNS THROUGHOUT THE SITE AND ENFORCE AS REQUIRED PER SECTION 310 OF THE NEW YORK CITY FIRE CODE. ALL WORK ON SITE TO COMPLY WITH BC 3303.7 SPECIFICALLY BUT NOT LIMITED TO NO SMOKING ON SITE. SIGNS PROHIBITING SMOKING ON SITE WILL BE POSTED.

3303.7.2 – FIRE EXTINGUISHERS SHALL BE LOCATED WITHIN THE BUILDING ON EACH FLOOR DURING THE INTERIOR DEMOLITION AND HAND DEMOLITION OPERATIONS. FIRE EXTINGUISHERS SHALL BE REMOVED FROM THE BUILDING DURING THE MECHANICAL DEMOLITION OF THE BUILDING. PER NEW YORK CITY FIRE CODE SECTION FC 1415 – PORTABLE FIRE EXTINGUISHERS NOT LESS THAN ONE APPROVED PORTABLE FIRE EXTINGUISHER IN ACCORDANCE WITH SECTION 906 OF THE NYCFC AND SIZED FOR NOT LESS THAN ORDINARY HAZARD AS FOLLOWS:

1. AT EACH STAIRWAY ON ALL FLOOR LEVELS WHERE COMBUSTIBLE MATERIALS ARE BEING SORTED OR COMBUSTIBLE WASTE IS BEING GENERATED.
2. AT THE ENTRANCE OF EACH STORAGE AND CONSTRUCTION SHED.
3. ADDITIONAL PORTABLE FIRE EXTINGUISHERS SHALL BE PROVIDED WHERE FLAMMABLE AND COMBUSTIBLE LIQUIDS ARE STORED HANDLED AND USED.

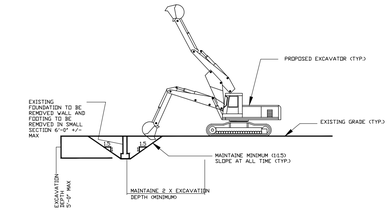
18. ONCE ALL SAFE ZONE ESTABLISHED, MECHANICAL DEMOLITION OF THE BUILDING SHALL PROCEED.

18.3– NOISE CONTROL MONITORING WILL BE IN PLACE DURING CONSTRUCTION ACTIVITIES. EQUIPMENT PROPOSED TO BE USED WILL HAVE A SHOULD LEVEL OF 140 D MEASURE BY A HAND HELD METER. ALL EQUIPMENT TO HAVE PROPER MUFFLERS INSTALLED AS REQUIRED. ALL DEMOLITION ACTIVITIES SHALL BE FROM 7:00AM 5:00PM MONDAY THRU FRIDAY. NO WORK WILL BE PERMITTED ON WEEKENDS UNLESS APPROVED BY OWNER.

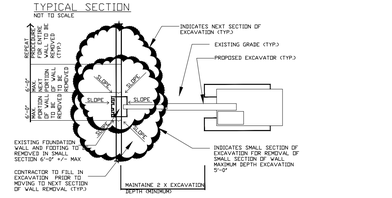
18.4 ALL DEBRIS, EQUIPMENT ETC... IS TO BE REMOVED FROM SITE/WORK AREA AS REQUIRED.

CONTROLLED INSPECTION

Y	N	SPECIAL INSPECTIONS ITEMS	CODE SECTION
X		STRUCTURAL STABILITY– EXISTING BUILDINGS	BC 1704.20.1
X		MECHANICAL DEMOLITION	BC 1704.20.4



TYPICAL SECTION
NOT TO SCALE

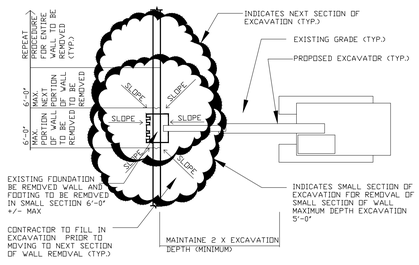


TYPICAL PLAN
NOT TO SCALE

TYPICAL FOUNDATION WALL REMOVAL UNDER 5' DEEP

NOT TO SCALE

NOTES:
1. ALL FOUNDATION ADJACENT TO EXISTING STRUCTURE ARE TO BE REMOVED, AND ARE TO BE REMOVED BY FOUNDATION CONTRACTOR AS REQUIRED AND ARE NOT PART OF THESE DOCUMENTS(TYP.)
2. ALL EXCAVATIONS TO BE FILLED TO GRADE (TYPICALO



TYPICAL PLAN
NOT TO SCALE

TYPICAL FOUNDATION WALL REMOVAL UNDER 5' DEEP

NOT TO SCALE

NOTES:
1. ALL FOUNDATION ADJACENT TO EXISTING STRUCTURE ARE TO BE REMOVED, AND ARE TO BE REMOVED BY FOUNDATION CONTRACTOR AS REQUIRED AND ARE NOT PART OF THESE DOCUMENTS(TYP.)
2. ALL EXCAVATIONS TO BE FILLED TO GRADE (TYPICALO

NOTE:–

1. CONTRACTOR TO NOTIFY ADJACENT PROPERTIES 10 DAYS ADVANCE NOTIFICATION, PRIOR TO START OF DEMO.
2. CONTRACTOR TO ADVANCE NOTIFICATION 24 TO 48 HOUR BEFORE STARTING DEMO, BY CALLING BEST AT 212 393 2550
3. ACCORDING TO MY PHYSICAL INSPECTIONS DATED IN 05–04–2016 IT'S OUR STRUCTURAL OPINION THAT THE STRUCTURE BEING DEMOLISHED IS NOT A WEAKENED STRUCTURE.
4. CONTRACTOR/OWNER MUST OBTAIN CONSENT OF ADJACENT PROPERTY OWNERS BEFORE INSTALLING OVERHEAD PROTECTION, FENCE OR ROOF PROTECTION OVER THEIR BUILDING/LOTS.
5. THERE IS A SPRINKLER SYSTEM IN THIS BUILDING AND IT'S FILED TO BE REMOVER UNDER FDNY.
6. CONTRACTOR TO PROVIDE HYDRANT USE PERMIT OR WATER TRUCK FOR DUST CONTROL DURING THE DEMOLITION.
7. THE DEMOLITION JOB BIN # 4014521

HEAVY DUTY SHED NOTES:–

1. LIVE LOAD 300 P.S.F.
2. STEEL DESIGN STRESS 14.000 P.S.I.
3. ELECTRIC LIGHTING– AS PER NYC LIGHTING CODE.
4. ALL BEAMS AND PIPES TO BE A–36 STEEL.

DRAWING LIST

DM–001.00	COVER SHEET AND DETAILS
DM–002.00	GENERAL NOTE
DM–100.00	GENERAL LAYOUT
DM–101.00	SAFETY ZONE PLAN AND DETAILS
DM–102.00	DEMOLITION PLAN VIEW FOR ROOF LEVEL
DM–103.00	DEMOLITION PLAN VIEW FOR FOUNDATION
DM–200.00	TYPICAL EXISTING SECTION DETAILS
DM–300.00	DEMOLITION – EQUIPMENT

MAN POWERS:
SIX TO FIFTEEN WORKERS ON SITE.

MECHANICAL EQUIPMENT:

WE WILL UTILIZE A CAT 345 EXCAVATOR AND/OR A CAT 345C UHD TO PERFORM DEMO.. THEY WILL HAVE DEMO ATTACHMENTS SUCH AS GRAPPLE, SHEAR, PULVERIZED, UNIVERSAL PROCESSOR, ETC. WE MAY ALSO UTILIZE CAT 320 EXCAVATOR, CAT 983 TRACK LOADER, AND GENIE S–85 BOOM LIFT.

HAND HELD TOOLS EQUIPMENT:

MEN WILL UTILIZE HAND TOOLS SUCH AS GAS POWERED SAWS, SAWZALLS, OXY/ACETYLENE TORCH SETUPS, SLEDGE HAMMERS, WRECKING BARS, AXES, AND OTHER HAND HELD TOOLS.

EQUIPMENT SCHEDULE

EQUIPMENT	MODE/TYPE	OPERATING WT.	FLOOR LEVEL PLACEMENT	MIN. SEPARATION DISTANCE
BOBCAT	S70	2,795 LBS.		N/A
BOBCAT	S100	4,091 LBS.		N/A
BOBCAT	T110	5202 LBS.		N/A
EXCAVATOR CAT MINI	301.6C/301.8C	3,936 LBS	ALL	N/A
DOOSAN 340DX	PC200	75,178 LBS.		N/A
CAT 226B	CAT 226B	7,142 LBS.		N/A
CAT 304.5	CAT 304.5	19.996 LBS.		N/A

CONTRACTOR WILL HAVE DEMO ATTACHMENTS SUCH AS GRAPPLE SHEAR, PULVERIZED, UNIVERSAL PROCESSOR, ETC

CONTRACTOR MAY USE THIS EQUIPMENT OR EQUAL

MANUAL EQUIPMENT
GAS POWERED SAWS,
SAWZALLS,
OXY/ACETYLENE TORCH SETUPS
BOOSH CHIPPING
GUN
SHOVELS
SLEDGE HAMMERS, WORKING BARS AND AXES

CONSULTANTS:

MJE&D
MJ ENGINEERING & DESIGN
3 BATTISTA CT
SAYREVILLE NJ 08872
PHONE : (201) 365–8065
EMAIL : YOUSSEFPE@GMAIL.COM

NO.	DATE	REVISION	BY

DESIGNER:	M.Y.
DRAWN BY:	F.I.
CHECKED BY:	M.Y.
SCALE	AS NOTED
DATE:	03/26/2019

PROJECT:
FULL DEMOLISION
LOT 1, BLOCK 3084

ADDRESS:
74 BOGART STREET BOROUGH OF BROOKLYN KINGS COUNTY CITY & STATE OF NEW YORK

DRAWING TITLE:
COVER SHEET AND DETAIL

STATE OF NEW YORK · MAGDY YOUSSEF · 088978 · LICENSED PROFESSIONAL ENGINEER

DRAWING NO.:
DM–001.00

SHEET NO.:

NYC BUILDING CODE COMPLIANCE NOTES FOR FULL DEMOLITION:

1. DEMOLITION OPERATIONS SHALL NOT COMMENCE UNTIL THE APPLICABLE PEDESTRIAN AND ADJOINING PROPERTY PROTECTION IS IN PLACE AS REQUIRED BY NEW YORK CITY BUILDING CODE SECTIONS 3307, 3308 AND 3309. [3306.2] A SAFETY ZONE APPROVED BY THE COMMISSIONER SHALL BE PROVIDED AROUND THE DEMOLITION AREA. FENCES THAT MEET THE REQUIREMENTS OF SECTION 3307.7 SHALL BE ERECTED TO PREVENT PERSONS OTHER THAN WORKERS FROM ENTERING SUCH SAFETY ZONE. [3306.2.1]

2. THE PERMIT HOLDER SHALL NOTIFY THE DEPARTMENT AND ADJOINING BUILDING OWNERS PRIOR TO THE COMMENCEMENT OF FULL AND PARTIAL DEMOLITION OPERATIONS IN ACCORDANCE WITH SECTIONS 3306.3.1 AND 3306.3.2. [3306.3] THE PERMIT HOLDER SHALL NOTIFY THE DEPARTMENT VIA PHONE OR ELECTRONICALLY AT LEAST 24 HOURS, BUT NO MORE THAN 48 HOURS, PRIOR TO THE COMMENCEMENT OF SUCH WORK. [3306.3.1] ADJOINING PROPERTY OWNERS SHALL BE NOTIFIED OF UPCOMING DEMOLITION OPERATIONS IN WRITING NOT LESS THAN 10 DAYS PRIOR TO THE SCHEDULED STARTING DATE OF THE DEMOLITION. THE WRITTEN NOTICE SHALL PROVIDE A DESCRIPTION OF THE WORK TO BE PERFORMED, THE TIMEFRAME AND SCHEDULE, AND CONTACT INFORMATION OF THE PERSON CAUSING THE DEMOLITION AND OF THE DEPARTMENT [3306.3.2]. REFER TO EXEMPTIONS UNDER 3306.3 FOR INTERIOR PARTIAL DEMOLITION WORK SCOPE.

3. THE APPROVED SET OF DEMOLITION DOCUMENTS SHALL BE KEPT AT THE SITE AT ALL TIMES AND BE ACCESSIBLE FOR INSPECTION IN ACCORDANCE WITH SECTION 3301.7. [3306..25]

4. WHERE MECHANICAL DEMOLITION EQUIPMENT, OTHER THAN HANDHELD DEVICES, IS TO BE USED IN THE FULL OR PARTIAL DEMOLITION OF A BUILDING FROM WITHIN THE BUILDING, OR IS TO BE USED WITHIN THE BUILDING TO REMOVE DEBRIS OR MOVE MATERIAL, SUCH DEMOLITION OPERATION SHALL BE SUBJECT TO SPECIAL INSPECTION IN ACCORDANCE WITH THE PROVISIONS OF CHAPTER 17. THE SPECIAL INSPECTOR SHALL VISIT THE SITE A MINIMUM OF THREE TIMES: BEFORE DEMOLITION OPERATIONS START, DURING DEMOLITION, AND AT THE CONCLUSION OF DEMOLITION. [3306.6] CONTRACTOR IS RESPONSIBLE TO NOTIFY INSPECTORS ENGINEER 2 DAYS IN ADVANCE OF REQUIRED INSPECTIONS.

5. STEEL REINFORCED CONCRETE AND HEAVY TIMBER CONSTRUCTION SHALL BE DEMOLISHED COLUMN LENGTH–BY–COLUMN LENGTH AND TIER–BY–TIER. ANY STRUCTURAL MEMBER THAT IS BEING DISMEMBERED SHALL NOT SUPPORT ANY LOAD OTHER THAN ITS OWN WEIGHT AND SUCH MEMBER SHALL BE CHAINED OR LASHED IN PLACE TO PREVENT ANY UNCONTROLLED SWING OR DROP. STRUCTURAL MEMBERS SHALL NOT BE THROWN OR DROPPED FROM THE BUILDING BUT SHALL BE SLOWLY AND CAREFULLY LOWERED BY HOISTS EQUIPPED WITH ADEQUATE BRAKES AND NON–REVERSING SAFETY DEVICES. [3306.8]

6. SERVICE UTILITY CONNECTIONS SHALL BE DISCONTINUED AND CAPPED, AND CERTIFICATIONS TO THAT EFFECT ISSUED BY THE REPRESENTATIVE UTILITY COMPANY SHALL BE FILED WITH THE DEPARTMENT. [3306.9.1]

7. NO PARTY WALL BALCONY OR HORIZONTAL FIRE EXIT SHALL BE DEMOLISHED, REMOVED, OR OBSTRUCTED IN ANY MANNER THAT WOULD DESTROY THE FULL EFFECTIVENESS OF SUCH FIRE EXIT AS A MEANS OF EGRESS UNLESS A SUBSTITUTE MEANS OF EGRESS MEETING THE REQUIREMENTS OF CHAPTER 10 HAS BEEN PROVIDED. [3306.9.2]

8. DUST PRODUCING OPERATIONS SHALL BE WETTED DOWN TO THE EXTENT NECESSARY TO CONTROL THE DUST. [3306.9.3]

9. PROVISION SHALL BE MADE TO PREVENT THE ACCUMULATION OF WATER OR WATER DAMAGE TO ANY FOUNDATIONS ON THE PREMISES OR TO THE ADJOINING PROPERTY. [3306.9.4]

10. WHEN EXIST. SPRINKLER SYSTEMS WITH FIRE DEPARTMENT HOSE CONNECTIONS ARE PRESENT IN STRUCTURES UNDERGOING FULL OR PARTIAL DEMOLITION, SUCH SYSTEMS SHALL BE MAINTAINED AS A NON–AUTOMATIC SPRINKLER SYSTEM. WHEN DEMOLITION STARTS, THE SPRINKLER RISERS SHALL BE CAPPED IMMEDIATELY BELOW THE FLOOR DEMOLISHED SO AS TO MAINTAIN THE SPRINKLER SYSTEM ON ALL LOWER FLOORS FOR FIRE DEPARTMENT USE. FIRE DEPARTMENT HOSE CONNECTIONS SHALL BE KEPT FREE FROM OBSTRUCTION AND SHALL BE MARKED BY A METAL SIGN READING "SPRINKLER FIRE DEPARTMENT CONNECTION" AND BY A RED LIGHT AT NIGHT. [3307.4]

11. HAZARDS SHALL BE REMOVED IN ACCORDANCE WITH THE FOLLOWING REQUIREMENTS: [3306.9.8]
11.1. BEFORE COMMENCEMENT OF ACTUAL DEMOLITION, ALL GLASS IN WINDOWS, DOORS, SKYLIGHTS AND FIXTURES SHALL BE REMOVED.
11.2. IN ANY STRUCTURE MORE THAN 25 FEET HIGH (7620 MM), ANY WINDOW OR OTHER EXTERIOR WALL OPENING THAT IS WITHIN 20 FEET (6096 MM) OF A FLOOR OPENING USED FOR THE PASSAGE OF DEBRIS FROM FLOORS ABOVE SHALL BE SOLIDLY BOARDED UP OR OTHERWISE SUBSTANTIALLY COVERED, UNLESS SUCH WINDOW OR OPENING IS SO LOCATED AS TO PRECLUDE THE POSSIBILITY OF ANY PERSON BEING INJURED BY MATERIAL THAT MAY FALL FROM SUCH WINDOW OR OPENING.
11.3. BEFORE DEMOLITION IS STARTED, ALL FLOORS SHALL BE THOROUGHLY CLEANED OF COMBUSTIBLE MATERIALS AND DEBRIS. ALL FIXTURES AND EQUIPMENT THAT WOULD CAUSE VOIDS IN THE FILL SHALL BE REMOVED. IF THE VOIDS IS TO BE FILLED TO GRADE, THE FIRST FLOOR CONSTRUCTION SHALL BE REMOVED AND THE EXIST. CELLAR FLOOR SHALL BE BROKEN UP TO THE EXTENT NECESSARY TO PROVIDE GROUND DRAINAGE AND PREVENT ACCUMULATION OF WATER. IF THE CELLAR IS NOT TO BE FILLED, POSITIVE CELLAR DRAINAGE SHALL BE PROVIDED.
11.4. ALL ASBESTOS SHALL BE REMOVED AND CERTIFICATIONS TO THAT EFFECT SHALL BE FILED WITH THE DEPARTMENT AND THE DEPARTMENT OF ENVIRONMENTAL PROTECTION.

12. MANUAL DEMOLITION OF WALLS AND PARTITIONS SHALL COMPLY WITH THE FOLLOWING REQUIREMENTS: DEMOLITION OF WALLS AND PARTITIONS SHALL PROCEED IN A SYSTEMATIC MANNER, AND ALL WORK ABOVE EACH TIER OF FLOOR BEAMS SHALL BE COMPLETED BEFORE ANY OF THE SUPPORTING STRUCTURAL MEMBERS ARE DISTURBED.SECTIONS OF MASONRY WALLS SHALL NOT BE LOOSENED OR PERMITTED TO FALL IN SUCH MASSES AS TO AFFECT THE CARRYING CAPACITY OF FLOORS OR THE STABILITY OF STRUCTURAL SUPPORTS. NO WALL, CHIMNEY OR OTHER STRUCTURAL PART SHALL BE LEFT IN SUCH CONDITION THAT IT MAY COLLAPSE OR BE TOPPLED BY WIND, VIBRATION OR ANY OTHER CAUSE. NO SECTION OF WALL WITH A HEIGHT MORE THAN 22 TIMES ITS THICKNESS SHALL BE PERMITTED TO STAND WITHOUT BRACING DESIGNED BY A REGISTERED DESIGN PROFESSIONAL.WHERE BRICK OR MASONRY CHIMNEYS CANNOT BE SAFELY TOPPLED OR DROPPED, ALL MATERIALS SHALL BE DROPPED DOWN ON THE INSIDE OF SUCH CHIMNEYS.ALL ENCLOSED VERTICAL SHAFTS AND STAIRS SHALL BE MAINTAINED ENCLOSED AT ALL FLOORS EXCEPT THE UPPERMOST FLOOR BEING DEMOLISHED, AND ALL WORK ON THE UPPERMOST FLOOR SHALL BE COMPLETED BEFORE STAIR AND SHAFT ENCLOSURES ON THE FLOOR BELOW ARE DISTURBED. ALL HAND RAILS AND BANISTERS SHALL BE LEFT IN PLACE UNTIL ACTUAL DEMOLITION OF SUCH FLOOR IS IN PROGRESS.

13. DURING MANUAL DEMOLITION, NO BEARING PARTITION SHALL BE REMOVED FROM ANY FLOOR UNTIL THE FLOOR FRAMING SYSTEM ON THE FLOOR ABOVE HAS BEEN REMOVED AND LOWERED. ALL HEADER BEAMS AND HEADERS AT STAIR OPENINGS AND CHIMNEYS SHALL BE CAREFULLY EXAMINED, AND WHERE REQUIRED SHALL BE SHORED FROM THE CELLAR FLOOR THROUGH SUCCESSIVE FLOORS. ALL OPERATIONS SHALL BE CONTINUALLY INSPECTED AS THE WORK PROGRESSES TO DETECT ANY HAZARDS THAT MAY DEVELOP. [3306.9.10]

14. MATERIAL SHALL NOT BE STORED ON CATCH PLATFORMS, WORKING PLATFORMS, FLOORS, OR STAIRWAYS OF ANY STRUCTURE, EXCEPT THAT ANY ONE FLOOR OF A BUILDING TO BE DEMOLISHED MAY BE USED FOR THE TEMPORARY STORAGE OF MATERIAL WHEN SUCH FLOOR CAN BE EVALUATED BY AN ENGINEER AND PROVEN TO BE OF ADEQUATE STRENGTH TO SUPPORT ONE AND ONE–HALF TIMES THE LOAD TO BE SUPERIMPOSED. SUCH EVALUATION BY THE ENGINEER SHALL BE MAINTAINED BY THE PERMIT HOLDER AND MADE AVAILABLE TO THE DEPARTMENT UPON REQUEST. STORAGE SPACES SHALL NOT INTERFERE WITH ACCESS TO ANY STAIRWAY OR PASSAGEWAY, AND SUITABLE BARRICADES SHALL BE PROVIDED SO AS TO PREVENT MATERIAL FROM SLIDING OR REBOUNDING INTO ANY SPACE ACCESSIBLE TO THE PUBLIC. ALL MATERIAL SHALL BE SAFELY PILED IN SUCH STORAGE LOCATIONS IN A MANNER THAT WILL NOT OVERLOAD ANY PART OF THE STRUCTURE OR CREATE ANY HAZARD. [3306.9.11] BEFORE ANY MATERIAL IS STORED ON ANY FLOOR, THE EXIST. FLOORING ADJACENT TO BEARING WALLS, SHEAR WALLS, BEAMS AND COLUMNS SHALL BE REMOVED AND THE CONNECTIONS OF THE FLOOR FRAMING SYSTEM TO THE BEARING WALLS, SHEAR WALLS, BEAMS AND COLUMNS SHALL BE CAREFULLY EXAMINED BY A COMPETENT PERSON TO ASCERTAIN THEIR CONDITION AND ADEQUACY TO SUPPORT SUCH MATERIAL. IF THE CONNECTIONS ARE FOUND TO BE IN POOR CONDITION OR INADEQUATE TO SUPPORT THE STORED MATERIAL, NO MATERIAL SHALL BE DEPOSITED ON THE FLOOR UNTIL THESE CONNECTIONS ARE SHORED FROM THE CELLAR FLOOR THROUGH EACH SUCCESSIVE FLOOR OR OTHERWISE STRENGTHENED TO SAFELY SUPPORT SUCH MATERIAL. [3306.9.11.1]

15. IN BUILDINGS OF NONCOMBUSTIBLE CONSTRUCTION, FLOOR SLABS TO AN ELEVATION OF NOT MORE THAN 25 FEET (7620 MM) ABOVE THE LEGALLY ESTABLISHED CURB LEVEL MAY BE REMOVED TO PROVIDE TEMPORARY STORAGE OF DEBRIS, PROVIDED THAT: [3306.9.11.2]
15.1. THE STORED DEBRIS IS PILED WITH SUFFICIENT UNIFORMITY TO PREVENT LATERAL DISPLACEMENT OF INTERIOR WALLS OR COLUMNS AS DETERMINED BY A REGISTERED DESIGN PROFESSIONAL.
15.2. THE HEIGHT OF THE PILED MATERIAL WILL NOT BURST THE EXTERIOR WALLS DUE TO HORIZONTAL LOADING AS DETERMINED BY A REGISTERED DESIGN PROFESSIONAL.
15.3. THE OPERATION DOES NOT OTHERWISE ENDANGER THE STABILITY OF THE STRUCTURE.

16. DEBRIS STORED IN THE CELLAR SHALL NOT BE PILED ABOVE THE LEVEL OF THE ADJACENT EXTERIOR GRADE UNLESS THE CONTRACTOR PROVIDES SHEET–PILING, SHORING, BRACING, OR SUCH OTHER MEANS NECESSARY TO INSURE THE STABILITY OF THE WALLS AND TO PREVENT ANY WALL FROM COLLAPSING DUE TO HORIZONTAL LOADING CREATED BY THE DEBRIS AS DETERMINED BY A REGISTERED DESIGN PROFESSIONAL. [3306.9.11.3]. WHERE DEBRIS IS STORED AGAINST A PARTY WALL, SECTION 3306.9.11.4 SHALL ALSO APPLY.

17. DEBRIS, BRICKS, AND SIMILAR MATERIAL SHALL BE REMOVED THROUGH OPENINGS IN THE FLOORS OF THE STRUCTURE, OR BY MEANS OF CHUTES, BUCKETS, OR HOISTS THAT COMPLY WITH THE PROVISIONS OF THIS CHAPTER. OPENINGS IN A FLOOR SHALL NOT AGGREGATE MORE THAN 25 PERCENT OF THE AREA OF THAT FLOOR UNLESS IT CAN BE SHOWN BY SUBMISSION FROM A REGISTERED DESIGN PROFESSIONAL TO THE SATISFACTION OF THE COMMISSIONER THAT LARGER OPENINGS WILL NOT IMPAIR THE STABILITY OF THE STRUCTURE. EVERY OPENING IN A FLOOR USED FOR THE REMOVAL OF DEBRIS SHALL BE TIGHTLY ENCLOSED WITH A SHAFTWAY, EXTENDING FROM FLOOR TO FLOOR, EQUIVALENT TO THAT AFFORDED BY PLANKING NOT LESS THAN 2 INCHES (51 MM) IN THICKNESS, OR EQUIVALENT SOLID MATERIAL. FOR NONCOMBUSTIBLE MATERIAL, WIRE MESH MAY BE UTILIZED IN LIEU OF PLANKING PER THE CRITERIA SET FORTH IN SECTION 3306.9.12.1. A SHAFTWAY IS NOT REQUIRED ON THE WORKING DECK OR IN BUILDINGS NOT MORE THAN 6 STORIES IN HEIGHT. INSTEAD, SUCH OPENINGS SHALL BE SOLIDLY PLANKED OVER WHILE NOT IN USE BY PLANKING NOT LESS THAN 2 INCHES (51 MM) IN THICKNESS, OR EQUIVALENT SOLID MATERIAL, AND LAID CLOSE. PROTECTED BY A TIGHT TEMPORARY COVERING EQUIVALENT TO THAT AFFORDED BY PLANKS NOT LESS THAN 2 INCHES (51 MM) IN THICKNESS AND LAID CLOSE. WHEREVER SUCH COVERING HAS BEEN TEMPORARILY REMOVED TO PERMIT DEBRIS REMOVAL, FLOOR OPENINGS SHALL BE PROTECTED BY A GUARDRAIL SYSTEM THAT MEETS THE REQUIREMENTS OF SECTIONS 3307.1 THROUGH 3308.7.5. SUCH COVERING SHALL BE PROMPTLY REPLACED IN POSITION UPON THE CEASING OF SUCH WORK AT THE END OF EACH WORKDAY. IN BUILDINGS OVER 25 FEET HIGH, EVERY WINDOW OR OTHER EXTERIOR WALL OPENING THAT IS WITHIN 20 FEET OF A FLOOR OPENING USED FOR THE PASSAGE OF DEBRIS FROM LEVELS ABOVE SHALL BE SOLIDLY BOARDED UP OR OTHERWISE SUBSTANTIALLY COVERED, UNLESS IT IS SO LOCATED AS TO PRECLUDE THE POSSIBILITY OF ANY PERSON BEING INJURED BY MATERIAL THAT MAY FALL FROM SUCH OPENING. [3306.9.12]

18. A LICENSED EXTERMINATOR SHALL EFFECTIVELY TREAT THE PREMISES FOR RODENT EXTERMINATION AS PER THE REQUIREMENTS OF THE DEPARTMENT OF HEALTH AND MENTAL HYGIENE. [3306.9.13]

19. ALL WORK REQUIRED FOR STRUCTURAL STABILITY AND PERMANENT WATERPROOFING OF ADJACENT BUILDINGS MUST BE COMPLETED PRIOR TO

DEMOLITION SIGN–OFF. AT THE COMPLETION OF DEMOLITION OPERATIONS, UNLESS NEW CONSTRUCTION IS TO FOLLOW WITHIN A PERIOD OF THREE MONTHS, THE SITE SHALL BE GRADED, DRAINED, OR OTHERWISE PROTECTED AS PROVIDED IN SECTIONS 3303.13 THROUGH 3303.13.3. [3306.10]

20. ALL WORKERS, FOREMAN, MANAGERS AND PROJECT SUPERINTENDENTS WORKING ON THE SITE ARE REQUIRED TO HAVE SUCCESSFULLY COMPLETED A 10 HOUR COURSE IN CONSTRUCTION SAFETY APPROVED BY THE UNITED STATES DEPARTMENT OF LABOR OCCUPATIONAL HEALTH AND SAFETY ADMINISTRATION AS REQUIRED BY LOCAL LAW 41 OF 2008 .

21. WHEN REQUIRED, FENCES SHALL BE AT LEAST 8 FEET (2438 MM) HIGH, AND CONSTRUCTED OF WOOD OR OTHER SUITABLE MATERIAL. THEY SHALL BE BUILT SOLID FOR THEIR ENTIRE LENGTH, EXCEPT FOR OPENINGS WITH SOLID SLIDING OR IN SWINGING GATES AS ARE REQUIRED FOR THE PROPER PROSECUTION OF WORK, AND FOR VIEWING PANELS, WHICH SHALL BE BLOCKED WITH PLEXIGLASS OR EQUIVALENT NONFRANGIBLE MATERIAL. THE FENCE SHALL BE CONSTRUCTED ALONG THE INSIDE EDGE OF THE SIDEWALK, WALKWAY OR TEMPORARY WALKWAY. THE FENCE SHALL BE PAINTED PER NYCDOB REQUIREMENT AT THE TIME OF INSTALLATION. IF PERMISSION TO CLOSE THE SIDEWALK HAS BEEN OBTAINED FROM THE DEPARTMENT OF TRANSPORTATION, SUCH FENCE MAY BE ERECTED ALONG THE CURB OR OUTSIDE OF THE CURB TO SUCH EXTENT AS APPROVED BY THE DEPARTMENT OF TRANSPORTATION. THE FENCE SHALL BE RETURNED AT ITS END TO THE EXTENT NECESSARY TO EFFECTIVELY CLOSE OFF THE SITE. [3307.7]

22. NO PERSONNEL IS PERMITTED AT THE CELLAR/EXCAVATION AREA JUST AFTER GROUND FLOOR STRUCTURAL MEMBERS REMOVAL (JOISTS, FLOOR BEAMS).

23. CONTRACTOR SHALL COORDINATE WITH NYCDOT FOR PERMITS TO PLACE DUMPSTER / TRASH CONTAINERS ON THE TRAVEL LANES.

24. EXIST. STANDPIPE SYSTEMS IF ANY, IN STRUCTURES UNDERGOING DEMOLITION SHALL BE MAINTAINED AS DRY STANDPIPES. AT THE COMMENCEMENT OF DEMOLITION, THE STANDPIPE RISERS SHALL BE CAPPED ABOVE THE OUTLET ON THE FLOOR IMMEDIATELY BELOW THE FLOOR BEING DEMOLISHED SO AS TO MAINTAIN THE STANDPIPE SYSTEM ON ALL LOWER FLOORS FOR FIRE DEPARTMENT USE. STANDPIPE HOSE, NOZZLES AND SPANNERS ARE NOT REQUIRED TO BE MAINTAINED AND MAY BE REMOVED AT ANY TIME. FIRE DEPARTMENT HOSE CONNECTIONS SHALL BE KEPT FREE FROM OBSTRUCTION AND SHALL BE MARKED BY A METAL SIGN READING, "STANDPIPE FIRE DEPARTMENT CONNECTION" AND BY A RED LIGHT AT NIGHT. [3303.8]

25. 3303.7 FIRE PREVENTION AND FIRE PROTECTION. FIREFIGHTING EQUIPMENT, FIRE FIGHTING ACCESS AT THE CONSTRUCTION OR DEMOLITION SITE, AND THE CONDUCT OF ALL CONSTRUCTION OR DEMOLITION OPERATIONS AFFECTING FIRE PREVENTION AND FIRE FIGHTING SHALL COMPLY WITH THE NEW YORK CITY FIRE CODE AND THE PR.OVISIONS OF SECTIONS 3303.1.1 THROUGH 3303.1.5.
3303.7.1 WATER SUPPLY. A WATER SUPPLY FOR FIRE PROTECTION SHALL BE PROVIDED IN ACCORDANCE WITH THE NEW YORK CITY FIRE CODE.
3303.7.1.1LARGE FOOTPRINT CONSTRUCTION. FOR A BUILDING THAT HAS A FOOTPRINT OF 150,000 SQUARE FEET (30 480 M2; OR MORE, REGARDLESS OF THE HEIGHT OF THE BUILDING, AND THE BUILDING IS SUBSTANTIALLY ENCLOSED, PERMANENT OR TEMPORARY FIRE HYDRANTS AVAILABLE FOR FIRE DEPARTMENT USE SHALL BE PROVIDED DURING THE COURSE OF CONSTRUCTION: 1. WITHIN 50 FEET (15 240 MM) OF THE MAIN ENTRANCE; AND 2. ALONG THE PERIMETER OF THE BUILDING, WITH THE HYDRANTS LOCATED SO THAT THERE IS AT LEAST ONE 3303.7.2 FIRE EXTINGUISHERS. FIRE EXTINGUISHERS SHALL BE PROVIDED IN ACCORDANCE WITH THE NEW YORK CITY FIRE CODE.
3303.7.3 SMOKING. SMOKING SHALL BE PROHIBITED AT ALL CONSTRUCTION AND DEMOLITION SITES. NO SMOKING SIGNS SHALL BE POSTED AT THE SITE IN ACCORDANCE WITH THE PROVISIONS OF THE NEW YORK CITY FIRE CODE.
3303.7.4 SPRINKLER SYSTEMS. EXISTING SPRINKLER SYSTEMS IN BUILDINGS UNDERGOING AN ALTERATION OR DEMOLITION SHALL COMPLY WITH THE REQUIREMENTS OF SECTION 3303.1 .4.1 THROUGH 3303 .7 .4.3.
3303.7.4.L SPRINKLERS DURING ALTERATION. EXISTING SPRINKLER SYSTEMS IN BUILDINGS UNDERGOING AN ALTERATION SHALL BE MAINTAINED IN ACCORDANCE WITH SECTION 3303.9, EXCEPT AS PROVIDED IN SECTION 3303.7 .4.3. THE RED PAINT REQUIRED PURSUANT TO SECTION 903.6 OF THIS CODE SHALL BE MAINTAINED DURING ANY ALTERATION OPERATION. 3303.7.4.2 SPRINKLERS DURING DEMOLITION. WHEN EXISTING SPRINKLER SYSTEMS WITH FIRE DEPARTMENT HOSE CONNECTIONS ARE PRESENT IN BUILDINGS UNDERGOING FULL OR PARTIAL DEMOLITION, SUCH SYSTEMS SHALL BE MAINTAINED AS A NON AUTOMATIC SPRINKLER SYSTEM, EXCEPT AS PROVIDED IN SECTION 3303.7.4.3. WHEN DEMOLITION STARTS, THE SPRINKLER RISERS SHALL BE CAPPED IMMEDIATELY BELOW THE FLOOR BEING DEMOLISHED SO AS TO MAINTAIN THE SPRINKLER SYSTEM ON ALL LOWER FLOORS FOR FIRE DEPARTMENT USE. CUTTING AND CAPPING OF SPRINKLERS DURING DEMOLITION WORK SHALL BE PERFORMED ONLY BY A LICENSED MASTER PLUMBER OR LICENSED MASTER FIRE SUPPRESSION PIPING CONTRACTOR WHO HAS OBTAINED A PERMIT FOR SUCH WORK. FIRE DEPARTMENT HOSE CONNECTIONS SHALL BE KEPT FREE FROM OBSTRUCTION AND SHALL BE MARKED BY A METAL SIGN READING "SPRINKLER CONNECTION" AND BY A RED LIGHT AT NIGHT. THE RED PAINT REQUIRED PURSUANT TO SECTION 903.6 OF THIS CODE SHALL BE MAINTAINED DURING ANY DEMOLITION OPERATIONS. 3303.7.4.3 REMOVAL OF DAMAGED SPRINKLERS. REQUESTS FOR A VARIANCE FROM THE SPRINKLER REQUIREMENTS OF THIS SECTION SHALL BE LIMITED TO REQUESTS TO REMOVE A DAMAGED OR INOPERABLE SPRINKLER SYSTEM OR A PORTION OF SUCH SYSTEM IN CONNECTION WITH DEMOLITIONS OR GUT REHABILITATIONS. APPLICATIONS FOR CONSTRUCTION DOCUMENT APPROVALS FOR SUCH REQUESTS SHALL BE FILED WITH THE DEPARTMENT BY A REGISTERED DESIGN PROFESSIONAL IN ACCORDANCE WITH THE FOLLOWING PROCEDURE: 1. THE FILED APPLICATION SHALL INCLUDE A COMPLETE REPORT PREPARED BY THE PROFESSIONAL DESCRIBING THE EXTENT OF THE DAMAGE AND ATTESTING AS TO WHY THE SYSTEM CANNOT BE RESTORED; AND 2. THE VARIANCE SHALL NOT BE APPROVED BY THE DEPARTMENT WITHOUT THE CONCURRENCE OF THE FIRE DEPARTMENT AS FOLLOWS: 2.L.THE APPLICANT SHALL FILE THE REQUEST FOR VARIANCE WITH THE FIRE DEPARTMENT; 2.2. T\E FIRE DEPARTMENT SHALL REVIEW AND RECOMMEND ANY NECESSARY SAFETY MEASURES HYDRANT ALONG EVERY 250 FEET (76 200 MM) OF BUILDING PERIMETER, AND WITH NO HYDRANT MORE THAN 50 FEET (15 240 MM) FROM THE EXTERIOR WALL. REQUIRED AS A CONDITION OF GRANTING THE VARIANCE AND 2.3.THE APPLICANT SHALL SUBMIT THE FIRE DEPARTMENT'S RECOMMENDATION TO THE DEPARTMENT ALONG WITH PROOF OF SATISFACTORY IMPLEMENTATION OF SUCH SAFETY MEASURES.

26. 3306.5.1 REQUIRED DOCUMENTS. SUBMITTAL DOCUMENTS SHALL BE APPROVED BY THE DEPARTMENT BEFORE DEMOLITION WORK BEGINS. SUCH SUBMITTAL DOCUMENTS SHALL BE SIGNED, SEALED, AND SUBMITTED BY A REGISTERED DESIGN PROFESSIONAL AND SHALL CONTAIN, AT A MINIMUM, THE FOLLOWING: 1. PLANS, SECTIONS, AND DETAILS OF THE BUILDING OR PORTION THEREOF, TO BE DEMOLISHED CLEARLY SHOWING THE EXTENT AND SEQUENCE OF THE DEMOLITION; 2. BRACING AND SHORING NECESSARY TO SUPPORT ALL DEMOLITION OPERATIONS, AND ADJOINING GROUND OR STRUCTURES AS NEEDED, THROUGH ALL SEQUENCES OF THE DEMOLITION; 3. WHERE MECHANICAL DEMOLITION EQUIPMENT, OTHER THAN HANDHELD DEVICES, IS TO BE USED, A LISTING AND DESCRIPTION OF ALL SUCH PROPOSED EQUIPMENT TO BE USED IN THE DEMOLITION, INCLUDING THE SCOPE OF EQUIPMENT WORK AND POSITIONING OF EQUIPMENT ON THE EXISTING STRUCTURE. THE DESCRIPTION OF THE EQUIPMENT SHALL INCLUDE CALCULATIONS SHOWING THE ADEQUACY OF THE EXISTING STRUCTURE TO SUPPORT LOADS IMPOSED BY SUCH EQUIPMENT. IF MORE THAN ONE PIECE OF DEMOLITION EQUIPMENT IS PROPOSED TO BE USED AT THE SAME TIME, THE EFFECT OF THE SIMULTANEOUS LOADS IMPOSED ON THE EXISTING STRUCTURE SHALL BE DESCRIBED AND INVESTIGATED; AND 4. A DESCRIPTION OF COMPLIANCE OF SECTION 3306.9 OF THIS CODE.
EXCEPTION: FOR A PARTIAL DEMOLITION USING MECHANICAL DEMOLITION EQUIPMENT, THE BRACING AND SHORING DETAILS REQUIRED BY ITEM 2 ABOVE MAY BE INCLUDED ON SIGNED AND SEALED SHOP DRAWINGS TO BE KEPT ON SITE, SEPARATE AND APART FROM THE SUBMITTAL DOCUMENTS, PROVIDED THE ALLOWANCE FOR SHOP DRAWINGS IS DESIGNATED ON THE SUBMITTAL DOCUMENTS.

NOTE:–

1. CONTRACTOR TO NOTIFY ADJACENT PROPERTIES 10 DAYS ADVANCE NOTIFICATION, PRIOR TO START OF DEMO.
2. CONTRACTOR TO ADVANCE NOTIFICATION 24 TO 48 HOUR BEFORE STARTING DEMO, BY CALLING BEST AT 212 393 2550
3. ACCORDING TO MY PHYSICAL INSPECTIONS DATED IN 05–04–2016 IT'S OUR STRUCTURAL OPINION THAT THE STRUCTURE BEING DEMOLISHED IS NOT A WEAKENED STRUCTURE.
4. CONTRACTOR/OWNER MUST OBTAIN CONSENT OF ADJACENT PROPERTY OWNERS BEFORE INSTALLING OVERHEAD PROTECTION, FENCE OR ROOF PROTECTION OVER THEIR BUILDING/LOTS.
5. THERE IS A SPRINKLER SYSTEM IN THIS BUILDING AND IT'S FILED TO BE REMOVER UNDER FDNY.
6. CONTRACTOR TO PROVIDE HYDRANT USE PERMIT OR WATER TRUCK FOR DUST CONTROL DURING THE DEMOLITION.

NYC BUILDING CODE COMPLIANCE NOTES FOR FULL DEMOLITION:

GENERAL NOTES PROVIDED HEREIN ARE INTENDED TO SUPPLEMENT THE NOTES AND OR SPECIFICATIONS PROVIDED ELSEWHERE IN THESE CONTRACT DOCUMENTS AND ANY CODES, RULES, REGULATIONS, AND OR LAWS PROMULGATED BY APPLICABLE GOVERNING JURISDICTIONS. CONTRACTORS ARE MADE FULLY AWARE THAT THIS GENERAL NOTES SHEET IS PART OF THE ENTIRE CONTRACT DOCUMENTS AND SHALL NOT BE OMITTED IN ANY PARTIAL TRANSMISSIONS OF THE CONTRACT DOCUMENTS. CONTRACTOR SHALL BE RESPONSIBLE TO ENSURE ANY PARTIAL TRANSMISSION OR RECEIPT OF THE CONTRACT DOCUMENTS INCLUDES THIS GENERAL NOTES SHEET.

BOHLER ENGINEERING, PLLC IS NOT RESPONSIBLE OR RETAINED BY ANY PARTY FOR JOB SITE SAFETY OR CONSTRUCTION SUPERVISION, NOR IS THE ENGINEER OF RECORD FOR SAME. CONTRACTOR SHALL PERFORM ALL ITS ACTIVITIES IN A SYSTEMATIC AND SAFE MANNER IN ACCORDANCE WITH OSHA REQUIREMENTS, AND ANY CODES, RULES, REGULATIONS, AND OR LAWS OF THE APPLICABLE GOVERNING JURISDICTIONS TO ENSURE THE PROTECTION AND SAFETY OF THE PUBLIC AND THE JOB SITE.

DO NOT SCALE PLANS. COPYING, PRINTING, SOFTWARE AND OTHER PROCESSES REQUIRED TO PREPARE THE DESIGN PLANS CAN STRETCH OR SHRINK THE ACTUAL PAPER THEREFORE AFFECTING THE LAYOUT. THEREFORE, SCALING OF THE DESIGN PLANS MAY RESULT IN INACCURACIES. CONTACT THE ENGINEER OF RECORD WITH ANY NEED FOR ADDITIONAL DIMENSIONS OR CLARIFICATIONS.

THE ENGINEER OF RECORD SHALL NOT SUPERVISE, DIRECT OR HAVE CONTROL OVER THE CONTRACTOR'S WORK NOR HAVE ANY RESPONSIBILITY FOR THE CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES OR PROCEDURES SELECTED NEITHER BY THE CONTRACTOR NOR FOR THE CONTRACTOR'S SAFETY PRECAUTIONS OR PROGRAMS IN CONNECTION WITH THE WORK. THESE RIGHTS AND RESPONSIBILITIES ARE SOLELY THOSE OF THE CONTRACTOR IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.

THE ENGINEER OF RECORD SHALL NOT BE RESPONSIBLE FOR ANY ACTS OR OMISSIONS OF THE CONTRACTOR, SUBCONTRACTOR, AND ANY ENTITY PERFORMING ANY PORTIONS OF THE WORK, OR ANY AGENTS OR EMPLOYEES OF ANY OF THEM. THE ENGINEER OF RECORD DOES NOT GUARANTEE THE PERFORMANCE OF THE CONTRACTOR AND SHALL NOT BE RESPONSIBLE FOR THE CONTRACTOR'S FAILURE TO PERFORM ITS WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS OR ANY APPLICABLE LAWS, CODES, RULES OR REGULATIONS.

PRIOR TO STARTING ANY CONSTRUCTION RELATED ACTIVITIES, THE CONTRACTOR SHALL ENSURE THAT ANY AND ALL PERMITS AND APPROVALS HAVE BEEN OBTAINED, AND/OR WILL OBTAIN THOSE THAT ARE TO BE OBTAINED DURING CONSTRUCTION, BY AND OR FROM THE APPROPRIATE GOVERNING JURISDICTIONS' LEGAL REQUIREMENTS. CONTRACTOR WILL ALSO RENEW ANY SUCH PERMITS. THE CONTRACTOR ASSUMES ALL RISK ASSOCIATED WITH THE COMMENCEMENT OF CONSTRUCTION WITHOUT SATISFYING ALL OF THE LEGAL REQUIREMENTS.

CONTRACTOR SHALL BE LIABLE FOR ANY COSTS, DAMAGES, LOSSES AND EXPENSES ARISING OUT OF THE VIOLATION OF ANY SUCH LEGAL REQUIREMENTS BY THE CONTRACTOR, ANY SUBCONTRACTORS OR ANYONE FOR WHOM THE CONTRACTOR IS RESPONSIBLE. THE CONTRACTOR SHALL INDEMNIFY, DEFEND AND SAVE HARMLESS THE OWNER AND BOHLER ENGINEERING, PLLC FROM AND AGAINST ANY SUCH COSTS, DAMAGES, LOSSES AND EXPENSES, INCLUDING REASONABLE ATTORNEY FEES AND DISBURSEMENTS, ATTRIBUTABLE TO ANY SUCH VIOLATION OR NONCOMPLIANCE BY CONTRACTOR OR ANY SUBCONTRACTOR, AS WELL AS ANY DELAY IN THE COMPLETION OF THE WORK. NO CONSTRUCTION RELATED ACTIVITIES SHOULD COMMENCE UNTIL THE CONTRACTOR HAS THOROUGHLY REVIEWED THE ENTIRE CONTRACT DOCUMENTS AND THOROUGHLY REVIEWED THE APPROVALS AND PERMITS OBTAINED FROM THE APPROPRIATE GOVERNING JURISDICTIONS. CONTRACTOR SHALL MAINTAIN ALL SUCH PERMITS AND APPROVALS AT THE JOB SITE AT ALL TIMES AND MAKE SAME AVAILABLE UPON REQUEST.

PRIOR TO THE COMMENCEMENT OF CONSTRUCTION, CONTRACTOR MUST INSPECT THE SITE, SATISFY ITSELF AS TO THE CONDITION OF THE SITE INCLUDING, BUT NOT LIMITED TO, ALL STRUCTURAL, SURFACE AND SUBSURFACE CONDITIONS, FAMILIARIZE ITSELF WITH THE SITE AND THE LOCAL CONDITIONS UNDER WHICH THE WORK IS TO BE PERFORMED, AND CORRELATE ITS OBSERVATIONS WITH THE REQUIREMENTS OF THE CONTRACT DOCUMENTS. CONTRACTOR IS AWARE THAT THE CONTRACT DOCUMENTS FOR THIS PROJECT INCLUDE VARIOUS RESOURCES, WHICH MAY BE IN A FORMAT OTHER THAN DRAWING DOCUMENTS. SUCH RESOURCES MAY INCLUDE, BUT ARE NOT LIMITED TO, SOIL MECHANICS STUDIES; ENVIRONMENTALLY RELATED INVESTIGATIONS, STUDIES, MAPPING, RECOMMENDATIONS; LAND SURVEYS; TITLE REPORTS; ARCHITECTURAL DOCUMENTS INCLUDING STRUCTURAL, MECHANICAL, ELECTRICAL AND PLUMBING; TESTING REPORTS; ET AL. CONTRACTOR SHALL FAMILIARIZE HIMSELF WITH ALL SUCH ITEMS PRIOR TO COMMENCEMENT OF CONSTRUCTION RELATED ACTIVITIES. ANY REQUIRED CLARIFICATION BY THE CONTRACTOR SHALL BE IN WRITING TO THE OWNER AND BOHLER ENGINEERING, PLLC PRIOR TO COMMENCING CONSTRUCTION RELATED ACTIVITIES.

WHEN WORK IS INDICATED ON THE DRAWINGS BUT IS NOT CALLED FOR IN THE OTHER CONTRACT DOCUMENTS, OR IS CALLED FOR IN THE OTHER CONTRACT DOCUMENTS BUT IS NOT INDICATED ON THE DRAWINGS, AND THE NATURE OF THE WORK IS SUCH THAT IT SHOULD BE PERFORMED BY WORKERS EMPLOYED BY THIS CONTRACTOR, OR IF STANDARD BUILDING PRACTICES IN THE LOCALE OF THE PROJECT WOULD REQUIRE SUCH WORK TO BE PERFORMED BY THIS CONTRACTOR, THEN SUCH WORK SHALL BE DEEMED A PART OF THE WORK COVERED BY THIS CONTRACT AND SHALL BE PERFORMED BY THIS CONTRACTOR WITHOUT ADDITIONAL COMPENSATION.

ALL CONSTRUCTION RELATED ACTIVITIES SHALL BE PERFORMED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS AS WELL AS IN ACCORDANCE WITH ALL THE REQUIREMENTS OF THE APPROPRIATE GOVERNING JURISDICTIONS. THE CONTRACTOR SHALL PROMPTLY REPORT TO THE OWNER AND BOHLER ENGINEERING, PLLC ANY ERROR, OMISSION, INCONSISTENCY, CONFLICT, AMBIGUITY OR SIMILAR DEFECT THAT MAY BE APPARENT FROM CONTRACTOR'S REVIEW OF THE CONSTRUCTION DOCUMENTS, THE CONTRACT DOCUMENTS, AND/OR EXISTING CONDITIONS AT THE PROJECT SITE. CONTRACTOR SHALL IMMEDIATELY UPON DISCOVERY BRING SUCH ERROR, OMISSION, INCONSISTENCY, CONFLICT, AMBIGUITY OR SIMILAR DEFECT TO THE ATTENTION OF THE OWNER AND BOHLER ENGINEERING, PLLC FOR RESOLUTION. IT IS EXPRESSLY UNDERSTOOD AND AGREED THAT OWNER, IN CONSULTATION WITH BOHLER ENGINEERING, PLLC AND THE ARCHITECT, SHALL BE THE INTERPRETER OF THE CONTRACT DOCUMENTS AND SHALL RESOLVE ANY SUCH CONFLICTS AND AMBIGUITIES. IN THE EVENT THERE IS ANY SUCH ERROR, OMISSION, INCONSISTENCY, CONFLICT, AMBIGUITY OR SIMILAR DEFECT, THEN THE MORE STRINGENT PROVISION SHALL APPLY. IN ADDITION, IN THE EVENT THERE IS ANY SUCH ERROR, OMISSION, INCONSISTENCY, CONFLICT, AMBIGUITY OR SIMILAR DEFECT, WHICH RESULT IN A CHOICE BETWEEN DIFFERENT MEANS AND METHODS TO PERFORM THE WORK AFTER THE RESOLUTION OF THE CONFLICT OR AMBIGUITY, CONTRACTOR SHALL BE RESPONSIBLE TO PERFORM THE WORK WITHOUT ADDITIONAL COMPENSATION FOR USING THE COSTLIER MEANS AND METHODS. IF CONTRACTOR PERFORMS ANY SUCH WORK BEFORE THE OWNER AND BOHLER ENGINEERING, PLLC HAVE HAD A REASONABLE TIME TO RESPOND, THE CONTRACTOR SHALL SOLELY BEAR THE RISK OF PERFORMING SUCH WORK CONTRARY TO THE RESOLUTION THEREOF BY OWNER.
THE CONTRACTOR SHALL BE FAMILIAR WITH AND SHALL BE RESPONSIBLE FOR THE PROCUREMENT AND SCHEDULING OF ANY AND ALL CERTIFICATIONS, TESTING, INSPECTIONS, ETC., INCLUDING THOSE THAT SHALL BE PERFORMED BY THIRD PARTIES, REQUIRED BY THE APPROPRIATE GOVERNING JURISDICTIONS DURING THE COURSE OF CONSTRUCTION OR FOR THE PURPOSES OF PROCURING SIGNOFFS, CERTIFICATE OF COMPLETIONS OR CERTIFICATE OF OCCUPANCY. IF THE CONTRACT DOCUMENTS OR ANY LAWS, RULES, ORDINANCES OR REGULATIONS OF ANY FEDERAL, STATE OR LOCAL GOVERNMENTAL AUTHORITIES HAVING JURISDICTION OVER THE WORK REQUIRE THAT ANY WORK BE INSPECTED OR TESTED, CONTRACTOR SHALL GIVE SUCH GOVERNING ENTITIES TIMELY NOTICE OF READINESS OF THE WORK FOR INSPECTION OR TESTING, COORDINATE AND FIX THE DATE FOR SUCH INSPECTION OR TESTING BY SUCH JURISDICTIONAL ENTITIES AND PROCURE THE NECESSARY MEANS TO HAVE SUCH INSPECTION OR TESTING PERFORMED TO THE SATISFACTION OF THE GOVERNING JURISDICTIONAL ENTITIES.

THE CONTRACTOR IS RESPONSIBLE FOR COORDINATION OF THE CIVIL DESIGN DOCUMENTS AND THE ARCHITECTURAL DOCUMENTS FOR REFERENCE TO EXACT BUILDING UTILITY CONNECTION LOCATIONS, GREASE TRAP REQUIREMENTS AND DETAILS, ENTRY AND EXIT LOCATIONS, FINISHED FLOOR ELEVATIONS AND EXTERIOR GRADING, ETC. THE UTILITY SERVICE SIZES SHALL BE DETERMINED BY THE ARCHITECT.

ALL CONCRETE SHALL HAVE THE MINIMUM COMPRESSIVE STRENGTH AT TWENTY–EIGHT (28) DAYS UNLESS OTHERWISE INDICATED IN THE CONSTRUCTION DOCUMENTS. UNSUITABLE MATERIALS, CONSTRUCTION DEBRIS, EXCESS SOIL, ETC., SHALL BE PROPERLY REMOVED AND DISPOSED OF OFF–SITE IN ACCORDANCE WITH ALL CODES, ORDINANCES, AND LAWS OF THE APPLICABLE GOVERNING JURISDICTIONS. ALL FILL, COMPACTION AND BACKFILL MATERIALS AND PLACEMENT METHODS REQUIRED FOR THE CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE RECOMMENDATIONS PROVIDED IN THE SOIL MECHANICS STUDIES. THE CONTRACTOR SHALL PLACE ASPHALT WITH SUITABLE GRADES TO PREVENT PONDING.

THE CONTRACTOR SHALL BE RESPONSIBLE TO USE APPROPRIATE DUST CONTROL AND EROSION CONTROL MEASURES IN ACCORDANCE WITH FEDERAL, STATE AND OR LOCAL STANDARDS, RULES, REGULATIONS OF THE APPROPRIATE GOVERNING JURISDICTIONS. AFTER CONSTRUCTION IS COMPLETE, ADJACENT STRUCTURES AND AREAS SHALL BE CLEANED OF ALL DUST AND DEBRIS CAUSED BY THE CONSTRUCTION OPERATIONS. THE CONTRACTOR IS RESPONSIBLE FOR RETURNING ALL ADJACENT AREAS TO THEIR PRE–CONSTRUCTION CONDITIONS.

THE CONTRACTOR SHALL SAFEGUARD THE PROJECT SITE IN ACCORDANCE WITH THE GOVERNING JURISDICTIONAL CODES AS NECESSARY TO PERFORM THE CONSTRUCTION IN SUCH A MANNER AS TO PREVENT ENTRY BY UNAUTHORIZED PERSONS AT ANY AND ALL TIMES.

THE CONTRACTOR SHALL NOT USE AREAS OUTSIDE THE PROPERTY LINE AND OR WORK LIMITS WITHOUT WRITTEN PERMISSION FROM THE OWNER AND OR THE APPROPRIATE GOVERNING JURISDICTIONS, WHICH MAY BE IN THE FORM OF PERMITS.

DURING ALL CONSTRUCTION RELATED OPERATIONS, THE CONTRACTOR SHALL PROTECT AND MAINTAIN THE OPERATION, IN A MANNER SATISFACTORY TO OWNER, OF ALL ACTIVE SYSTEMS THAT ARE NOT TO BE REMOVED.

PROPOSED WATER SERVICE CUTOFFS, REMOVALS, AND ABANDONMENTS REQUIREMENT SHALL BE IN ACCORDANCE WITH THE LOCAL UTILITY COMPANIES' REQUIREMENTS. CONTRACTOR SHALL INCLUDE ALL FEES AND APPURTENANCES REQUIRED BY THE LOCAL UTILITY COMPANIES TO PROVIDE THE OWNER WITH A COMPLETE WORKING WATER SERVICE. ALL TOPOGRAPHY SHOWN IN THESE CONSTRUCTION DOCUMENTS DEPICT THE EXISTING CONDITIONS AT THE TIME OF THE CONTRACT DOCUMENTS' PREPARATION. CONTRACTOR SHALL OBSERVE THE CONDITIONS OF THE PROJECT PRIOR TO COMMENCING CONSTRUCTION RELATED ACTIVITIES AND NOTIFY THE OWNER AND THE ENGINEER OF RECORD IN WRITING IF ANY DEVIATIONS FROM THE CONSTRUCTION DOCUMENTS ARE OBSERVED.

CONTRACTOR MUST CARRY STATUTORY WORKERS' COMPENSATION INSURANCE, EMPLOYERS LIABILITY INSURANCE AND APPROPRIATE LIMITS OF COMMERCIAL GENERAL LIABILITY INSURANCE (CGL). CONTRACTOR MUST HAVE THEIR CGL POLICY ENDORSED NAMING BOHLER ENGINEERING, PLLC AND ITS AFFILIATES AS ADDITIONAL INSURED AND TO PROVIDE CONTRACTUAL LIABILITY COVERAGE SUFFICIENT TO ENSURE THE HOLD HARMLESS AND INDEMNITY OBLIGATIONS ASSUMED BY THE CONTRACTOR. THE CONTRACT SHALL FURNISH CERTIFICATES TO BOHLER ENGINEERING, PLLC AS EVIDENCE OF THE REQUIRED INSURANCE PRIOR TO COMMENCING WORK AND WITHIN THIRTY (30) DAYS UPON RENEWAL OF EACH POLICY DURING THE ENTIRE PERIOD OF CONSTRUCTION. CONTRACTOR MUST HAVE ITS INSURANCES IN FULL FORCE THROUGHOUT THE CONSTRUCTION. IN ADDITION, THE CONTRACTOR WILL, TO THE FULLEST EXTENT PERMITTED BY LAW, INDEMNIFY AND HOLD HARMLESS BOHLER ENGINEERING, PLLC AND ITS AFFILIATES FROM AND AGAINST ANY DAMAGES, LIABILITIES OR COSTS, INCLUDING REASONABLE ATTORNEY FEES AND DEFENSE COSTS, ARISING OUT OF OR IN ANY WAY CONNECTED WITH THE PROJECT, INCLUDING ALL CLAIMS BY EMPLOYEES OF THE CONTRACTOR.

UNLESS OTHERWISE AGREED TO IN WRITING SIGNED BY AN OFFICER OF BOHLER ENGINEERING, PLLC, UNDER NO CIRCUMSTANCE IS ANY PERSON A THIRD PARTY BENEFICIARY OF THE AGREEMENT BETWEEN BOHLER ENGINEERING, PLLC AND THE OWNER.

ACCESSIBILITY NOTE

ALL ACCESSIBLE PARKING STALLS, SIDEWALKS, RAMPS AND ALL OTHER ACCESS PROVISIONS TO, INTO AND FROM BUILDINGS AND TO AND FROM PARKING AREAS AND PUBLIC WAYS SHALL BE CONSTRUCTED IN SUBSTANTIAL COMPLIANCE WITH ADA REQUIREMENTS. THE OWNER AND THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADA COMPLIANCE WITH ANY PROPOSED SIDEWALK CONSTRUCTION AND OTHER SITE WORK ELEMENTS (WHETHER ON OR OFF SITE). IT IS THE OWNER'S RESPONSIBILITY TO MAINTAIN CONTINUED ADA COMPLIANCE AT THE PROJECT SITE REGARDING ACCESS, PARKING AND DIMENSIONAL REQUIREMENTS.

GENERAL DEMOLITION NOTES:

1. THESE PLANS ADDRESS THE MEANS AND METHODS (AS DIRECTED BY THE DEMOLITION CONTRACTOR) FOR STRUCTURAL DEMOLITION OF THE ONE STORY MASONRY BUILDING AT 1654 BUSHWICK AVENUE, BROOKLYN, NY. THE PLANS DO NOT COVER ANY OTHER REQUIREMENTS SUCH AS ASBESTOS REMOVAL, UTILITY CUT OFFS, ETC.. REFER TO SITE REMOVALS PLAN FOR LOCATIONS OF EXISTING UTILITIES.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COMPLYING WITH ALL PERTINENT REGULATIONS GOVERNING DEMOLITION IN NEW YORK CITY, INCLUDING NYC 2014 BC CHAPTER 33 AND OSHA.
3. THE PUBLIC AND ADJOINING PROPERTIES SHALL BE PROTECTED AT ALL TIMES BY SOLID FENCING AS PER NYC 2014 BC 3306 AND 3307.
4. THIS BUILDING WILL BE DEMOLISHED FROM ROOF TO FLOOR LEVEL OF FIRST FLOOR BY MEANS OF MECHANICAL AND HAND DEMOLITION.
5. ALL DEBRIS SHALL BE LOADED OUT USING A 40 CY ROLL OFF CONTAINER AND DUMP TRUCKS. THE DEBRIS CAN BE SORTED WITHIN THE SUBJECT LOT ONCE THE BUILDING IS DEMOLISHED. MASONRY, TIMBER, STEEL AND MISCELLANEOUS DEBRIS SHALL BE HAULED OFF SITE.
6. DUST CONTROL WILL BE ACHIEVED BY WATER SPRAYING. WATER WILL BE PROVIDED BY THE GENERAL CONTRACTOR.
7. ALL NECESSARY PERMITS FROM NYCDOT, NYCDOB, FDNY JURISDICTION WILL BE OBTAINED BY GC PRIOR TO DEMOLITION.
8. THERE IS NO EXISTING SPRINKLER SYSTEM. THERE ARE NO FIRE DEPARTMENT CONNECTIONS AT THIS LOCATION.
9. THE EXISTING BUILDING IS STRUCTURALLY SOUND AT THE TIME OF FIELD VISIT BY BOHLER ENGINEERING AND IS SAFE FOR THE DEMOLITION WORK TO THE BEST OF OUR KNOWLEDGE AND PROFESSIONAL JUDGEMENT

CONSULTANTS:

MJE&D
MJ ENGINEERING & DESIGN
3 BATTISTA CT
SAYREVILLE NJ 08872
PHONE : (201) 365–8065
EMAIL : YOUSSEFPE@GMAIL.COM

NO.	DATE	REVISION	BY

DESIGNER: M.Y.
DRAWN BY: F.I.
CHECKED BY: MY.
SCALE: AS NOTED
DATE: 03/26/2019

PROJECT: FULL DEMOLISION
LOT 1, BLOCK 3084

ADDRESS: 74 BOGART STREET BOROUGH
OF BROOKLYN KINGS COUNTY
CITY & STATE OF NEW YORK

DRAWING TITLE: GENERAL NOTES

MAGDY YOUSSEF
089378

DRAWING NO.: DM-002-00

SHEET NO.:

TRANSIT AUTHORITY GENERAL NOTES:

1. THE NYC TRANSIT (NYCTA) RESERVES THE RIGHT TO PLACE INSPECTORS, FLAGMEN OR OTHER PERSONNEL IN THE SUBWAY STRUCTURES DURING CONSTRUCTION OF THE PROJECT LINKED BY A TELEPHONE SYSTEM, IF DEEMED NECESSARY, TO OBSERVE THE EFFECTS OF THE CONSTRUCTION ON THE TRANSIT FACILITIES. IT IS EXPECTED THAT SUCH PERSONNEL WILL BE NECESSARY WHEN THE CONSTRUCTION COMES WITHIN TWENTY-FIVE FEET OF THE SUBWAY STRUCTURE. HOWEVER, NYCT FURTHER RESERVES THE RIGHT TO PLACE SUCH PERSONNEL WHENEVER, IN ITS OPINION, THE PROJECT CONDITIONS WARRANT SUCH PLACEMENT, REGARDLESS OF DISTANCE. THE COST OF SUCH PERSONNEL, TELEPHONE INSTALLATION AND ANY RE-ROUTES, DIVERSIONS OF SERVICE, WORK TRAINS, ETC., MADE NECESSARY BY THE PROJECT, MUST BE BORNE BY THE PROJECT OR THE RESPONSIBLE NEW YORK CITY/STATE AGENCY.

2. ALL ROCK EXCAVATION ADJACENT TO THE TRANSIT STRUCTURE IS TO BE CANNEL DRILLED TWO FEET BELOW SUBGRADE.

3. IF TOP OF ROCK IS FOUND BELOW SUBWAY STRUCTURE, THE SUBWAY STRUCTURE MUST BE UNDERPINNED IN ACCORDANCE WITH DRAWINGS TO BE SUBMITTED TO NYCT FOR APPROVAL.

4. IF ROCK IS SOFT OR SEAMY, LATERAL SUPPORTS MUST BE PROVIDED BELOW THE SUBWAY STRUCTURE IN ACCORDANCE WITH DRAWINGS TO BE SUBMITTED TO NYCT FOR APPROVAL.

5. BLASTING WILL BE PERMITTED ONLY WITH LIGHT CHARGES SUBJECT TO THE APPROVAL OF NYCT'S ENGINEER AND IN ACCORDANCE WITH THE REGULATIONS OF THE FIRE DEPARTMENT. THE CONTRACTOR SHALL PROVIDE A DETAILED MONITORING PLAN, PROVIDING FOR MEASUREMENTS OF BOTH PARTICLE VELOCITY AND DISPLACEMENTS AT CRITICAL LOCATIONS OF THE NYCT STRUCTURE. THE MONITORING PLAN SHALL INCLUDE THRESHOLD AND UPSET LEVELS OF BOTH PARTICLE VELOCITY AND SETTLEMENT TOGETHER WITH AN ACTION PLAN FOR THEIR IMPLEMENTATION. THE CONTRACTOR SHALL SECURE AN APPROVED SEISMOLOGIST TO INSTALL AND OPERATE SUITABLE VELOCITY GAUGES TO CONTINUOUSLY MONITOR PARTICLE VELOCITY AND AN INDEPENDENT LICENSED SURVEYOR TO MONITOR DISPLACEMENTS. THE THRESHOLD MAXIMUM PARTICLE VELOCITY ABOVE AMBIENT CAUSED BY THE BLASTING WILL BE 0.5 INCHES PER SECOND. VALUES EXCEEDING THIS LEVEL WILL BE REVIEWED AND EVALUATED BY NYCT'S ENGINEER. IN NO CASE WILL PARTICLE VELOCITIES EXCEED THE UPSET LEVEL OF 2.0 INCHED PER SECOND.

6. BEFORE PLACING CONCRETE, THE SUBGRADE OF THE FOUNDATIONS IN THE VICINITY OF THE SUBWAY STRUCTURE IS TO BE INSPECTED AND APPROVED BY NYCT'S ENGINEER.

7. IF ANY PORTION OF THE SUBWAY STRUCTURE OR FINISH IS DAMAGED, IT SHALL BE REPAIRED OR REPLACED WITH THE SAME MATERIALS IN PLACE, SUBJECT TO THE APPROVAL OF NYCT'S ENGINEER AND AT THE EXPENSE OF THE PROJECT.

8. EXCAVATION EMBARKMENTS ARE TO BE SHORED AND BRACED. DRAWINGS INDICATING A SUGGESTED METHOD OF CONSTRUCTION ARE TO BE SUBMITTED TO NYCT FOR APPROVAL IN CONJUNCTION WITH THE PROJECTS CONTRACT DRAWINGS. IN CASE OF EXCAVATION UNDERMINING THE SUBWAY STRUCTURE, UNDERPINNING MAY BE REQUIRED. DRAWINGS FOR UNDERPINNING ARE TO BE SUBMITTED TO NYCT FOR APPROVAL.

9. TEMPORARY SHORING MAY BE PLACED IN DIRECT CONTACT WITH NYCT STRUCTURES ONLY IF THE NYCT STRUCTURE IS SHOWN TO BE ABLE TO SUPPORT ALL ANTICIPATED LOADS THAT CAN BE TRANSFERRED THROUGH THE TEMPORARY STRUCTURES WITHOUT DAMAGING THE EXISTING STRUCTURE. AT THE COMPLETION OF THE PROJECT, THESE TEMPORARY SHORING AND BRACING SYSTEMS ARE TO BE REMOVED OR CUT OFF AS APPROVED BY NYCT.

10. WHEN PILES ARE TO BE DRIVEN ADJACENT TO THE SUBWAY STRUCTURE, BORING DATA, PILE LAYOUTS, SPECIFICATIONS AND INSTALLATION PROCEDURES ARE TO BE SUBMITTED TO NYCT FOR APPROVAL. VELOCITY METERS ARE TO BE INSTALLED IN THE SUBWAY TUNNEL AT CRITICAL LOCATIONS TO MONITOR INDUCED VIBRATIONS. INDUCED DISPLACEMENTS ALONG THE TUNNEL STRUCTURE AND TRACK INVERT ARE TO BE MONITORED DURING DRIVING. THE THRESHOLD MAXIMUM PARTICLE VELOCITY ABOVE AMBIENT CAUSED BY THE DRIVING WILL BE 0.5 INCHES PER SECOND. VALUES EXCEEDING THIS LEVEL WILL BE REVIEWED AND EVALUATED BY NYCT'S ENGINEER. IN NO CASE WILL PARTICLE VELOCITIES EXCEED THE UPSET LEVEL OF 2.0 INCHES PER SECOND.

11. NO PILES ARE PERMITTED TO BE INSTALLED NY ANY METHOD WITHIN THREE FEET OF SUBWAY STRUCTURE, MEASURED FROM THE EDGE OF THE PILE OF CASING TO THE WALL. CLOSED-END PILES WILL NOT BE PERMITTED TO BE DRIVEN WITHIN TEN FEET OF THE SUBWAY STRUCTURE.

12. ALL PILES ARE TO BE PLACED WITHIN A PREAUGERED CASE HOLE TO THE INFLUENCE LINE. THE CASING SHALL BE CLEANED WITHOUT DISTURBING THE SOIL OUTSIDE THE CASING AND THE PILE TO BE PLACED WITHIN THE CASING FOR INSTALLATION. THE PILES MAY THEN BE DRIVEN BEYOND THE INFLUENCE LINE WITHOUT THE CASING.

13. THE INFLUENCE LINE SHALL START AT THE BOTTOM OF THE SUBWAY STRUCTURE AND EXTEND AT A 1 ON 1 SLOPE. FOR PILES INSTALLED WITHIN TEN FEET OF THE SUBWAY STRUCTURE, THE CASING SHALL BE EXTENDED UP TO THE BOTTOM OF THE SUBWAY STRUCTURE.

14. ALL PILES ARE TO BE DRIVEN A MINIMUM OF TEN FEET BELOW THE INTERSECTION OF THE PILE CENTERLINE AND THE INFLUENCE LINE OF THE SUBWAY STRUCTURE.

15. THE USE OF "DOWN-THE-HOLE-HAMMERS" FOR INSTALLATION OF PILES THROUGH OVERBURDEN AND FILL WILL BE PERMITTED ONLY TO REMOVE BOULDERS. IT WILL NOT BE PERMITTED AS A MATTER OF COURSE TO ADVANCE THE HOLE. THEIR USE TO CONSTRUCT ROCK SOCKETS WILL NOT BE ALLOWED WITHIN 5 FEET OF THE NYCT STRUCTURE.

16. VIBRATORY HAMMERS WILL NOT BE PERMITTED WITHIN 75 FEET OF SUBWAY STRUCTURES. HOERAMS WILL NOT BE PERMITTED WITHIN 25 FEET OF SUBWAY STRUCTURES.

17. DYNAMICS COMPACTION METHODS USING DROPPED HEAVY WEIGHTS CANNOT BE CONDUCTED WITHIN 1000 FEET OF ANY NYCT STRUCTURES UNLESS IT IS SHOWN THAT INDUCED SETTLEMENTS AND VIBRATIONS WILL NOT DAMAGE THESE STRUCTURES. A SUITABLE MONITORING PLAN INCLUDING SETTLEMENT AND VIBRATION MEASUREMENTS MUST BE APPROVED BY NYCT'S ENGINEER FOR ALL SUCH OPERATIONS WITHIN THESE DISTANCES.

18. THERE SHALL BE NO MACHINE EXCAVATION WITHIN 3 FEET OF NYCT STRUCTURES, POWER DUCT LINES, OR ANY OTHER FACILITIES UNTIL THEY HAVE BEEN CAREFULLY EXPOSED BY HAND EXCAVATION.

19. ALL DEWATERING OPERATIONS CONDUCTED WITHIN 500 FEET OF THE NYCT STRUCTURE MUST BE PERFORMED IN ACCORDANCE WITH DRAWINGS AND PROCEDURES SUBMITTED TO NYCT FOR APPROVAL. THE DISTANCE FROM THE STRUCTURE TO THE DEWATERING OPERATION CAN BE REDUCED PROVIDED THAT SOIL CONDITIONS AT THE SITE INDICATE THAT THE RADIUS OF INFLUENCE OF THE DEWATERING IS LESS THEN 500 FEET. FOR DEWATERING WITHIN THE RADIUS OF INFLUENCE, THE DEWATERING PROGRAM MUST BE SHOWN TO HAVE NEGLIGENCE INFLUENCE ON SETTLEMENTS OF THE NYCT STRUCTURE.

20. SUBWAY ENTRANCES (VENTILATORS, ETC) ARE TO BE UNDERPINNED OR SHORED AND BRACED IF DIRECTED BY NYCT'S ENGINEER.

21. NYCT, AT ITS DISCRETION, RESERVES THE RIGHT TO REQUIRE THE PROJECT TO CLOSE OR MAINTAIN AND PROTECT EXISTING SUBWAY ENTRANCES, VENTILATORS, ETC. ADJACENT TO THE PROJECT DURING CONSTRUCTION. SUCH CONSTRUCTION MAY INCLUDE UNDERPINNING, SHORING, BRACING AND ERECTION OF SUITABLE BARRICADES AND/OR CANOPIES AND SHIELDS. SUCH PROTECTION SHALL BE IN ACCORDANCE WITH DRAWINGS SUBMITTED TO NYCT FOR APPROVAL.

22. IF SHIELDS ARE TO BE INSTALLED TO PROTECT NYCT FACILITIES AND/OR THE PUBLIC, PLANS SHOWING THE LOCATION, TYPE AND METHOD OF ATTACHMENT TO THE TRANSIT STRUCTURE MUST BE SUBMITTED TO NYCT FOR APPROVAL.

23. ALL LUMBER AND PLYWOOD USED FOR PROTECTION OF SUBWAY FACILITIES MUST BE FIRE RETARDANT.

24. SUBWAY EMERGENCY EXISTS MUST BE KEPT CLEAR AT ALL TIMES.

25. IN EXCAVATING OVER OR NEAR THE SUBWAY ROOF, SPECIAL CARE SHALL BE EXERCISED SO THAT THE THIN CONCRETE PROTECTION OF THE SUBWAY WATERPROOFING IS NOT DAMAGED.

26. BURNING OF, WELDING TO OR DRILLING THROUGH EXISTING STEEL STRUCTURE WILL NOT BE PERMITTED EXCEPT AS SHOWN ON DRAWINGS APPROVED BY THE NYCT.

27. HORIZONTAL AND VERTICAL CONTROL SURVEY DATA OF THE EXISTING NYCT STRUCTURE IS TO BE TAKEN BY A LICENSED LAND SURVEYOR TO MONITOR ANY MOVEMENTS THAT OCCUR DURING CONSTRUCTION AND TO SHOW THAT THE INDUCED MOVEMENTS ARE WITHIN ALLOWABLES NOTED BELOW. IF ANY MOVEMENTS EXCEED ALLOWABLES, REMEDIATION AS APPROVED BY NYCT SHALL BE PERFORMED.

STRUCTURE	NOTIFY TO NYCT ENGINEER	STOP WORK
ELEVATED	1/8" INCH	1/4" INCH
SUBWAY	1/4" INCH	1/2" INCH

28. BUS ROUTES AFFECTED BY THE PROJECT WILL OR MAY REQUIRE BUS DIVERSIONS. THESE ARRANGEMENTS SHALL BE MADE THROUGH:

MS. SARAH WYSS
ACTING DIRECTOR, OPERATIONS PLANNING
NEW YORK CITY TRANSIT
2 BROADWAY, ROOM A 17.82
NEW YORK, NY 10004
TELEPHONE NUMBER 646/252-5517

WHEN IMPACTING ANY BUS STOP, SPECIAL OPERATIONS MUST BE NOTIFIED TWO WEEKS IN ADVANCE.

29. DUCT LINES MUST BE MAINTAINED AND PROTECTED DURING CONSTRUCTION. ANY INTERFERENCE WITH DUCT LINES SHOULD BE REPORTED TO NYCT INSPECTOR. WHEN A DUCT LINE CONTAINING CABLES IS TO BE REMOVED, OR WHEN MASONRY ADJACENT THERE TO IS TO BE REMOVED, PENETRATED, OR DRILLED, THE WORK SHALL BE DONE WITH HAND LABOR ENTIRELY, USING HAMMER AND CHISEL. JACKHAMMERS, BULL POINTS OR OTHER POWER EQUIPMENT SHALL NOT BE USED.

30. WHERE MANHOLES ARE ENCOUNTERED:
   A)THEY SHALL BE PROTECTED AND RAIDED OR LOWERED AS REQUIRED, TO MATCH THE NEW STREET GRADE.
   B) IF MANHOLE COVERS ARE RAISED OR LOWERED, PROTECT CABLES IN MANHOLE BY WOOD SHEETING OF 2" NOMINAL THICKNESS.
   C) PRIOR TO THE START OF CONSTRUCTION OPERATIONS AFFECTING MANHOLES AND DUCT LINES, SEVEN DAYS NOTICE MUST BE GIVEN TO MR. JOHN MALVASIO, P.E. MANAGER, DEPARTMENT OF MAINTENANCE OF WAY, AT 718-694-1358.

31. CONSTRUCTION WORK DONE NEAR VENT GRATINGS AND HATCHES SHALL BE AS FOLLOWS:
   A)UNLESS APPROVED BY THE NYCT'S ENGINEER, ALL VENT GRATINGS AND HATCHES SHOULD REMAIN OUTSIDE THE CONSTRUCTION SITE, SEPARATED BY A CONSTRUCTION FENCE. PROTECTIVE SHIELDS MUST BE PROVIDED OVER VENT GRATINGS AS REQUIRED BY NYCT'S ENGINEER.
   B) NO BUILDING MATERIAL, VEHICLES OR CONSTRUCTION EQUIPMENT IS TO BE STORED OR RUN OVER VENT, GRATINGS, HATCHES OR EMERGENCY EXITS.
   C) DETAILS OF SIDEWALK RECONSTRUCTION AROUND VENT GRATINGS, HATCHES AND EMERGENCY EXITS ARE TO BE SUBMITTED TO NYCT FOR APPROVAL.

32. TRACTORS, CRANES, EXCAVATORS, ETC. USED IN THE VICINITY OF THE ELEVATED STRUCTURES SHALL BE ISOLATED FROM THE GROUND. SINCE THE ELEVATED STRUCTURE IS USED AS A NEGATIVE RETURN PATH, WITH A CONSEQUENT POTENTIAL BETWEEN IT AND THE GROUND, ANY CONTACT BETWEEN THE STRUCTURE AND GROUNDED EQUIPMENT COULD RESULT IN BURNING OF THE STEEL.

33. TEMPORARY CONSTRUCTION SHEDS, BARRICADES OR PLYWOOD PARTITIONS MUST BE A MINIMUM OF 5'-0' FROM EDGE OF FINISHED PLATFORM.

34. STATION AREAS OR STAIRWAY/ENTRANCE CLOSINGS: THE GENERAL REQUIREMENTS FOR STAIRWAY/ENTRANCE CLOSINGS ARE AS FOLLOWS:
   A)ONLY ONE STAIRWAY AT EACH STATION WILL BE PERMITTED TO BE CLOSED AT THE SAME TIME. APPROVALS FOR CLOSING ANY STAIRWAY MUST BE OBTAINED FROM THE DIVISION OF STATION OPERATIONS AT LEAST THREE WEEKS IN ADVANCE.
   B) MR. ASHOK PATEL, DIRECTOR, OFFICE OF STATION PROGRAMS; TELEPHONE 718-694-1695 OF THE DIVISION OF STATIONS MUST BE NOTIFIED ONE WEEK PRIOR TO THE ACTUAL CLOSING AND REOPENING OF THE ENTRANCE.
   C) AMPLE SIGNAGE MUST BE SUPPLIED AND POSTED AT LEAST ONE WEEK IN ADVANCE, ADVISING THE PUBLIC OF THE PROPOSED SUBWAY STAIR CLOSING.
   D) THE STREET ENTRANCE STAIRWAY SHOULD NOT BE CLOSED UNLESS MANPOWER AND MATERIALS ARE AVAILABLE TO COMMERCE WORK ON DATES PERMITTED.
   E) ONCE THE CLOSING IS EFFECTED, CONSTRUCTION SIGNS MUST BE PLACED AT APPROPRIATE LOCATIONS ON THE BARRICADES AT THE STREET AND MEZZANINE LEVELS, STATING THE CONTRACTOR'S NAME, 24 HOUR EMERGENCY TELEPHONE NUMBER, CONTRACT NUMBER, THE DURATION OF THE CLOSING, DIRECTION TO AN ALTERNATE ENTRANCE/EXIT, AND AN APOLOGY FOR THE INCONVENIENCE TO OUR CUSTOMERS.
   F) EXISTING STATION SIGNAGE. MUST BE ADJUSTED TO REFLECT ANY CHANGES IN ACCESS/EGRESS.
   G) BARRICADES ARE TO BE PAINTED AND KEPT GRAFFITI FREE AT ALL TIMES. THE CONTRACTOR MUST MAINTAIN THE BARRICADED AREA CLEAN OF ALL DEBRIS.
   H) ALL MATERIALS ARE TO BE PROPERLY STORED AND SECURED AWAY FROM PASSENGER TRAFFIC.
   I) THE CONTRACTOR MUST REMOVE ALL WASTE MATERIAL AND BARRICADES FROM ALL STATION AREAS WHEN CONSTRUCTION IS COMPLETED.
   J) INSPECTION OF THE AREA UNDER CONSTRUCTION BY AUTHORIZED STATION DEPARTMENT EMPLOYEES SHALL NOT BE INHIBITED.
   K) IF STREETLIGHTS ON THE SIDEWALK ARE AFFECTED, TEMPORARY LIGHT SHALL BE PROVIDED.

35. IF NEW CONCRETE CONSTRUCTION IS JOINED TO EXISTING CONCRETE, DOWELS AND KEYWAYS ARE TO BE USED IN ACCORDANCE WITH NYCT STANDARDS.

36. IF THE PROJECT INVOLVES CONSTRUCTION OR ALTERATION OF A SUBWAY FACILITY ON PRIVATE PROPERTY, THE PROPERTY OWNERS WILL BE REQUIRED TO ENTER INTO AN AGREEMENT WITH NYCT PERTAINING TO ALL WORK AFFECTING THE TRANSIT FACILITIES AND CLEARLY DEFINING LIMITS AND RESPONSIBILITIES FOR MAINTENANCE AND LIABILITY.

37. WHEREVER A NEW SIDEWALK IS BEING PLACED ADJACENT TO NYCT STRUCTURES THE FOLLOWING WILL BE REQUIRED:

   A)THE TOP OF THE NEW SIDEWALK SHALL BE FLUSHED WITH THE SUBWAY VENT GRATINGS, HATCHES AND EMERGENCY EXISTS.
   B) THE SLOPE OF THE NEW SIDEWALK SHALL BE SUCH THAT THE DRAINAGE BE AWAY FROM THESE STRUCTURES.
   C) A ½" PRE-MOLDED FILLER SHALL BE INSTALLED BETWEEN THE NEW SIDEWALK AND NYCT STRUCTURE.
   D) WHERE SIDEWALK ELEVATIONS ARE BEING CHANGED DETAILS OF PROPOSED WORK AROUND NYCT STRUCTURES ARE TO BE SUBMITTED FOR APPROVAL.

38. BEFORE ENTERING NYCT PROPERTY, CONTRACTOR OR SUBCONTRACTOR'S PERSONNEL SHALL HAVE ATTENDED NYCT TRACK SAFETY TRAINING AND EXPECT TO FOLLOW NYCT RULES AND REGULATIONS AS PER TRAINING AND ENGINEER INSTRUCTIONS.

39. BEFORE THE START OF ANY WORK, THE CONTRACTOR SHALL MAKE AN EXAMINATION, IN THE PRESENCE OF NYCT'S ENGINEER OF THE INTERIOR AND EXTERIOR OF NYCT SUBWAY OR OTHER STRUCTURE ADJACENT TO THE PROPOSED WORK. THE PERSON OR PERSONS AUTHORIZED BY THE CONTRACTOR TO MAKE THESE EXAMINATIONS SHALL BE APPROVED BY THE ENGINEER. THE CONTRACTOR SHALL TAKE ALL PHOTOGRAPHS AS MAY BE NECESSARY OR ORDERED TO INDICATE THE EXISTING CONDITION OF NYCT STRUCTURE. ONE COPY OF EACH PHOTOGRAPH, EIGHT INCHES BY TEN INCHES IN SIZE, AND THE NEGATIVES IS TO BE SUBMITTED TO MR.JOHN MALVASIO, P.E., MANAGER, DEPARTMENT OF MAINTENANCE-OF-WAY, 130 LIVINGSTON ST, ROOM 8044D, BROOKLYN, NEW YORK 11201, TELEPHONE 718 694-1358 BEFORE THE START OF CONSTRUCTION.

40. ALL ARCHITECTURAL DETAILS (TOKEN BOOTHS, RAILINGS, DOORS, ETC.) ARE TO CONFORM TO THE LATEST NYCT STANDARDS. THESE STANDARDS ARE AVAILABLE AT NYCT.

41. STANDARD NYCT INSURANCE CLAUSES ARE TO BE MADE PART OF THE PROJECTS CONTRACT DRAWINGS. PROOF THAT THE NECESSARY INSURANCE IS IN EFFECT WILL BE REQUIRED BEFORE WORK CAN COMMENCE.

42. AT THE CLOSE OF ANY PROJECT INVOLVING CONSTRUCTION OR ALTERATIONS TO TRANSIT FACILITIES, ONE SET OF VELLUMS OR MYLARS, FIVE SETS OF 35MM MICROFILM, AND ELECTRONIC COPIES COMPLYING TO MICROSTATION.DGN FORMAT OF "APPROVED AS-BUILTS" MUST BE PROVIDED TO NYCT FOR ITS RECORDS. FOR DETAILS OF SPECIFIC REQUIREMENTS CONTACT NYCT OUTSIDE PROJECTS.

43. AT LEAST SEVEN WORKING DAYS PRIOR TO THE START OF CONSTRUCTION OPERATIONS, NOTIFICATION MUST BE GIVEN TO MR. JOHN MALVASIO, P.E., ASSISTANT CHIEF ENGINEERING OFFICER, MAINTENANCE-OF-WAY, AT 718-694-1358. THE CONTRACTOR TO PROVIDE TEMPORARY QUARTERS NEAR THE JOB SITE FOR NYCT INSPECTORS CONTAINING A DESK AND TELEPHONE

EXCAVATION NOTES:

1. THE PERIMETER OF THE GENERAL EXCAVATION SHALL BE RETAINED BY A SOIL RETENTION SYSTEM(WHERE APPLICABLE). THE INSTALLATION, MAINTENANCE AND REMOVAL (WHERE REQUIRED) SHALL BE THE COMPLETE AND SOLE RESPONSABILITY OF THE CONTRACTOR. THE CONTRACTOR SHALL PROVIDE ALL MEASURES AND PRECAUTIONS NECESSARY TO PREVENT DAMAGE AND MINIMIZE SETTLEMENT OF EXISTING OR NEW CONSTRUCTION INSIDE AND OUTSIDE THE PROJECT LIMITS. ANY DAMAGE TO NEW OR EXISTING CONSTRUCTION INSIDE OR OUTSIDE OF THE PROJECT LIMITS, CAUSED BY CONSTRUCTION TECHNIQUES OR MOVEMENTS OF THE SOIL RETENTION SYSTEM. IS THE RESPONSIBILITY OF THE CONTRACTOR. THE DESIGN OF THE SOIL RETENTION SYSTEM WILL BE PROVIDED BY THE OWNER. THE CONTRACTOR WILL ASSIST THE OWNER IN THE APPROVAL PROCESS FOR THE RETENTION SYSTEM IF SO REQUIRED. THE CONTRACTOR SHALL PROVIDE ALL CONTROLLED INSPECTIONS REQUIRED BY THE STATE BUILDING CODE RELATING TO THE RETENTION SYSTEM.

2. THE CONTRACTOR SHALL COORDINATE ALL ELEMENTS OF THE SOIL RETENTION SYSTEM WITH ALL ELEMENTS OF THE PERMANENT BUILDING.

3. PRIOR TO ANY EXCAVATION OR INSTALLATION OF ELEMENTS OF THE SOIL RETENTION SYSTEM, THE CONTRACTOR SHALL ESTABLISH SURVEY POINTS AROUND THE PERIMETER OF THE AREA TO BE EXCAVATED AND OTHER POINTS UP TO 200 FEET BEYOND THE PERIMETER. THESE POINTS SHALL BE SURVEYED FOR VERTICAL AND HORIZONTAL MOVEMENT AT FREQUENT INTERVALS DURING ACTUAL EXCAVATION AND CONTINUING DURING EACH SUBSEQUENT PHASE OF THE WORK AND SUBMITTED TO THE ARCHITECT FOR INFORMATION.

4. ALL EXCAVATION SHALL BE BASED ON ENGINEERED DRAWINGS PREPARED BY THE CONTRACTOR INCLUDING PLANS AND SECTIONS OF EXCAVATION SEQUENCES. THE EXCAVATION SEQUENCES SHALL BE CONTROLLED TO MATCH THE REQUIREMENTS OF THE DESIGN OF THE SOIL RETENTION SYSTEM AND TO PERMIT MONITORING OF WALL AND GROUND MOVEMENTS.

5. THE GENERAL EXCAVATION ACROSS THE SITE SHALL NOT EXTEND DEEPER THAN THE SLAB-ON-GRADE SUBGRADE ELEVATION. THE EXCAVATIONS FOR FOOTINGS, GRADE BEAMS, PILE CAPS, MATS, PITS, SLABS, ETC. SHALL BE EXCAVATED ON AN INDIVIDUAL, LOCALIZED BASIS DOWN FROM THE SLAB-ON-GRADE SUBGRADE LEVEL.

6. ALL EXCAVATION BELOW THE SLAB LEVEL REQUIRED FOR PITS SHALL BE RETAINED BY LOCALIZED SOIL RETENTION SYSTEMS AS MAY BE NECESSARY BASED ON A DESIGN USING APPROPRIATED EARTH AND HYDRAULIC PRESSURES AND OTHER CONSTRUCTION LOADINGS.

7. THE CONTRACTOR SHALL PROVIDE POSITIVE PROTECTION (MAT/SHEET COVERINGS) FOR ALL EXCAVATION SLOPES TO PROTECT SLOPES FROM INSTABILITY AND DETERIORATION DUE TO RAIN, WND OR SNOW/ICE.

8. THE CONTRACTOR SHALL PROVIDE SURFACE DRAINAGE CHANNELS AND SUMPS AND SUMP PUMPS TO PROTECT ALL EXCAVATIONS FROM FLOODING. FLOODING OF ANY EXCAVATION AFTER APPROVAL OF THE SUBGRADE WILL BE CAUSE FOR COMPLETE REPREPARTION AND APPROVAL OF THE SUBGRADE.

9. PROVIDE A DRAINAGE PANEL AGAINST THE OUTSIDE FACE OF THE FOUNDATION WALL AT LOCATIONS INDICATED ON THE ARCHITECTURAL DRAWINGS.

10. THE OWNER'S SOIL TESTING LABORATORY SHALL REVIEW AND MONITOR THE EXCAVATION, DEWATERING AND SOIL RETENTION SYSTEMS. THE CONTRACTOR SHALL PROVIDE, INSTALL AND SURVEY: (A) VERTICAL AND HORIZONTAL MOVEMENTS OF THE TOP OF THE SOIL RETENTION SYSTEM: AND (B) BENCH MARKS ADJACENT TO AND AWAY FROM THE SITE PERIMETER FOR VERTICAL AND HORIZONTAL MOVEMENTS.

11. SEE PLUMBING AND ELECTRICAL DRAWINGS FOR UNDERFLOOR UTILITY AND GROUNDING REQUIREMENTS.

NYCT "NOT FOR BENEFIT" INSURANCE REQUIREMENTS

△1

SECTION A: INSURANCE REQUIREMENTS

THE PERMITTEE AT ITS SOLE COST AND EXPENSE SHALL CARRY AND MAINTAIN POLICIES OF INSURANCE AT ALL TIMES DURING THE PERIOD OF PERFORMANCE UNDER THIS AGREEMENT AS HEREIN SET FORTH BELOW:

1 **WORKERS' COMPENSATION:** INCLUDING EMPLOYER'S LIABILITY INSURANCE WITH LIMITS OF LIABILITY NOT LESS THAN $2,000,000 WHICH MAY BE MET BY A COMBINATION OF PRIMARY AND EXCESS INSURANCE MEETING THE STATUTORY LIMITS OF NEW YORK STATE.

2. **COMMERCIAL GENERAL LIABILITY**: (ISO 2001 FORM OR EQUIVALENT) APPROVED BY PERMITTOR IN THE PERMITTEE'S NAME WITH LIMITS OF LIABILITY IN THE AMOUNT OF NOT LESS THAN $3,000,000 FOR EACH OCCURRENCE ON A COMBINED SINGLE LIMIT BASIS FOR INJURIES TO PERSONS (INCLUDING DEATH) AND DAMAGE TO PROPERTY, $3,000,000 GENERAL AGGREGATE AND $3,000,000 IN THE AGGREGATE WITH RESPECT TO PRODUCTS/COMPLETED OPERATIONS. THE LIMITS MAY BE PROVIDED IN THE FORM OF A PRIMARY POLICY OR COMBINATION OF PRIMARY AND UMBRELLA/EXCESS POLICY. WHEN THE MINIMUM CONTRACT AMOUNTS CAN ONLY BE MET WHEN APPLYING THE UMBRELLA/EXCESS POLICY, THE UMBRELLA/EXCESS POLICY MUST FOLLOW FORM OF THE UNDERLYING POLICY AND BE EXTENDED TO "DROP DOWN" TO BECOME PRIMARY IN THE EVENT PRIMARY LIMITS ARE REDUCED OR AGGREGATE LIMITS ARE EXHAUSTED. SUCH INSURANCE SHALL BE PRIMARY AND NON-CONTRIBUTORY TO ANY OTHER VALID AND COLLECTIBLE INSURANCE AND MUST BE EXHAUSTED BEFORE IMPLICATING ANY PERMITTOR/MTA POLICY AVAILABLE.

SUCH POLICY SHOULD BE WRITTEN ON AN OCCURRENCE FORM, AND SHALL INCLUDE THE FOLLOWING COVERAGES:

- ADDITIONAL INSURED ENDORSEMENT (I.S.O. FORM CG 20 26 07/04) VERSION OR EQUIVALENT APPROVED BY THE PERMITTOR, SHALL NAME THE INDEMNITEES AS REFERENCED UNDER SECTION B OF THIS AGREEMENT AS ADDITIONAL INSUREDS.
- CONTRACTUAL LIABILITY ASSUMED BY THE PERMITTEE UNDER THIS AGREEMENT;
- PERSONAL AND ADVERTISING INJURY;
- PRODUCTS-COMPLETED OPERATIONS;
- INDEPENDENT CONTRACTORS;
- "XCU" (EXPLOSION, COLLAPSE, AND UNDERGROUND HAZARDS) WHERE NECESSARY;
- CONTRACTUAL LIABILITY EXCLUSION, APPLICABLE TO CONSTRUCTION OR DEMOLITION OPERATIONS TO BE PERFORMED WITHIN 50 FEET OF RAILROAD TRACKS, MUST BE REMOVED, WHERE NECESSARY;

3. **BUSINESS AUTOMOBILE LIABILITY:** (ISO FORM CA 00 01 10 01 OR EQUIVALENT) APPROVED BY THE PERMITTOR IS REQUIRED IF PERMITTEE'S VEHICLE ENTERS PERMITTOR'S PROPERTY. THE INSURANCE MUST BE IN THE NAME OF THE PERMITTEE OR ITS CONTRACTOR ENTERING THE PERMITTOR PROPERTY WITH LIMITS OF LIABILITY IN THE AMOUNT OF NOT LESS THAN $2,000,000 EACH ACCIDENT FOR CLAIMS FOR BODILY INJURIES (INCLUDING DEATH) TO PERSONS AND FOR DAMAGE TO PROPERTY ARISING OUT OF THE OWNERSHIP, MAINTENANCE OR USE OF ANY OWNED, HIRED OR NON-OWNED MOTOR VEHICLE.

4. **RAILROAD PROTECTIVE LIABILITY**: (ISO-RIMA OR EQUIVALENT FORM) APPROVED BY PERMITTOR COVERING THE WORK TO BE PERFORMED AT THE DESIGNATED JOB SITE AND AFFORDING PROTECTION FOR DAMAGES ARISING OUT OF BODILY INJURY OR DEATH, PHYSICAL DAMAGE TO OR DESTRUCTION OF PROPERTY, INCLUDING DAMAGE TO THE INSURED'S OWN PROPERTY AND CONFORMING TO THE FOLLOWING:

- THE POLICY SHALL BE ISSUED TO THE "NAMED INSUREDS" LISTED UNDER SECTION B.
- THE LIMIT OF LIABILITY SHALL BE NOT LESS THAN $2,000,000 PER OCCURRENCE, SUBJECT TO A $6,000,000 ANNUAL AGGREGATE;
- POLICY MUST BE ENDORSED TO PROVIDE COVERAGE FOR CLAIMS ARISING FROM INJURY TO EMPLOYEES COVERED BY FEDERAL EMPLOYER'S LIABILITY ACT (FELA).
- INDICATE THE NAME AND ADDRESS OF THE DESIGNATED CONTRACTOR, PROJECT LOCATION AND DESCRIPTION OF WORK, AND PERMIT NUMBER IF APPLICABLE.

EVIDENCE OF RAILROAD PROTECTIVE LIABILITY INSURANCE, MUST BE PROVIDED IN THE FORM OF A POLICY. A DETAILED **INSURANCE BINDER (ACORD OR MANUSCRIPT FORM)** WILL BE ACCEPTED PENDING ISSUANCE OF THE POLICY, WHICH MUST BE PROVIDED WITHIN 30 DAYS FROM THE EFFECTIVE DATE

5. **ENVIRONMENTAL INSURANCE:** IN THE EVENT ENVIRONMENTAL OR POLLUTION EXPOSURES EXIST, THE PERMITTEE SHALL REQUIRE THE ENVIRONMENTAL CONTRACTOR OR SUB-CONTRACTOR TO PROVIDE THE APPLICABLE INSURANCE COVERING SUCH EXPOSURE. THE LIMITS AND TYPES OF INSURANCE PROVIDED MUST BE SATISFACTORY TO THE PERMITTOR AND APPROVED PRIOR TO THE START OF THE WORK.

SECTION B: INDEMNITEES (ADDITIONAL INSUREDS / NAMED INSUREDS)

NEW YORK CITY TRANSIT AUTHORITY ("NYCT"), THE MANHATTAN AND BRONX SURFACE TRANSIT OPERATING AUTHORITY ("MABSTOA"), THE STATEN ISLAND RAPID TRANSIT OPERATING AUTHORITY ("SIRTOA"), THE METROPOLITAN TRANSPORTATION AUTHORITY ("MTA") INCLUDING ITS SUBSIDIARIES AND AFFILIATES, MTA CAPITAL CONSTRUCTION ("MTACC"), MTA BUS COMPANY ("MTA BUS"), AND THE CITY OF NEW YORK ("CITY" AS OWNER) AND THE RESPECTIVE AFFILIATES AND SUBSIDIARIES EXISTING CURRENTLY OR IN THE FUTURE OF AND SUCCESSORS TO EACH INDEMNIFIED PARTIES LISTED HEREIN.

SECTION C: GENERAL INSURANCE REQUIREMENTS

1. **INSURANCE COMPANIES:** ALL OF THE INSURANCE REQUIRED BY THIS ARTICLE SHALL BE WITH COMPANIES LICENSED OR AUTHORIZED TO DO BUSINESS IN THE STATE OF NEW YORK WITH AN A.M. BEST COMPANY RATING OF NOT LESS THAN A-/VII OR BETTER AND REASONABLY APPROVED BY THE PERMITTOR/MTA.

2. **FORMS:** ALL FORMS SHALL COMPLY WITH THE INSURANCE SERVICES OFFICE, INC. ("ISO") OR ITS EQUIVALENT APPROVED BY THE INSURANCE DEPARTMENT OF THE STATE OF NEW YORK

3. **POLICY DEDUCTIBLE / SELF INSURED RETENTION**: INSURANCE MAY CONTAIN A DEDUCTIBLE AND OR SELF-INSURED RETENTION AND SHALL NOT EXCEED $100,000. THE PERMITTEE SHALL BE RESPONSIBLE FOR ALL CLAIM EXPENSES AND LOSS PAYMENTS WITHIN THE DEDUCTIBLE OR SELF-INSURED RETENTION.

4. **POLICY TERMS:** THESE POLICIES MUST: (I) BE WRITTEN IN ACCORDANCE WITH THE REQUIREMENTS OF THE PARAGRAPHS ABOVE, AS APPLICABLE; (II) BE ENDORSED IN FORM ACCEPTABLE TO INCLUDE A PROVISION THAT SHOULD THE POLICY BE CANCELED, MATERIALLY CHANGED, OR NOT RENEWED, NOTICE SHALL BE DELIVERED IN ACCORDANCE WITH THE INSURANCE POLICY PROVISIONS TO THE PERMITTOR, AND (III) STATE OR BE ENDORSED TO PROVIDE THAT THE COVERAGE AFFORDED UNDER THE PERMITTEE'S POLICIES SHALL APPLY ON A PRIMARY AND NOT ON AN EXCESS OR CONTRIBUTING BASIS WITH ANY POLICIES WHICH MAY BE AVAILABLE TO THE PERMITTOR/MTA, AND ALSO THAT THE PERMITTEE'S POLICIES, PRIMARY AND EXCESS, MUST BE EXHAUSTED BEFORE IMPLICATING ANY PERMITTOR/MTA POLICY AVAILABLE. (IV) IN ADDITION, PERMITTEE'S POLICIES SHALL STATE OR BE ENDORSED TO PROVIDE THAT, IF A SUBCONTRACTOR'S POLICY CONTAINS ANY PROVISION THAT MAY ADVERSELY AFFECT WHETHER PERMITTEE'S POLICIES ARE PRIMARY AND MUST BE EXHAUSTED BEFORE IMPLICATING ANY PERMITTOR/MTA POLICY AVAILABLE, PERMITTEE'S AND SUBCONTRACTOR'S POLICIES SHALL NEVERTHELESS BE PRIMARY AND MUST BE EXHAUSTED BEFORE IMPLICATING ANY PERMITTOR/MTA POLICY AVAILABLE. AT LEAST TWO (2) WEEKS PRIOR TO THE EXPIRATION OF THE POLICIES, THE PERMITTEE SHALL ENDEAVOR TO PROVIDE EVIDENCE OF RENEWAL OR REPLACEMENT POLICIES OF INSURANCE, WITH TERMS AND LIMITS NO LESS FAVORABLE THAN THE EXPIRING POLICIES.

SECTION D: SUBMISSION OF INSURANCE

CERTIFICATES OF INSURANCE MAY BE SUPPLIED AS EVIDENCE OF POLICIES EXCEPT FOR RAILROAD PROTECTIVE LIABILITY. HOWEVER, IF REQUESTED BY THE PERMITTOR, THE PERMITTEE SHALL DELIVER TO THE PERMITTOR WITHIN FORTY-FIVE (45) DAYS A COPY OF SUCH POLICIES, CERTIFIED BY THE INSURANCE CARRIER AS BEING TRUE AND COMPLETE. IF A CERTIFICATE OF INSURANCE IS SUBMITTED, IT MUST: (1) BE PROVIDED ON THE PERMITTOR CERTIFICATE OF INSURANCE; (2) BE SIGNED BY AN AUTHORIZED REPRESENTATIVE OF THE INSURANCE CARRIER OR PRODUCER AND NOTARIZED; (3) DISCLOSE ANY DEDUCTIBLE, SELF-INSURED RETENTION, SUB-LIMIT, AGGREGATE LIMIT OR ANY EXCLUSIONS TO THE POLICY THAT MATERIALLY CHANGE THE COVERAGE; (4) INDICATE THE ADDITIONAL INSUREDS AS REQUIRED HEREIN UNDER SECTION B; THE PERMITTEE MUST PROVIDE A COPY OF THE ADDITIONAL INSURED ENDORSEMENT (ISO) FORM CG 20 26 07/04 OR ITS EQUIVALENT AND MUST REFERENCE THE POLICY INFORMATION; (5) INDICATE PROJECT NAME AND LOCATION ON THE CERTIFICATE; AND (6) EXPRESSLY REFERENCE THE INCLUSION OF ALL REQUIRED ENDORSEMENTS.

THE PERMITTEE OR ITS CONTRACTOR/SUBCONTRACTOR PERFORMING THE WORK SHALL FURNISH EVIDENCE OF ALL POLICIES BEFORE ANY WORK IS STARTED TO THE APPROPRIATE DEPARTMENT:

NEW AGREEMENTS:	**RENEWAL INSURANCE**:
MTA/NYCT MOW ENGINEERING ATTENTION: MR. JOHN MALVASIO 130 LIVINGSTON STREET BROOKLYN, NY 11201	MTA RISK INSURANCE MANAGEMENT ATTENTION: RUTH APOSTOL 2 BROADWAY - 21ST FLOOR NEW YORK, NY 10004

SECTION E: NO LIMIT OF LIABILITY
THE MINIMUM AMOUNTS OF INSURANCE REQUIRED IN THE DETAIL DESCRIPTION OF POLICIES ABOVE SHALL NOT BE CONSTRUED TO LIMIT THE EXTENT OF THE PERMITTEE'S LIABILITY UNDER THIS AGREEMENT.

SECTION F: RIGHT TO REQUEST ADDITIONAL INSURANCE
PERMITTEE FURTHER AGREES TO PROVIDE, AT PERMITTEE'S SOLE COST AND EXPENSE, SUCH INCREASED OR EXPANDED INSURANCE COVERAGE AS PERMITTOR MAY FROM TIME TO TIME AS DEEM APPROPRIATE.

SECTION G: EVENT OF DEFAULT
IF, AT ANY TIME DURING THE PERIOD OF THIS AGREEMENT, INSURANCE AS REQUIRED IS NOT IN EFFECT, OR PROOF THEREOF IS NOT PROVIDED TO THE PERMITTOR, THE PERMITTOR SHALL HAVE THE OPTIONS TO: (I) DIRECT THE PERMITTEE TO SUSPEND WORK OR OPERATION WITH NO ADDITIONAL COST OR EXTENSION OF TIME DUE ON ACCOUNT THEREOF; OR (II) TREAT SUCH FAILURE AS AN EVENT OF DEFAULT.

SECTION H: NOTICE OF CLAIM
THE PERMITTEE SHALL IMMEDIATELY FILE WITH NYCT/MTA'S TORT DIVISION (WITH A COPY TO THE PROJECT MANAGER), 130 LIVINGSTON STREET, 11TH FLOOR, BROOKLYN, NEW YORK 11201, A NOTICE OF ANY OCCURRENCE LIKELY TO RESULT IN A CLAIM AGAINST NYCT/MTA AND SHALL ALSO FILE WITH THE TORTS DIVISION DETAILED SWORN PROOF OF INTEREST AND LOSS WITH THE CLAIM. THIS PARAGRAPH SHALL SURVIVE THE EXPIRATION OR EARLIER TERMINATION OF THE CONTRACT.

CONSULTANTS:

MJE&D
MJ ENGINEERING & DESIGN
3 BATTISTA CT
SAYREVILLE NJ 08872
PHONE : (201) 365-8065
EMAIL : YOUSSEFPE@GMAIL.COM

NO.	DATE	REVISION	BY

DESIGNER: M.Y.
DRAWN BY: F.I.
CHECKED BY: MY.
SCALE: AS NOTED
DATE: 03/26/2019

PROJECT:
FULL DEMOLISION
LOT 1, BLOCK 3084

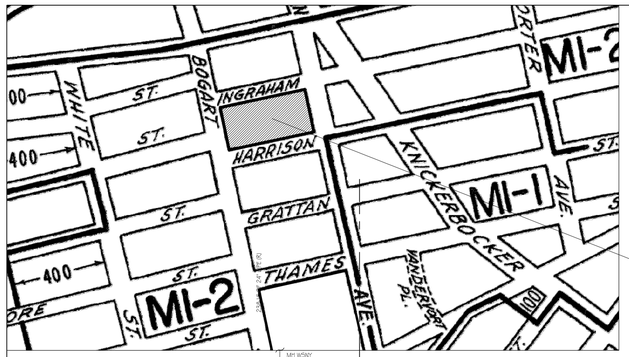
ADDRESS:
74 BOGART STREET BOROUGH
OF BROOKLYN KINGS COUNTY
CITY & STATE OF NEW YORK

DRAWING TITLE:
MTA. NOTES

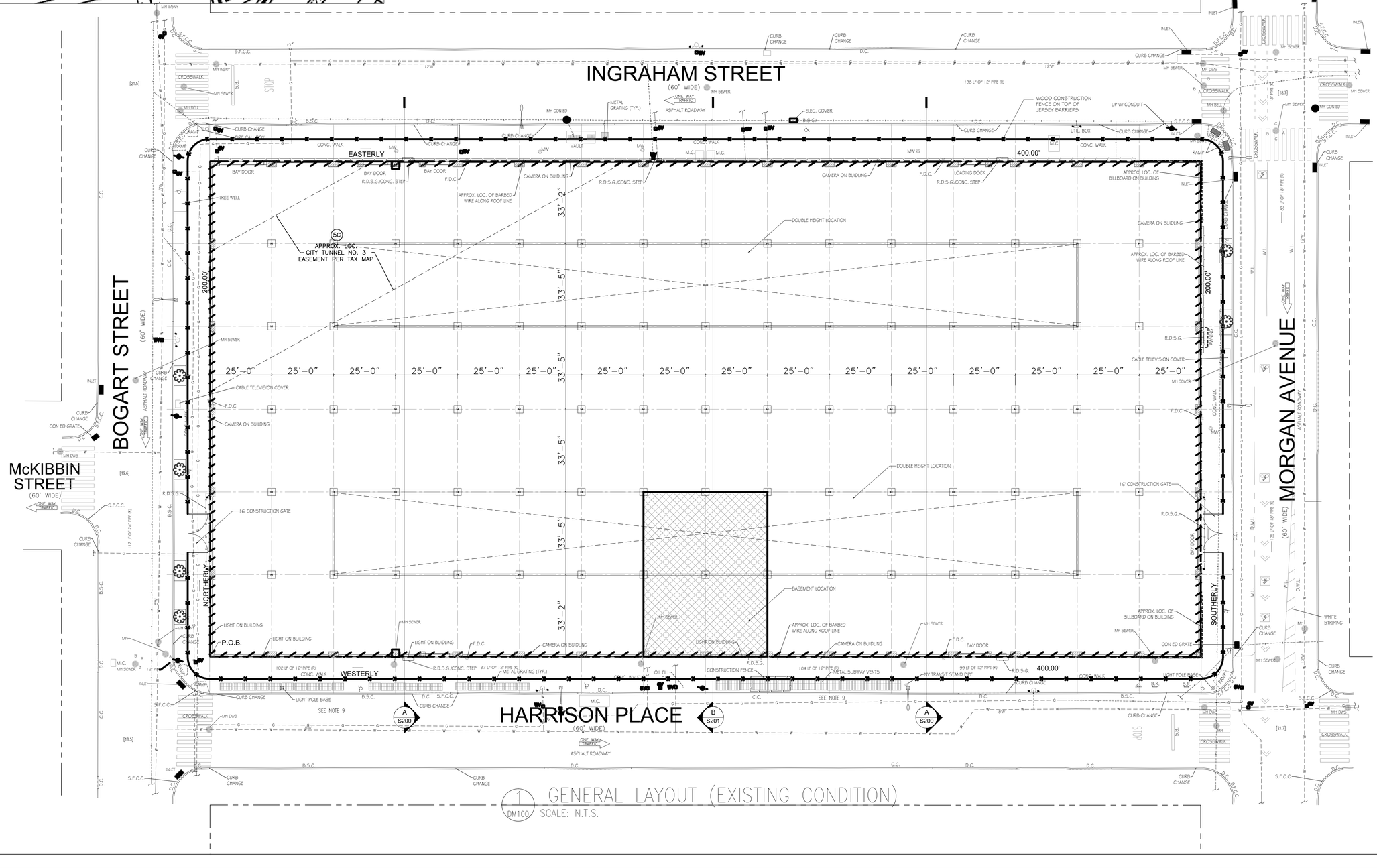
MAGDY YOUSSEF
089378

DRAWING NO.:
DM-003-00

SHEET NO.:



BUILDING LOCATION



1 DM100 GENERAL LAYOUT (EXISTING CONDITION)
SCALE: N.T.S.

MAP LEGEND

- PROPERTY LINE
- EXIST. BUILDING FOOTPRINT AT GROUND LEVEL & DOORWAY
- BARBED WIRE ALONG ROOF LINE
- 123 EXISTING CONTOUR
- 12.34 EXISTING SPOT ELEVATION
- TC12.34 EXIST. TOP OF CURB ELEVATION
- GC12.34 EXIST. GUTTER ELEVATION
- FF12.34 FINISHED FLOOR ELEVATION
- [98.5] LEGAL GRADE CONVERTED TO NAVD 88
- SW APPROX. LOCATION U.G. WATER LINE & SIZE PER REFERENCE MAPPING
- APPROX. LOCATION U.G. GAS LINE PER UTILITY MARKOUT & REFERENCE MAPPING
- APPROX. LOCATION U.G. ELECTRIC LINE PER UTILITY MARKOUT
- APPROX. LOCATION U.G. COMMUNICATION LINE PER UTILITY MARKOUT
- APPROX. LOCATION U.G. TELEVISION LINE PER UTILITY MARKOUT
- APPROX. LOCATION U.G. FDNY COMMUNICATION LINE PER REFERENCE MAPPING
- HYDRANT
- WV WATER VALVE
- GV GAS VALVE
- MANHOLE
- INLET
- F.D.C. FIRE DEPARTMENT CONNECTION
- STREET LIGHT
- OVERHEAD WIRES
- UTILITY POLE
- BOLLARD
- SIGN
- D.C. DEPRESSED CURB
- S.F.C.C. STEEL FACED CONC. CURB
- C.C. CONCRETE CURB
- B.S.C. BLUESTONE CURB
- M.C. METAL COVER
- D.W.P. DETECTABLE WARNING PAD
- S.B. STOP BAR
- W.L. WHITE LINE
- D.W.L DASHED WHITE LINE
- NPV NO PIPES VISIBLE
- B.R. BIKE RACK
- MW MONITORING WELL
- R.D.S.G. ROLL DOWN SECURITY GATE
- DENOTES OFFSET OF STRUCTURE AT GROUND LEVEL RELATIVE TO PROPERTY LINE
- TREE & TRUNK SIZE
- (R) RECORD MAPPING
- 5C TITLE REPORT EXCEPTION

CONSULTANTS:

MJE&D
MJ ENGINEERING & DESIGN
3 BATTISTA CT
SAYREVILLE NJ 08872
PHONE : (201) 365-8065
EMAIL : YOUSSEFPE@GMAIL.COM

NO.	DATE	REVISION	BY

DESIGNER: M.Y.
DRAWN BY: F.I.
CHECKED BY: MY.
SCALE: AS NOTED
DATE: 03/26/2019

PROJECT: FULL DEMOLISION
LOT 1, BLOCK 3084

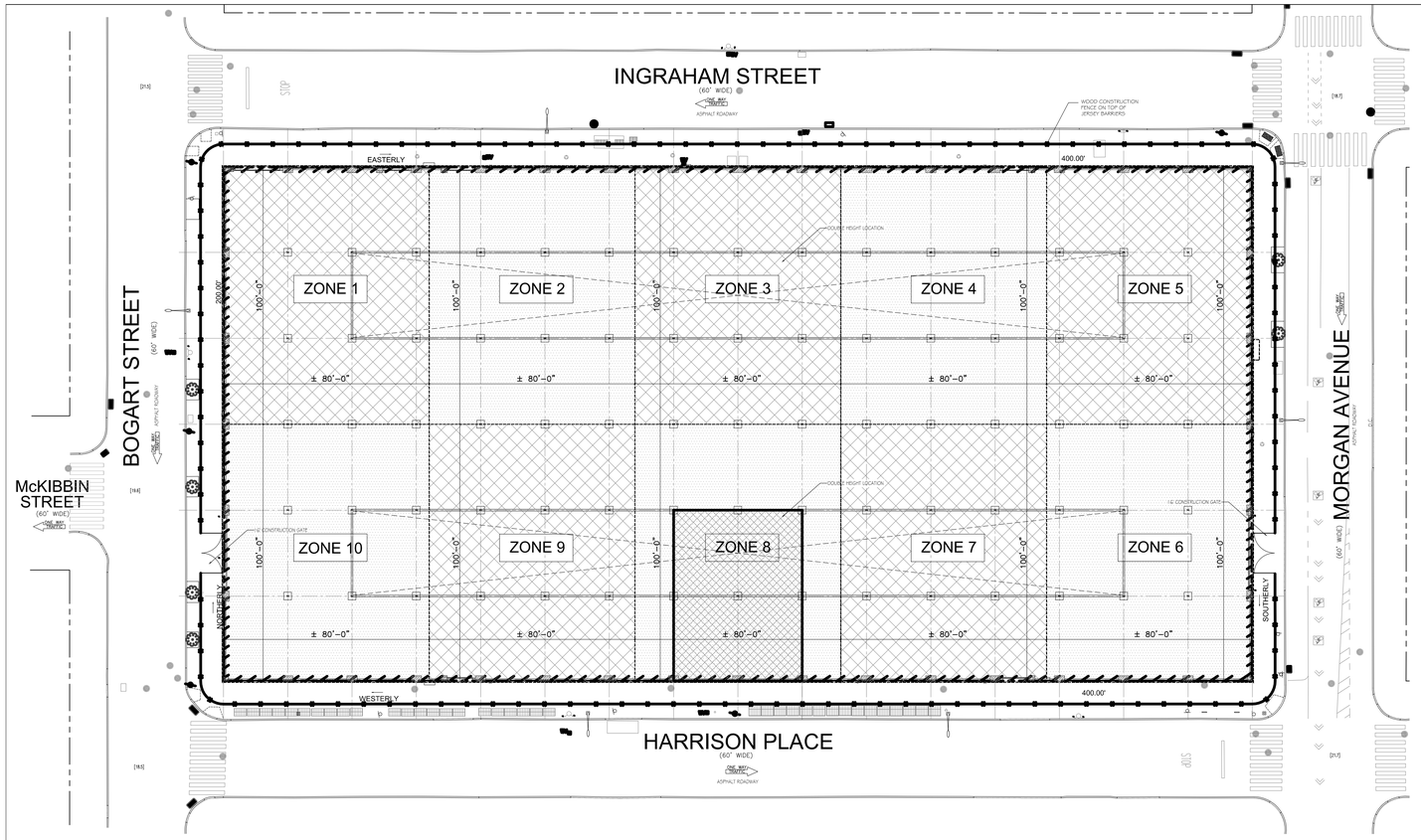
ADDRESS: 74 BOGART STREET BOROUGH OF BROOKLYN KINGS COUNTY CITY & STATE OF NEW YORK

DRAWING TITLE: GENERAL LAYOUT

DRAWING NO.: DM-100-00

SHEET NO.:

STATE OF NEW YORK · MAGDY YOUSSEF · 089376 · LICENSED PROFESSIONAL ENGINEER



1 DM101 SAFETY ZONE PLAN

SCALE: N.T.S.

CONTROL ZONE:

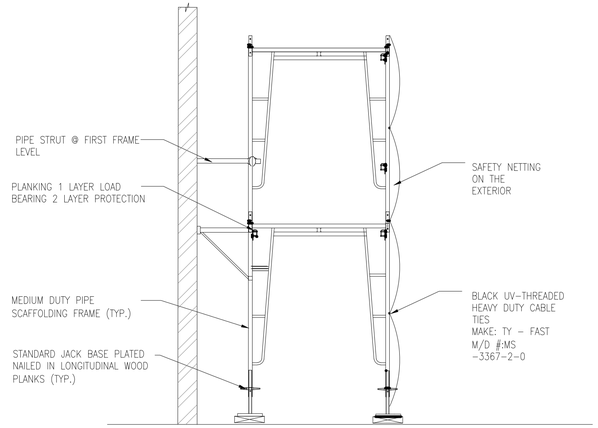
1. PROVIDE CONTROL ZONE IN THE WORK AREA TO PROTECT WORKERS. WORK TO START FROM ZONE 1, 2 AND 3 TOWARD ZONE 10

2. REMOVE EXISTING ROOFING MATERIAL AND SMALL PARAPET ALL WORK TO BE PERFORMED MANUAL (PANELS SHALL BE PROTECTED W/ GUARDRAIL AND CONTROL ZONE AROUND THE WORK AREA.

3. START AT ZONE #1 USING THE SEQUENCE AND DETAILS LISTED IN DM102. ALL THE ACCESS SHALL BE FROM THE EMPTY LOT. CONTRACTOR TO CLEAN ALL LOSE MATERIAL PRIOR TO MOVE INTO ZONE #2

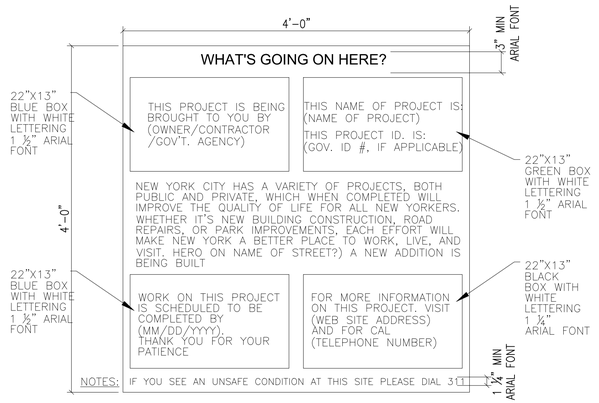
4. MOVE TO #2 PROVIDE CONTROL ZONE ON 3 SIDES AND REMOVE ROOFING MATERIAL

5. REPEAT ABOVE SEQUENCE IN ALL FRAMING.



2 DM101 SCAFFOLDING SECTION DETAILS

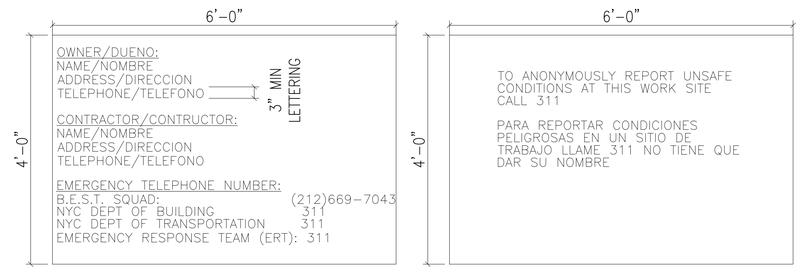
SCALE: N.T.S.

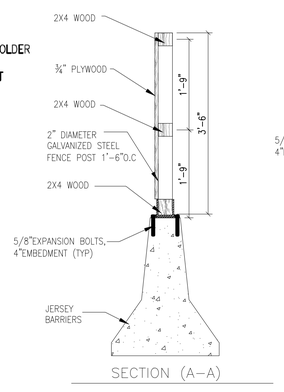


NOTE:
DESIGN OF ASSOCIATED STRUCTURES SUCH AS FENCE, SIDEWALK SHED AND SCAFFOLDING ARE PROVIDED HEREIN FOR GUIDANCE ONLY, CONTRACTORS FOR THESE ITEMS ARE REQUIRED TO PROVIDED INDEPENDENT ENGINEERING, PERMITS AND INSPECTIONS, THESE ITEMS ARE NOT PART OF THIS APPLICATION.

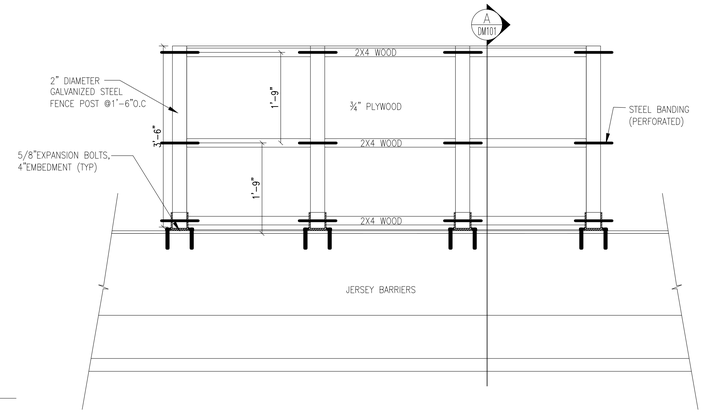
SIGNAGE NOTES
1. FOLLOWING THE RECEIPT OF A PERMIT TO ERECT A SIDEWALK SHED, THE PERMIT HOLDER SHALL POST A SIGN ON THE SIDEWALK SHED.
2. SUCH SIGN SHALL INCLUDE THE NAME, ADDRESS, TELEPHONE NUMBERS AND PERMIT NUMBER OF THE PERMIT HOLDER.
3. THE SIGN SHALL ALSO INCLUDE THE SATE THAT THE PERMIT EXPIRES.
4. SIGN SHALL MEASURE 25 SQUARE FEET.

WORK TO BE DONE TO COMPLY WITH LL/33-91.





SECTION (A-A)



3 DM101 CONSTRUCTION FENCE DETAIL AT STREET SIDE

SCALE:3/4"=1'-0"

CONSULTANTS:
MJE&D
MJ ENGINEERING & DESIGN
3 BATTISTA CT
SAYREVILLE NJ 08872
PHONE : (201) 365-8065
EMAIL : YOUSSEFPE@GMAIL.COM

NO.	DATE	REVISION	BY

DESIGNER: M.Y.
DRAWN BY: F.I.
CHECKED BY: MY.
SCALE: AS NOTED
DATE: 03/26/2019

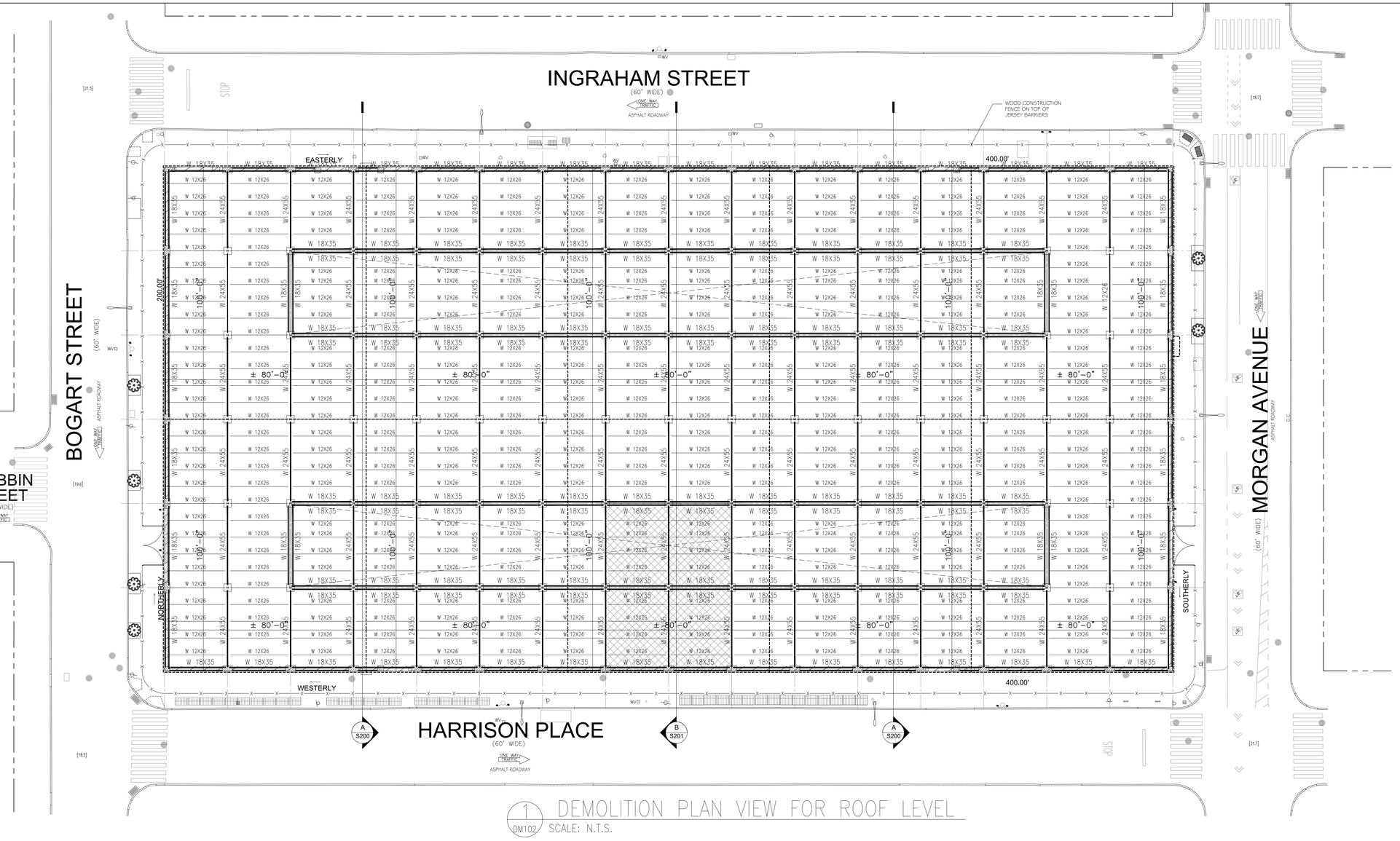
PROJECT:
FULL DEMOLISION
LOT 1, BLOCK 3084

ADDRESS:
74 BOGART STREET BOROUGH OF BROOKLYN KINGS COUNTY CITY & STATE OF NEW YORK

DRAWING TITLE:
SAFTETY ZONE PLAN AND DETAILS

DRAWING NO.:
DM-101-00

SHEET NO.:



1 DEMOLITION PLAN VIEW FOR ROOF LEVEL
DM102 SCALE: N.T.S.

PREPARATION WORK NOTES:

1. PRIOR TO START DEMOLITION, CONTRACTOR SHALL INSTALL ALL SITE PROTECTION AND SITE LOGISTICS AS REQUIRED,SEE DM 100 FOR ALL THE REQUIRED PROTECTION AND LOCATION.
2. CONTRACTOR SHALL FIRST ESTABLISH ALL SAFE BUFFER ZONES FOR ALL DEMOLITION INSTALL ALL REQUIRES PROTECTION.
3. REMOVE ALL FIXTURES,CABINETS,CLOSETS DOORS, WINDOWS ETC.ALL OPENINGS SHALL BE BOARDER –UP.
4. ASBESTOS ABATEMENT IF REQUIRED MUST BE PERFORMED PRIOR TO COMMENCEMENT OF DEMOLITION OPERATIONS.
5. REMOVE ALL HAZARDS, SUCH AS DOORS, WINDOWS, ETC.
6. REMOVE ALL ROOFING MATERIAL AND SMALL PARAPET USING MANUAL\ HAND HELD CHIPPING HUMMER.

PHASE #1:

DEMOLITION OF EXISTING ROOF MATERIAL

#1A. HAND DEMOLITION FOR EXISTING ROOF MATERIAL LAYERS TPO. SYSTEM, DENS DECK BOARD, INSULATION,FOR THE ENTIRE ROOFING

PHASE #2: MECHANICAL DEMOLITION) ZONE 1

#2A. REMOVE ALL THE CONCRETE PLANKS IN ZONE #1 ONLY

#2B. REMOVE OF THE STEEL BEAM

HANG STEEL BEAM WITH CHAIN LINK IN ⅔ OF THE STEEL BEAM SPAN SAW CUT THE STEEL BEAM NEAR TO THE SUPPORT LOCATION USE THE MACHINE TO REMOVE\CARRY THE STEEL BEAM AND LOWERED IT TO THE FLOOR. SAW CUT THE BEAM IN 4'–0" PIECES AND MOVE THE DUMPSTER.SEE DETAILS DM 200, 201 AND 202 FOR DETAILS

PHASE #3: MECHANICAL DEMOLITION FOR ZONE # 2

#3A. REPEAT ALL THE SEQUENCE FOR PHASE #2 THEN ADD THE FOLLOWING CONTRACTOR TO PROVIDE BUFFER ZONE FOR THE DEMOLITION AREA CLEAN ALL THE LOSE MATERIAL PRIOR TO MOVE TO ZONE 3

PHASE #4 :

REPEAT DEMOLITION SEQUENCE LISTED IN PHASE #2 FOR ALL ZONES

FOR THE REMOVAL OF THE FOOTINGS AND FOUNDATION WALL, PLEASE SEE DM 103 FOR SEQUENCE

CONSULTANTS:
MJE&D
MJ ENGINEERING & DESIGN
3 BATTISTA CT
SAYREVILLE NJ 08872
PHONE : (201) 365-8065
EMAIL : YOUSSEFPE@GMAIL.COM

NO.	DATE	REVISION	BY

DESIGNER:	M.Y.
DRAWN BY:	F.I.
CHECKED BY:	MY.
SCALE	AS NOTED
DATE:	03/26/2019

PROJECT:
FULL DEMOLISION
LOT 1, BLOCK 3084

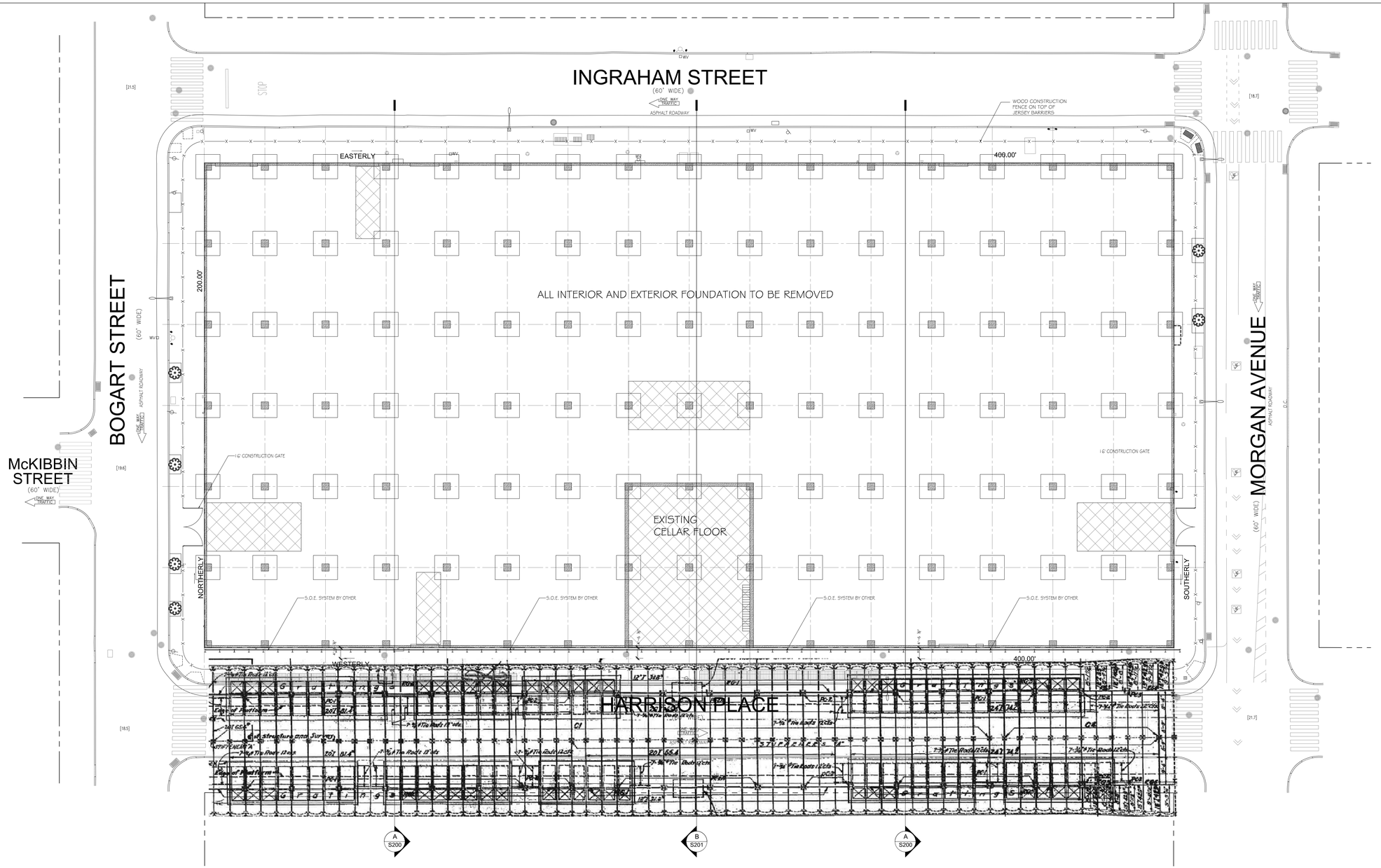
ADDRESS:
74 BOGART STREET BOROUGH OF BROOKLYN KINGS COUNTY CITY & STATE OF NEW YORK

DRAWING TITLE:
DEMOLITION PLAN VIEW FOR ROOF LEVEL

STATE OF NEW YORK · MAGDY YOUSSEF · 089376 · LICENSED PROFESSIONAL ENGINEER

DRAWING NO.:
DM-102-00

SHEET NO.:



SEQUENCE OF REMOVAL OF THE FOUNDATION MECHANICAL DEMO

#A. CONTRACTOR UTILIZING AN EXCAVATOR FROM GRADE SHALL BREAK UP THE REMAINING OF THE CONCRETE SLAB ON GRADE AND REMOVE THE SLAB AS REQUIRED.

#B. ONCE CONCRETE SLAB HAS BEEN REMOVED, CONTRACTOR EXCAVATE (4'-0") WIDE AND REMOVE ALL INTERIOR FOUNDATIONS AS REQUIRED.

#C ALL EXTERIOR FOUNDATION TO BE REMOVE

#D. ONCE ALL SLABS AND FOUNDATIONS HAVE BEEN REMOVED, CONTRACTOR SHALL ROUGH GRADE AND THE SITE AS REQUIRED.

#E. FINAL GRADE TO BE FLAT SURFACE WITH ROUGH ELEVATION. MATCHING THE EXISTING.

1 DM103 DEMOLITION PLAN VIEW FOR FOUNDATION

SCALE: N.T.S.

CONSULTANTS:

MJE&D
MJ ENGINEERING & DESIGN
3 BATTISTA CT
SAYREVILLE NJ 08872
PHONE : (201) 365-8065
EMAIL : YOUSSEFPE@GMAIL.COM

NO.	DATE	REVISION	BY

DESIGNER:	M.Y.
DRAWN BY:	F.I.
CHECKED BY:	MY.
SCALE:	AS NOTED
DATE:	03/26/2019

PROJECT:

FULL DEMOLISION
LOT 1, BLOCK 3084

ADDRESS:

74 BOGART STREET BOROUGH OF BROOKLYN KINGS COUNTY CITY & STATE OF NEW YORK

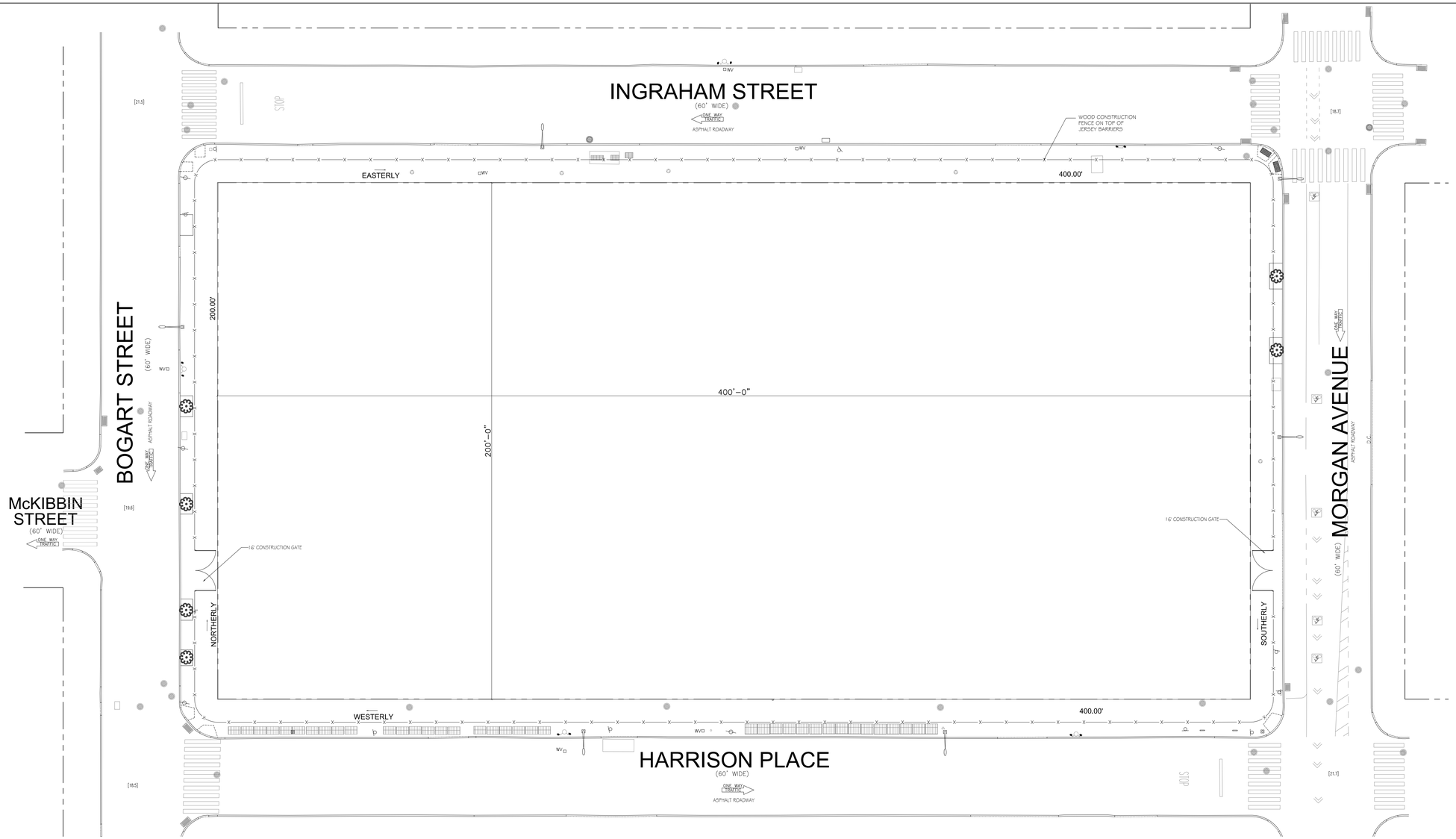
DRAWING TITLE:

DEMOLITION PLAN VIEW FOR FOUNDATION

STATE OF NEW YORK · MAGDY YOUSSEF · 089376 · LICENSED PROFESSIONAL ENGINEER

DRAWING NO.: DM-103-00

SHEET NO.:



REQUEST FOR WAIVER OF FOUNDATION/ SLAB REMOVAL AND FULL BACKFILL

1. IF EARTHWORK FOR A NEW DEVELOPMENT WILL NOT BEGIN WITHIN THREE MONTHS OF COMPLETION OF DEMOLITION OPERATIONS AN ENGINEER MUST PERFORM PERIODIC INSPECTIONS, AS PER NYC BC 3033.13.3.

2. THIS FOUNDATION/SLAB REMOVAL AND BACKFILL WAIVER SATISFIES THE REQUIREMENTS OUTLINED IN NYC BUILDING WAIVER OF BACKFILL AND/OR FOUNDATION REMOVAL NOTICE

3. A QUALIFIED PERSON MUST PERIODICALLY INSPECT THE SITE TO ENSURE STABILITY UNTIL EARTHWORK COMMENCES. RECORDS OF INSPECTIONS AND MAINTENANCE MUST BE KEPT ON SITE AND MADE AVAILABLE TO DEPARTMENT OF BUILDINGS UPON REQUEST.

4. THE APPROVED DM PLANS WILL BE PROVIDED TO THE OWNER, ILLUSTRATING SITE CONDITIONS AT THE COMPLETION OF DEMOLITION, TO BE INCORPORATED INTO THE SUPPORT –OF– EXCAVATION DESIGN FOR NEW DEVELOPMENT.
ADDITIONAL TEMPORARY SHORING DESIGNED AND PREPARED TO SHORE THE REMAINING FOUNDATION WALLS UNTIL THE INSTALLATION OF THE SHEETING AND SHORING

1 DEMOLITION PLAN FINAL CONDITION

DM104 SCALE: N.T.S.

CONSULTANTS:

MJE&D
MJ ENGINEERING & DESIGN
3 BATTISTA CT
SAYREVILLE NJ 08872
PHONE : (201) 365-8065
EMAIL : YOUSSEFPE@GMAIL.COM

NO.	DATE	REVISION	BY

DESIGNER:	M.Y.	
DRAWN BY:	F.I.	
CHECKED BY:	MY.	
	SCALE: AS NOTED	DATE: 03/26/2019

PROJECT:

FULL DEMOLISION
LOT 1, BLOCK 3084

ADDRESS:

74 BOGART STREET BOROUGH OF BROOKLYN KINGS COUNTY CITY & STATE OF NEW YORK

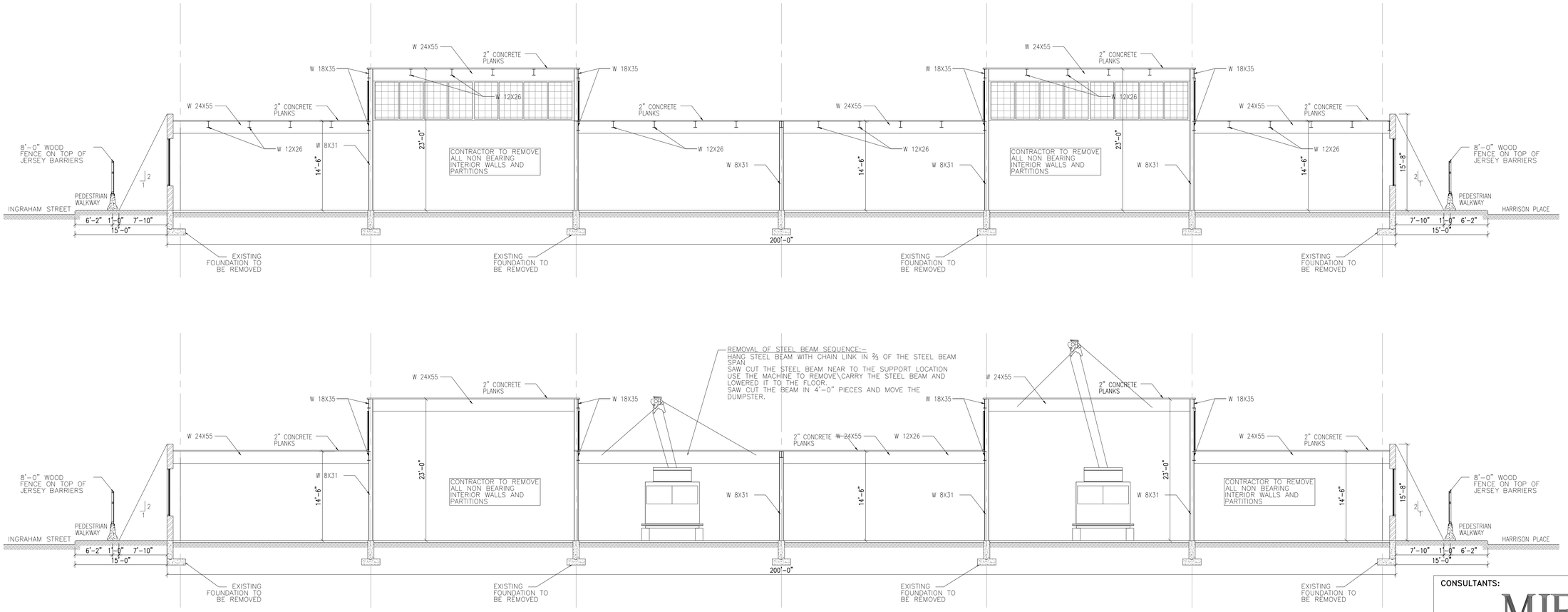
DRAWING TITLE:

HIGH 1 STORY BUILDING DEMOLITION FINAL CONDITION

STATE OF NEW YORK · MAGDY YOUSSEF · 085974 · LICENSED PROFESSIONAL ENGINEER

DRAWING NO.: DM-104-00

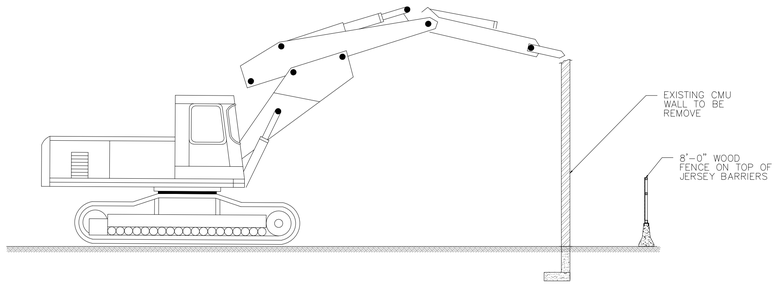
SHEET NO.: 08 OF 15



1 DM200 SECTION (A-A)
SCALE:1/8"=1'-0"

GROUND FLOOR DEMOLITION SEQUENCE:-

1. INSTALL SCREW JACKS @3'-0" TEMPORARY SHORING INSIDE THE CELLAR AREA TO SUPPORT THE 1ST FLOOR SLAB DURING THE DEMOLITION OF THE ROOF LEVEL.
2. PERM INSIDE THE CELLAR FOR THE EXTERIOR FOUNDATION WALL.
3. SAW CUT AND REMOVE 1ST FLOOR CONCRETE SLAB (CELLAR CEILING SLAB), REMOVE TEMPORARY SHORING WITH THE FRAMING.
4. EXCAVATE INSIDE THE PROPERTY AND REMOVE THE INTERIOR CELLAR FOUNDATION WALLS.
5. BACK FILL THE CELLAR AREA TO HAVE ROUGH GRADE LEVEL.



2 DM200 SECTION AT EXTERIOR WALL
SCALE:1/8"=1'-0"

CONSULTANTS:
MJE&D
MJ ENGINEERING & DESIGN
3 BATTISTA CT
SAYREVILLE NJ 08872
PHONE : (201) 365-8065
EMAIL : YOUSSEFPE@GMAIL.COM

NO.	DATE	REVISION	BY

DESIGNER:	M.Y.
DRAWN BY:	F.I.
CHECKED BY:	MY.
SCALE:	AS NOTED
DATE:	03/26/2019

PROJECT:
FULL DEMOLISION
LOT 1, BLOCK 3084

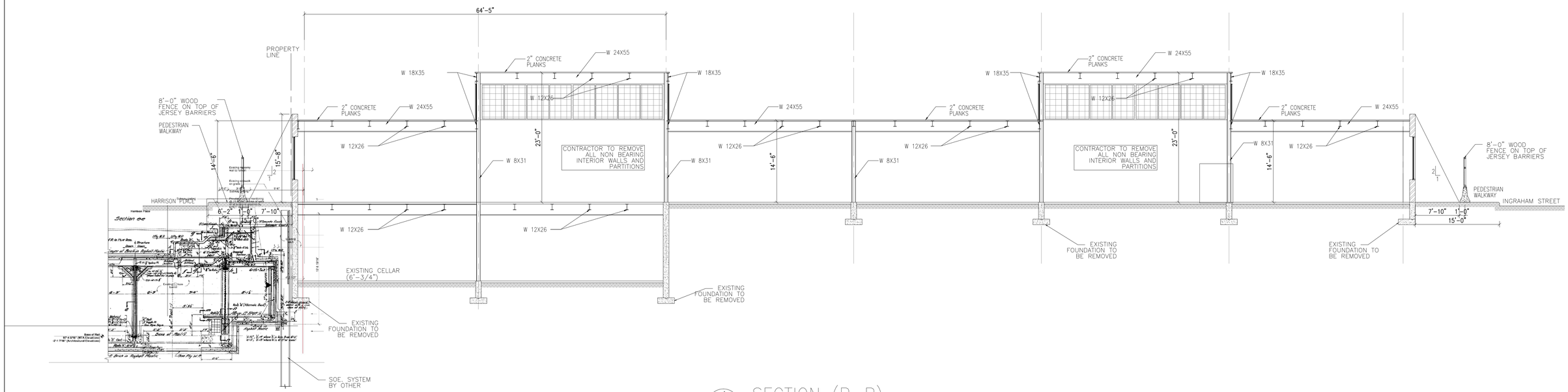
ADDRESS:
74 BOGART STREET BOROUGH OF BROOKLYN KINGS COUNTY CITY & STATE OF NEW YORK

DRAWING TITLE:
TYPICAL EXISTING SECTION DETAIL

STATE OF NEW YORK · MAGDY YOUSSEF · 089376 · LICENSED PROFESSIONAL ENGINEER

DRAWING NO.:
DM-200-00

SHEET NO.:



1 DM201 SECTION (B-B)
SCALE:1/8"=1'-0"

CONSULTANTS:

MJE&D
MJ ENGINEERING & DESIGN
3 BATTISTA CT
SAYREVILLE NJ 08872
PHONE : (201) 365-8065
EMAIL : YOUSSEFPE@GMAIL.COM

NO.	DATE	REVISION	BY

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DRAWN BY:	F.I.
CHECKED BY:	MY.
SCALE	AS NOTED
DATE:	03/26/2019

PROJECT:
FULL DEMOLISION
LOT 1, BLOCK 3084

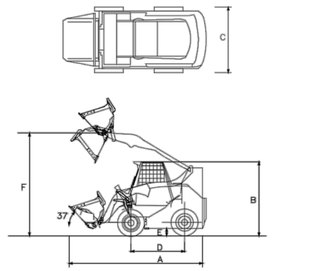
ADDRESS:
74 BOGART STREET BOROUGH OF BROOKLYN KINGS COUNTY CITY & STATE OF NEW YORK

DRAWING TITLE:
MTA SECTION

STATE OF NEW YORK · MAGDY YOUSSEF · 089378 · LICENSED PROFESSIONAL ENGINEER

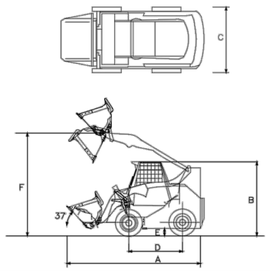
DRAWING NO.:
DM-201-00

SHEET NO.:



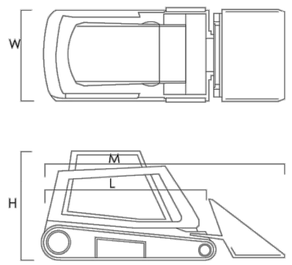
MAKE: BOBCAT	
MODEL: S70	
OPERATING WEIGHT:	2,795 LBS
(A) SHIPPING LENGTH	8.11 FT
(B) OVERALL HEIGHT	6.3 FT
(C) OVERALL WIDTH	2.9 FT
(D) WHEEL BASE	2.3 FT
(E) CLEARANCE	0.46 FT
(F) HINGE PIN (MAX HT.)	7.8 FT

1 BOBCAT S70
Scale: AS SHOWN



MAKE: BOBCAT	
MODEL: S100	
OPERATING WEIGHT:	4,091 LBS
(A) SHIPPING LENGTH	10.8 FT
(B) OVERALL HEIGHT	6.8 FT
(C) OVERALL WIDTH	4.15 FT
(D) WHEEL BASE	2.6 FT
(E) CLEARANCE	0.5 FT
(F) HINGE PIN (MAX HT.)	8.6 FT

2 BOBCAT S100
Scale: AS SHOWN

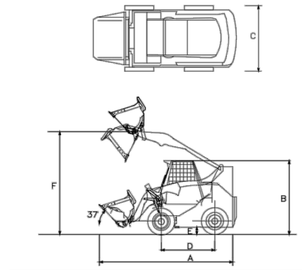


MAKE: BOBCAT
MODEL: T110
OPERATING WEIGHT: 5,202 LBS

PERFORMANCE:

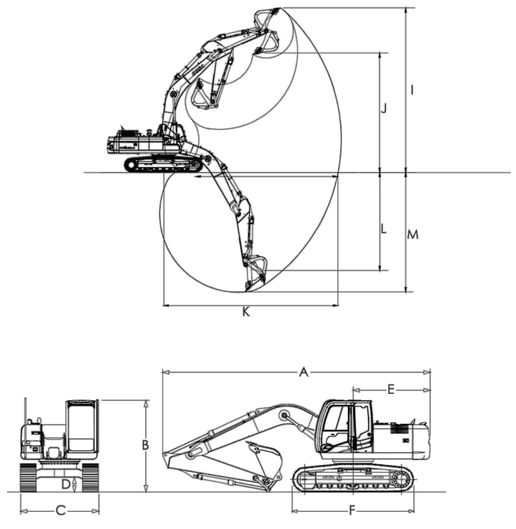
LENGTH (L): 7.42 FT
LENGTH W/ STANDARD BUCKET(M): 9.7 FT
WIDTH (W): 4.16 FT
HEIGHT (H): 6.5 FT
REACH AT MAX HEIGHT: 1.65
LENGTH OF TRACK ON GROUND: 10.6 FT

3 BOBCAT T110
Scale: AS SHOWN



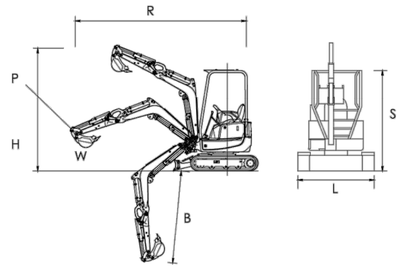
MAKE: CAT	
MODEL: 226B	
OPERATING WEIGHT:	7,142 LBS
(A) SHIPPING LENGTH	10.6FT
(B) OVERALL HEIGHT	6.4FT
(C) OVERALL WIDTH	6FT
(D) WHEEL BASE	3.2FT
(E) CLEARANCE	7.7IN
(F) HINGE PIN (MAX HT.)	7.1FT

4 CAT 226B
Scale: AS SHOWN



MAKE: DOOSAN 340DX	
MODEL: PC200	
OPERATING WEIGHT:	75,178 LBS
(A) SHIPPING LENGTH	37.3 FT
(B) OVERALL HEIGHT	10.3 FT
(C) OVERALL WIDTH	10.8 FT
(D) CLEARANCE	1.7 FT
(E) SWING RADIUS	11.5 FT
(F) TRACK LENGTH	13.3 FT
WORKING RANGE	
(I) MAX. CUTTING HEIGHT	32.8 FT
(J) MAX. LOADING HEIGHT	22.6 FT
(K) MAX. REACH ALONG THE GROUND	34.1 FT
(L) MAX. VERTICAL WALL DIGGING DEPTH	16.8 FT
(M) MAX. DIGGING DEPTH	22.7 FT

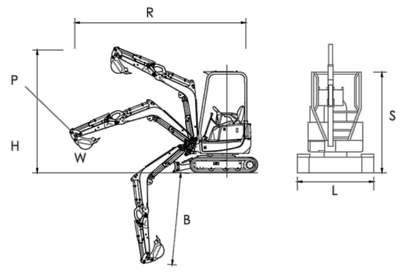
5 EXCAVATOR DOOSAN DAEWOO DX340
Scale: AS SHOWN



MAKE: CAT MINI EXCAVATOR
MODEL: 301.6C / 301.8C
OPERATING WEIGHT: 3,936 LBS

R: REACH FROM SWING CENTER LINE: 12FT-2IN
H: LIFT POINT HEIGHT: 7FT-9IN MAXIMUM
L: 3FT-3IN
S: 7FT-2IN
B: 6FT-10IN

6 CAT MINI-EXCAVATOR 301.6C / 301.8C
Scale: AS SHOWN



MAKE: CAT
MODEL: 304E CR
OPERATING WEIGHT: 8,838 LBS

R: REACH FROM SWING CENTER LINE: 15FT-10IN
H: LIFT POINT HEIGHT: 11FT-9IN MAXIMUM
L: 6FT-5IN
S: 8FT-2IN
B: 8FT

7 EXCAVATOR CAT 304E CR
Scale: AS SHOWN

CONSULTANTS:
MJE&D
MJ ENGINEERING & DESIGN
3 BATTISTA CT
SAYREVILLE NJ 08872
PHONE : (201) 365-8065
EMAIL : YOUSSEFPE@GMAIL.COM

NO.	DATE	REVISION	BY

DESIGNER:	M.Y.
DRAWN BY:	F.I.
CHECKED BY:	MY.
SCALE	AS NOTED
DATE:	03/26/2019

PROJECT:
FULL DEMOLISION
LOT 1, BLOCK 3084

ADDRESS:
74 BOGART STREET BOROUGH OF BROOKLYN KINGS COUNTY CITY & STATE OF NEW YORK

DRAWING TITLE:
DEMOLITION EQUIPMENT

DRAWING NO.: DM-300-00

SHEET NO.:

NOTES:

1. ALL WORK TO BE PERFORMED IN ACCORDANCE WITH REQUIREMENTS OF NEW YORK CITY BUILDING CODE. CONTRACTOR SHALL GIVE REQUIRED NOTICE TO THE NEW YORK CITY DEPARTMENT OF BUILDINGS BEFORE COMMENCEMENT OF WORK, PER NYCBC 3304.3.1.
2. BASE PLAN COMPILED FROM SURVEY DRAWING PREPARED BY GALLAS SURVEYING GROUP, DATED 12-14-2018, AND SITE PLAN ANALYSIS PREPARED BY BUTZ-WILBERN LTD, DATED 12-13-2018.
3. COORDINATE THESE PLANS WITH THE STRUCTURAL PLANS FOR THE NEW BUILDING.
4. ALL ELEVATIONS SHOWN REFER TO NAVD88 DATUM, WHICH IS 1.106 FEET ABOVE MEAN SEA LEVEL AT SANDY HOOK, NEW JERSEY.
5. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS.
6. REFER TO GEOTECHNICAL ENGINEERING REPORT PREPARED BY ALL PHASE TESTING, INC., DATED 10-04-2013, FOR ADDITIONAL SUBSURFACE INFORMATION.
7. CONTRACTOR SHALL VERIFY LOCATION OF ALL UNDERGROUND UTILITIES AND VAULTS PRIOR TO DRILLING. CONTRACTOR SHALL CALL FOR A UTILITY MARK-OUT BEFORE COMMENCEMENT OF WORK AND WAIT THE REQUIRED NUMBER OF DAYS. CONTRACTOR SHALL REPORT LOCATIONS AND ELEVATIONS OF UTILITIES, STRUCTURES AND OBSTRUCTIONS WHICH CONFLICT WITH LOCATIONS OF SUPPORT OF EXCAVATION ELEMENTS.
8. CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS.
9. CONTRACTOR SHALL BE RESPONSIBLE FOR SITE SAFETY AND PROVIDE A SAFETY PLAN CONFORMING TO OSHA STANDARDS.
10. SOLDIER PILES AND LAGGING, WALERS AND BRACING ARE SUBJECT TO SPECIAL INSPECTION AS PER THE NEW YORK CITY BUILDING CODE. SEE STRUCTURAL DRAWINGS FOR A COMPLETE LIST OF REQUIRED SPECIAL INSPECTIONS.
11. UPON INSTALLATION OF THE PERMANENT WALLS, CUT AND REMOVE SOLDIER PILES A MINIMUM 2 FEET FROM THE GRADE LEVEL, OR AS REQUIRED FOR INSTALLATION OF FOUNDATIONS FOR THE PROPOSED BUILDING.
12. ANY PROPOSED REVISION/MODIFICATION TO THE SUPPORT OF EXCAVATION SHOWN SHALL BE SUBMITTED TO GEODESIGN FOR REVIEW.
13. ALL STEEL SHALL CONFORM TO ASTM A572 GRADE 50 (FY=50 KSI), UNLESS OTHERWISE NOTED.
14. A 250 PSF UNIFORM VERTICAL SURCHARGE HAS BEEN INCLUDED AT THE SOLDIER PILE LOCATIONS. IF IT IS DETERMINED THAT THESE LOADS ARE NOT SUFFICIENT, THE VALUE TO BE USED SHOULD BE PROVIDED SO THAT THE DESIGN CAN BE MODIFIED, AS NECESSARY.
15. THE GROUNDWATER LEVEL INSIDE THE EXCAVATION SHALL BE MAINTAINED AT A MINIMUM OF 2 FEET BELOW THE FINAL SUBGRADE LEVEL.
16. SOLDIER PILE DESIGN IS BASED ON A GROUNDWATER ELEVATION OF +5.5 FEET. IF GROUNDWATER LEVELS ARE DIFFERENT FROM THIS, GEODESIGN SHALL BE NOTIFIED BEFORE PROCEEDING WITH THE WORK.
17. WELDING SHALL BE PERFORMED IN ACCORDANCE WITH THE REQUIREMENTS OF THE AMERICAN SOCIETY FOR WELDING IN BUILDING CONSTRUCTION AWS D1.1-88. WELDING ELECTRODES TO BE E7018.
18. THE PROPOSED BUILDING IS SHOWN FOR REFERENCE ONLY. REFER TO STRUCTURAL DRAWINGS FOR REQUIRED INFORMATION.
19. A CONDITION SURVEY OF ADJACENT BUILDINGS SHALL BE PERFORMED BY A COMPANY RETAINED BY THE OWNER PRIOR TO THE START OF CONSTRUCTION.

TIMBER LAGGING NOTES:

1. TIMBER LAGGING SHALL BE 3 INCH THICK (NOMINAL). TIMBER SHALL BE STRUCTURAL GRADE WITH MINIMUM ALLOWABLE BENDING CAPACITY (FB) OF 1500 PSI. THE ALLOWABLE SHEAR CAPACITY SHALL BE 150 PSI.
2. LAGGING SHALL BE INSTALLED SUCH THAT GAPS BETWEEN THE LAGGING BOARDS ARE ONE HALF INCH NOMINAL AND ONE INCH MAXIMUM. VOIDS IN THE RETAINED EARTH BEHIND THE TIMBER LAGGING SHALL BE BACKFILLED WITH EXCAVATED GRANULAR SOIL, AND THE GAPS BETWEEN THE TIMBER LAGGING PACKED AS REQUIRED TO PREVENT EROSION OF THE RETAINED SOIL BUT STILL ALLOW GROUNDWATER TO SEEP OUT.
3. LAGGING MUST BE INSTALLED AT EXCAVATION INTERVALS OF 2 FT OR LESS.

DRIVEN SOLDIER PILE INSTALLATION PROCEDURE:

1. PILE DRIVING ACTIVITIES SHOULD BE INSPECTED TO CONFIRM THE PILE SIZE, PILE SPACING AND THE INDICATED MINIMUM TIP ELEVATIONS.
2. MAINTAIN A MINIMUM OF 2% PLUMBNESS DURING THE DRIVING OF THE PILES.
3. PILE SHALL BE INSTALLED WITH A HYDRAULIC IMPACT HAMMER HAVING A MINIMUM ENERGY OF 15,000 FT-LBS.
4. VIBRATION MONITORING SHOULD BE PERFORMED IN ACCORDANCE WITH NYC TRANSIT REQUIREMENTS

SUMMARY OF CONSTRUCTION MONITORING ACTIVITIES

DURING CONSTRUCTION MONITORING ACTIVITY	DESCRIPTION OF MONITORING SYSTEM	DATA ACQUISITION AND MONITORING FREQUENCY (MIN)	DATA ANALYSIS FREQUENCY FOR THRESHOLD OCCURRENCE (MIN)	THRESHOLD CRITERIA	REQUIRED ACTION IF THRESHOLD IS REACHED	WRITTEN COMPILATION DATA REPORTING FREQUENCY
SUBWAY & EXISTING BUILDING VIBRATION MONITORING	REMOTE AUTOMATED SEISMIC UNIT MOUNTED IN LOCATIONS SHOWN ON PLAN	CONTINUOUS DATA ACQUISITION AND MONITORING DURING CONSTRUCTION OPERATIONS (REAL-TIME DATA SHALL BE AVAILABLE AT JOB SITE)	SEISMIC UNIT CONTINUOUSLY MONITORS READINGS; UNIT TRIGGERS SIGNAL TO THE SERVER AND TRANSMITS INSTANT E-MAIL NOTIFICATION ON PRESET THRESHOLD LIMIT	PEAK PARTICLE VELOCITY = 0.5 in./sec. (SEE NOTE 10, SOE-002)	STOP WORK IF THRESHOLD IS EXCEEDED AND MODIFY CONSTRUCTION PROCEDURES. ANALYSIS BY: OWNER'S DESIGN TEAM	WEEKLY
EXISTING BUILDING MOVEMENT MONITORING	MANUAL OPTICAL SURVEYING EQUIPMENT	MANUAL ONCE A WEEK. INCREASE FREQUENCY IF 50% THRESHOLD REACHED. FREQUENCY MAY BE DECREASED AFTER GROUND FLOOR IS REACHED	MONITORING POINT DATA IS IMMEDIATELY PROCESSED UPON ACQUISITION BY THE SURVEYOR; RELATIVE MOVEMENT IS IMMEDIATELY IDENTIFIED AND REPORTED TO RESPONSIBLE PERSON AT SITE.	1/4" HORIZONTAL OR VERTICAL (SEE NOTE 27, SOE-002)	STOP WORK IF THRESHOLD IS EXCEEDED AND ANALYZE. ANALYSIS BY: OWNER'S DESIGN TEAM	WEEKLY
EXISTING BUILDING CRACK MONITORING	PERMANENTLY MOUNTED "TELLTALE" CRACK GAUGE	MANUAL ONCE A WEEK. INCREASE FREQUENCY IF MOVEMENT IS DETECTED.	RELATIVE MOVEMENT IS IMMEDIATELY IDENTIFIED BY MONITORING TECHNICIAN BY COMPARISON WITH EARLIER READINGS AND REPORTED TO RESPONSIBLE PERSON AT SITE.	ALL MOVEMENT ANALYZED IN CONJUNCTION WITH VIBRATION AND BUILDING MOVEMENT DATA	ACTION BASED ON COMBINED RESULTS WITH VIBRATION AND BUILDING MOVEMENT	WEEKLY

DRILLED SOLDIER PIPE PILE INSTALLATION NOTES:

1. ALL PILES SHALL BE INSTALLED AT THE LOCATIONS SHOWN ON THESE DRAWINGS.
2. PERFORM UTILITY IDENTIFICATION AND EXPLORATION AS NECESSARY.
3. THE DRILL SHALL BE A ROTARY HYDRAULIC DRILL CAPABLE OF DUPLEX DRILLING 13-3/8" AND 9-5/8" DIAMETER CASING.
4. INSTALLATION PROCEDURE:
   a. SET UP RIG ON PROPER LOCATION AND PLUMB THE MAST.
   b. INSTALL FIRST PIECE OF CASING WITH CARBIDE CUTTING TEETH ATTACHED.
   c. DRILL CASING DOWN AND MAINTAIN POSITIVE FLUID HEAD AT ALL TIMES.
   d. DRILLING TO BE PERFORMED USING INTERNAL FLUSH METHOD. OUTSIDE CASING SHALL REMAIN AHEAD OF THE INTERNAL FLUSHING BY A MINIMUM OF 2 FEET. IF OBSTRUCTIONS ARE ENCOUNTERED OR IF THE OUTSIDE CASING GETS STUCK, ADVANCE THE INNER CASING THROUGH OBSTRUCTION OR UNTIL OUTER CASING CAN ROTATE, AND THEN RESUME STANDARD PROCEDURE OF 2 FOOT LEAD OF THE OUTSIDE CASING. IF EXISTING CONCRETE IS DISCOVERED DURING THE DRILLING PROCESS, FOLLOW NYCT GENERAL NOTE 15, PERTAINING TO THE USE OF DOWN-THE-HOLE-HAMMER.
   e. FOLLOW UP WITH ADDITIONAL CASING TO ELEVATION SHOWN ON THESE DRAWINGS.
   f. REMOVE INNER CASING.
   g. AT LOCATIONS ALONG SUBWAY, INSTALL STEEL REINFORCEMENT.
   h. FLUSH INSIDE OF CASING CLEAN OF SPOILS.
   i. PLACE CEMENT GROUT VIA TREMIE METHODS UNTILL GOOD GROUT IS OBSERVED AT THE TOP OF PILE.
   j. AT LOCATIONS ALONG SUBWAY, EXTRACT THE CASING THE LENGTH OF BOND ZONE, AS SHOWN ON THESE DRAWINGS.
   k. PLACE CEMENT GROUT TO THE TOP OF PILE.

GEODESIGN INCORPORATED
Geotechnical | Construction | Environmental
Engineers and Scientists
60 PARK PLACE, SUITE 302 • NEWARK, NJ 07102
TELEPHONE: 973.803.4515
www.geodesign.net

CLIENT:

STORAGE CONSTRUCTION CO., LLC
26 WEST 17TH STREET, SUITE 801
NEW YORK, NY 10011

REVISIONS:

#	DATE	DESCRIPTION

PROJECT:

74 BOGART STREET
BROOKLYN, NY

DRAWING:

SUPPORT OF EXCAVATION GENERAL NOTES

DATE:	04/26/2019	DESIGNED BY:	AR
SCALE:	AS SHOWN	DRAWN BY:	RH
PROJECT NO:	4139-001	APPROVED BY:	TGT

DRAWING NO.

SOE-001.00

SHEET 1 OF 7

NEW YORK CITY TRANSIT
GENERAL NOTES

NOTE: THE APPROPRIATE NOTES ARE TO BE MADE PART OF THE PROJECT'S CONTRACT DRAWINGS.

1. THE NYC TRANSIT (NYCT) RESERVES THE RIGHT TO PLACE INSPECTORS, FLAGMEN OR OTHER PERSONNEL IN THE SUBWAY STRUCTURES DURING CONSTRUCTION OF THE PROJECT LINKED BY A TELEPHONE SYSTEM, IF DEEMED NECESSARY, TO OBSERVE THE EFFECTS OF THE CONSTRUCTION ON THE TRANSIT FACILITIES. NYCT FURTHER RESERVES THE RIGHT TO PLACE SUCH PERSONNEL WHENEVER, IN ITS OPINION, THE PROJECT CONDITIONS WARRANT SUCH PLACEMENT, REGARDLESS OF DISTANCE. THE COST OF SUCH PERSONNEL, TELEPHONE INSTALLATION AND ANY RE-ROUTES, DIVERSIONS OF SERVICE, WORK TRAINS, ETC., MADE NECESSARY BY THE PROJECT, MUST BE BORNE BY THE PROJECT OR THE RESPONSIBLE NEW YORK CITY/STATE AGENCY.

2. ALL ROCK EXCAVATION ADJACENT TO THE TRANSIT STRUCTURE IS TO BE CHANNEL DRILLED TWO FEET BELOW SUBGRADE.

3. IF TOP OF ROCK IS FOUND BELOW SUBWAY STRUCTURE, THE SUBWAY STRUCTURE MUST BE UNDERPINNED IN ACCORDANCE WITH DRAWINGS TO BE SUBMITTED TO NYCT FOR APPROVAL.

4. IF ROCK IS SOFT OR SEAMY, LATERAL SUPPORTS MUST BE PROVIDED BELOW THE SUBWAY STRUCTURE IN ACCORDANCE WITH DRAWINGS TO BE SUBMITTED TO NYCT FOR APPROVAL.

5. BLASTING WILL BE PERMITTED ONLY WITH LIGHT CHARGES SUBJECT TO THE APPROVAL OF NYCT'S ENGINEER AND IN ACCORDANCE WITH THE REGULATIONS OF THE FIRE DEPARTMENT. THE CONTRACTOR SHALL PROVIDE A DETAILED MONITORING PLAN, PROVIDING FOR MEASUREMENTS OF BOTH PARTICLE VELOCITY AND DISPLACEMENTS AT CRITICAL LOCATIONS OF THE NYCT STRUCTURE. THE MONITORING PLAN SHALL INCLUDE THRESHOLD AND UPSET LEVELS OF BOTH PARTICLE VELOCITY AND SETTLEMENT TOGETHER WITH AN ACTION PLAN FOR THEIR IMPLEMENTATION. THE CONTRACTOR SHALL SECURE AN APPROVED SEISMOLOGIST TO INSTALL AND OPERATE SUITABLE VELOCITY GAUGES TO CONTINUOUSLY MONITOR PARTICLE VELOCITY AND AN INDEPENDENT LICENSED SURVEYOR TO MONITOR DISPLACEMENTS. THE PRESENCE OF A QUALIFIED TECHNICIAN FROM MONITORING COMPANY IS NECESSARY TO PROVIDE THE VIBRATION READING UPON REQUEST OF NYCT ENGINEER. THE THRESHOLD MAXIMUM PARTICLE VELOCITY ABOVE AMBIENT CAUSED BY THE BLASTING WILL BE 0.5 INCH PER SECOND. VALUES EXCEEDING THIS LEVEL WILL BE REVIEWED AND EVALUATED BY NYCT'S ENGINEER. IN NO CASE WILL PARTICLE VELOCITIES EXCEED THE UPSET LEVEL OF 2.0 INCHES PER SECOND.

6. BEFORE PLACING CONCRETE, THE SUBGRADE OF THE FOUNDATIONS IN THE VICINITY OF THE SUBWAY STRUCTURE IS TO BE INSPECTED AND APPROVED BY NYCT'S ENGINEER.

7. IF ANY PORTION OF THE SUBWAY STRUCTURE OR FINISH IS DAMAGED, IT SHALL BE REPAIRED OR REPLACED WITH THE SAME MATERIALS IN PLACE, SUBJECT TO THE APPROVAL OF NYCT'S ENGINEER AND AT THE EXPENSE OF THE PROJECT.

8. EXCAVATION EMBANKMENTS ARE TO BE SHORED AND BRACED. DRAWINGS INDICATING A SUGGESTED METHOD OF CONSTRUCTION ARE TO BE SUBMITTED TO NYCT FOR APPROVAL IN CONJUNCTION WITH THE PROJECT'S CONTRACT DRAWINGS. IN CASE OF EXCAVATION UNDERMINING THE SUBWAY STRUCTURE, UNDERPINNING MAY BE REQUIRED. DRAWINGS FOR UNDERPINNING ARE TO BE SUBMITTED TO NYCT FOR APPROVAL.

9. TEMPORARY SHORING MAY BE PLACED IN DIRECT CONTACT WITH NYCT STRUCTURES ONLY IF THE NYCT STRUCTURE IS SHOWN TO BE ABLE TO SUPPORT ALL ANTICIPATED LOADS THAT CAN BE TRANSFERRED THROUGH THE TEMPORARY STRUCTURES WITHOUT DAMAGING THE EXISTING STRUCTURE. AT THE COMPLETION OF THE PROJECT, THESE TEMPORARY SHORING AND BRACING SYSTEMS ARE TO BE REMOVED OR CUT-OFF AS APPROVED BY NYCT.

10. WHEN PILES ARE TO BE DRIVEN OR DRILLED ADJACENT TO THE SUBWAY STRUCTURE, BORING DATA, PILE LAYOUTS, SPECIFICATIONS AND INSTALLATION PROCEDURES ARE TO BE SUBMITTED TO NYCT FOR APPROVAL. VELOCITY METERS ARE TO BE INSTALLED IN THE SUBWAY TUNNEL AT CRITICAL LOCATIONS TO MONITOR INDUCED VIBRATIONS. INDUCED DISPLACEMENTS ALONG THE TUNNEL STRUCTURE AND TRACK INVERT ARE TO BE MONITORED DURING DRIVING OR DRILLING. THE THRESHOLD MAXIMUM PARTICLE VELOCITY ABOVE AMBIENT CAUSED BY THE DRIVING OR DRILLING WILL BE 0.5 INCH PER SECOND. VALUES EXCEEDING THIS LEVEL WILL BE REVIEWED AND EVALUATED BY NYCT'S ENGINEER. IN NO CASE WILL PARTICLE VELOCITIES EXCEED THE UPSET LEVEL OF 2.0 INCHES PER SECOND.

11. NO PILES ARE PERMITTED TO BE INSTALLED BY ANY METHOD WITHIN THREE FEET OF SUBWAY STRUCTURE, MEASURED FROM THE EDGE OF THE PILE OR CASING TO THE WALL. CLOSED-END PILES WILL NOT BE PERMITTED TO BE DRIVEN WITHIN TEN FEET OF THE SUBWAY STRUCTURE.

12. ALL PILES ARE TO BE PLACED WITHIN A PREAUGERED CASED HOLE TO THE INFLUENCE LINE. THE CASING SHALL BE CLEANED WITHOUT DISTURBING THE SOIL OUTSIDE THE CASING AND THE PILE TO BE PLACED WITHIN THE CASING FOR INSTALLATION. THE PILES MAY THEN BE DRIVEN BEYOND THE INFLUENCE LINE WITHIN THE CASING.

13. THE INFLUENCE LINE SHALL START AT THE BOTTOM OF THE SUBWAY STRUCTURE AND EXTEND FROM 1H:1V TO 2H:1V SLOPE DEPENDING ON THE SOIL PROPERTIES AND GROUND WATER TABLE. FOR PILES INSTALLED WITHIN TEN FEET OF THE SUBWAY STRUCTURE, THE CASING SHALL BE EXTENDED UP TO THE BOTTOM OF THE SUBWAY STRUCTURE.

14. ALL PILES ARE TO BE DRIVEN OR DRILLED A MINIMUM OF TEN FEET BELOW THE INTERSECTION OF THE PILE CENTERLINE AND THE INFLUENCE LINE OF THE SUBWAY STRUCTURE.

15. THE USE OF “DOWN-THE-HOLE -HAMMERS” FOR INSTALLATION OF PILES THROUGH OVERBURDEN AND FILL WILL BE PERMITTED ONLY TO REMOVE BOULDERS. IT WILL NOT BE PERMITTED AS A MATTER OF COURSE TO ADVANCE THE HOLE. THEIR USE TO CONSTRUCT ROCK SOCKETS WILL NOT BE ALLOWED WITHIN 5 FEET OF THE NYCT STRUCTURE. THE USE OF MACHINE UTILIZING AIR FOR SOIL REMOVAL WILL NOT BE ALLOWED.

16. VIBRATORY HAMMERS WILL NOT BE PERMITTED WITHIN 75 FEET OF SUBWAY STRUCTURES. HOE RAMS WILL NOT BE PERMITTED WITHIN 25 FEET OF SUBWAY STRUCTURES.

17. DYNAMIC COMPACTION METHODS USING DROPPED HEAVY WEIGHTS CANNOT BE CONDUCTED WITHIN 1000 FEET OF ANY NYCT STRUCTURE UNLESS IT IS SHOWN THAT INDUCED SETTLEMENTS AND VIBRATIONS WILL NOT DAMAGE THESE STRUCTURES. A SUITABLE MONITORING PLAN INCLUDING SETTLEMENT AND VIBRATION MEASUREMENTS MUST BE APPROVED BY NYCT'S ENGINEER FOR ALL SUCH OPERATIONS WITHIN THESE DISTANCES.

18. THERE SHALL BE NO MACHINE EXCAVATION WITHIN 3 FEET OF NYCT STRUCTURES, POWER DUCT LINES, OR ANY OTHER FACILITIES UNTIL THEY HAVE BEEN CAREFULLY EXPOSED BY HAND EXCAVATION.

19. ALL DEWATERING OPERATIONS CONDUCTED WITHIN 500 FEET OF THE NYCT STRUCTURE MUST BE PERFORMED IN ACCORDANCE WITH DRAWINGS AND PROCEDURES SUBMITTED TO NYCT FOR APPROVAL. THE DISTANCE FROM THE STRUCTURE TO THE DEWATERING OPERATION CAN BE REDUCED PROVIDED THAT SOIL CONDITIONS AT THE SITE INDICATE THAT THE RADIUS OF INFLUENCE OF THE DEWATERING IS LESS THAN 500 FEET. FOR DEWATERING WITHIN THE RADIUS OF INFLUENCE, THE DEWATERING PROGRAM MUST BE SHOWN TO HAVE NEGLIGIBLE INFLUENCE ON SETTLEMENTS OF THE NYCT STRUCTURE.

20. SUBWAY ENTRANCES (VENTILATORS, ETC.) ARE TO BE UNDERPINNED OR SHORED AND BRACED IF DIRECTED BY NYCT'S ENGINEER.

21. NYCT, AT ITS DISCRETION, RESERVES THE RIGHT TO REQUIRE THE PROJECT TO CLOSE OR MAINTAIN AND PROTECT EXISTING SUBWAY ENTRANCES, VENTILATORS, ETC. ADJACENT TO THE PROJECT DURING CONSTRUCTION. SUCH CONSTRUCTION MAY INCLUDE UNDERPINNING, SHORING, BRACING AND ERECTION OF SUITABLE BARRICADES AND/OR CANOPIES AND SHIELDS. SUCH PROTECTION SHALL BE IN ACCORDANCE WITH DRAWINGS SUBMITTED TO NYCT FOR APPROVAL.

22. IF SHIELDS ARE TO BE INSTALLED TO PROTECT NYCT FACILITIES AND/OR THE PUBLIC, PLANS SHOWING THE LOCATION, TYPE AND METHOD OF ATTACHMENT TO THE TRANSIT STRUCTURE MUST BE SUBMITTED TO NYCT FOR APPROVAL.

23. ALL LUMBER AND PLYWOOD USED FOR PROTECTION OF SUBWAY FACILITIES MUST BE FIRE RETARDANT.

24. SUBWAY EMERGENCY EXITS MUST BE KEPT CLEAR AT ALL TIMES.

25. IN EXCAVATING OVER OR NEAR THE SUBWAY ROOF, SPECIAL CARE SHALL BE EXERCISED SO THAT THE THIN CONCRETE PROTECTION OF THE SUBWAY WATERPROOFING IS NOT DAMAGED.

26. BURNING OF, WELDING TO OR DRILLING THROUGH EXISTING STEEL STRUCTURES WILL NOT BE PERMITTED EXCEPT AS SHOWN ON DRAWINGS APPROVED BY NYCT.

27. HORIZONTAL AND VERTICAL CONTROL SURVEY DATA OF THE EXISTING NYCT STRUCTURE IS TO BE TAKEN BY A LICENSED LAND SURVEYOR TO MONITOR ANY MOVEMENTS THAT OCCUR DURING CONSTRUCTION AND TO SHOW THAT THE INDUCED MOVEMENTS ARE WITHIN ALLOWABLES NOTED BELOW. IF ANY MOVEMENTS EXCEED ALLOWABLES, REMEDIATION AS APPROVED BY NYCT SHALL BE PERFORMED.

STRUCTURE	NOTIFY NYCT ENGINEER	STOP WORK
ELEVATED	1/8 INCH	¼ INCH
SUBWAY	¼ INCH	½ INCH

28. BUS ROUTES AFFECTED BY THE PROJECT WILL OR MAY REQUIRE BUS DIVERSIONS. THESE ARRANGEMENTS SHALL BE MADE THROUGH:

MS. SARAH WYSS
SENIOR DIRECTOR, OPERATIONS PLANNING
NEW YORK CITY TRANSIT
2 BROADWAY, ROOM A17.82
NEW YORK, NEW YORK 10004
TELEPHONE NUMBER 646/252-5517

WHEN IMPACTING ANY BUS STOP, SPECIAL OPERATIONS MUST BE NOTIFIED TWO WEEKS IN ADVANCE.

29. DUCT LINES MUST BE MAINTAINED AND PROTECTED DURING CONSTRUCTION. ANY INTERFERENCE WITH DUCT LINES SHOULD BE REPORTED TO NYCT INSPECTOR. WHEN A DUCT LINE CONTAINING CABLES IS TO BE REMOVED, OR WHEN MASONRY ADJACENT THERETO IS TO BE REMOVED, PENETRATED, OR DRILLED, THE WORK SHALL BE DONE WITH HAND LABOR ENTIRELY, USING HAMMER AND CHISEL. JACKHAMMERS, BULL POINTS OR OTHER POWER EQUIPMENT SHALL NOT BE USED.

30. WHERE MANHOLES ARE ENCOUNTERED:

    a) THEY SHALL BE PROTECTED AND RAISED OR LOWERED AS REQUIRED, TO MATCH THE NEW STREET GRADE.

    b) IF MANHOLE COVERS ARE RAISED OR LOWERED, PROTECT CABLES IN MANHOLE BY WOOD SHEETING OF 2” NOMINAL THICKNESS.

    c) PRIOR TO THE START OF CONSTRUCTION OPERATIONS AFFECTING MANHOLES AND DUCT LINES, SEVEN DAYS NOTICE MUST BE GIVEN TO MR. PIERRE SYLDOR, SR. DIRECTOR, CIVIL/STRUCTURAL ENGINEERING, DEPT. OF SUBWAYS, AT 718/694-1465.

31. CONSTRUCTION WORK DONE NEAR VENT GRATINGS AND HATCHES SHALL BE AS FOLLOWS:

    a) UNLESS APPROVED BY THE NYCT'S ENGINEER, ALL VENT GRATINGS AND HATCHES SHOULD REMAIN OUTSIDE THE CONSTRUCTION SITE, SEPARATED BY A CONSTRUCTION FENCE. PROTECTIVE SHIELDS MUST BE PROVIDED OVER VENT GRATINGS AS REQUIRED BY NYCT'S ENGINEER.

    b) NO BUILDING MATERIAL, VEHICLES OR CONSTRUCTION EQUIPMENT IS TO BE STORED OR RUN OVER VENT, GRATINGS, HATCHES OR EMERGENCY EXITS.

    c) DETAILS OF SIDEWALK RECONSTRUCTION AROUND VENT GRATINGS, HATCHES AND EMERGENCY EXITS ARE TO BE SUBMITTED TO NYCT FOR APPROVAL.

32. TRACTORS, CRANES, EXCAVATORS, ETC. USED IN THE VICINITY OF THE ELEVATED STRUCTURES SHALL BE ISOLATED FROM THE GROUND. SINCE THE ELEVATED STRUCTURE IS USED AS A NEGATIVE RETURN PATH, WITH A CONSEQUENT POTENTIAL BETWEEN IT AND THE GROUND, ANY CONTACT BETWEEN THE STRUCTURE AND GROUNDED EQUIPMENT COULD RESULT IN BURNING OF THE STEEL.

33. TEMPORARY CONSTRUCTION SHEDS, BARRICADES OR PLYWOOD PARTITIONS MUST BE A MINIMUM OF 5'-0” FROM EDGE OF FINISHED PLATFORM. ALL BARRICADES MUST BE SUBMITTED TO THE OFFICE OF STATION PROGRAMS FOR REVIEW AND APPROVAL.

34. STATION AREAS OR STAIRWAY/CLOSINGS: THE GENERAL REQUIREMENTS FOR STATION AREAS OR STAIRWAY/CLOSINGS ARE AS FOLLOWS:

    a) ONLY ONE STAIRWAY AT EACH STATION WILL BE PERMITTED TO BE CLOSED AT THE SAME TIME. APPROVALS FOR CLOSING ANY STAIRWAY MUST BE OBTAINED FROM THE DIVISION OF STATION PROGRAMS AT LEAST THREE WEEKS IN ADVANCE.

    b) MS. SUSANNAH HARRINGTON, DIRECTOR, OFFICE OF STATION PROGRAMS; TELEPHONE 718/694-4891 OF THE DIVISION OF STATIONS MUST BE NOTIFIED THREE WEEKS PRIOR TO THE ACTUAL CLOSING AND REOPENING OF THE ENTRANCE.

    c) SIGNAGE MUST BE SUPPLIED AND POSTED AT LEAST TWO WEEKS IN ADVANCE, ADVISING THE PUBLIC OF THE PROPOSED SUBWAY STAIR CLOSING. HOWEVER, IF IT IS AN ENTIRE ENTRANCE CLOSING, SIGNAGE MUST BE POSTED TWO WEEKS IN ADVANCE.

    d) THE STREET ENTRANCE STAIRWAY SHOULD NOT BE CLOSED UNLESS MANPOWER AND MATERIALS ARE AVAILABLE TO COMMENCE WORK ON DATES PERMITTED.

    e) ONCE THE CLOSING IS EFFECTED, CONSTRUCTION SIGNS MUST BE PLACED AT APPROPRIATE LOCATIONS ON THE BARRICADES AT THE STREET AND MEZZANINE LEVELS, STATING THE CONTRACTOR'S NAME, 24 HOUR EMERGENCY TELEPHONE NUMBER, CONTRACT NUMBER, THE DURATION OF THE CLOSING, DIRECTION TO AN ALTERNATE ENTRANCE/EXIT, AND AN APOLOGY FOR THE INCONVENIENCE TO OUR CUSTOMERS.

    f) EXISTING STATION SIGNAGE MUST BE ADJUSTED TO REFLECT ANY CHANGES IN ACCESS/EGRESS.

    g) BARRICADES ARE TO BE PAINTED FEDERAL BLUE AND BE MADE OF FIRE RATED MATERIAL. BARRICADES MUST BE KEPT GRAFFITI FREE AT ALL TIMES. THE CONTRACTOR MUST MAINTAIN THE BARRICADED AREA CLEAN OF ALL DEBRIS.

    h) ALL MATERIALS ARE TO BE PROPERLY STORED AND SECURED AWAY FROM CUSTOMER TRAFFIC.

    i) THE CONTRACTOR MUST REMOVE ALL WASTE MATERIAL AND BARRICADES FROM ALL STATION AREAS WHEN CONSTRUCTION IS COMPLETED.

    j) INSPECTION OF THE AREA UNDER CONSTRUCTION BY AUTHORIZED STATION DEPARTMENT EMPLOYEES SHALL NOT BE INHIBITED.

    k) IF STREETLIGHTS ON THE SIDEWALKS ARE AFFECTED, TEMPORARY LIGHTS SHALL BE PROVIDED.

35. IF NEW CONCRETE CONSTRUCTION IS JOINED TO EXISTING CONCRETE, DOWELS AND KEYWAYS ARE TO BE USED IN ACCORDANCE WITH NYCT STANDARDS.

36. IF THE PROJECT INVOLVES CONSTRUCTION OR ALTERATION OF A SUBWAY FACILITY ON PRIVATE PROPERTY, THE PROPERTY OWNERS WILL BE REQUIRED TO ENTER INTO AN AGREEMENT WITH NYCT PERTAINING TO ALL WORK AFFECTING THE TRANSIT FACILITIES AND CLEARLY DEFINING LIMITS AND RESPONSIBILITY FOR MAINTENANCE AND LIABILITY.

37. WHEREVER A NEW SIDEWALK IS BEING PLACED ADJACENT TO NYCT STRUCTURES THE FOLLOWING WILL BE REQUIRED:

    a) THE TOP OF THE NEW SIDEWALK SHALL BE FLUSH WITH THE SUBWAY VENT GRATINGS, HATCHES AND EMERGENCY EXITS.

    b) THE SLOPE OF THE NEW SIDEWALK SHALL BE SUCH THAT THE DRAINAGE BE AWAY FROM THESE STRUCTURES.

    c) A 1/2" PREMOLDED FILLER SHALL BE INSTALLED BETWEEN THE NEW SIDEWALK AND NYCT STRUCTURE.

    d) WHERE SIDEWALK ELEVATIONS ARE BEING CHANGED DETAILS OF PROPOSED WORK AROUND NYCT STRUCTURES ARE TO BE SUBMITTED FOR APPROVAL.

38. BEFORE ENTERING NYCT PROPERTY, CONTRACTOR OR SUBCONTRACTOR'S PERSONNEL SHALL HAVE ATTENDED NYCT TRACK SAFETY TRAINING AND EXPECT TO FOLLOW NYCT RULES AND REGULATIONS AS PER TRAINING AND ENGINEER INSTRUCTIONS

39. BEFORE THE START OF ANY WORK, THE CONTRACTOR SHALL MAKE AN EXAMINATION, IN THE PRESENCE OF NYCT'S ENGINEER, OF THE INTERIOR AND EXTERIOR OF NYCT SUBWAY OR OTHER STRUCTURE ADJACENT TO THE PROPOSED WORK. THE PERSON OR PERSONS AUTHORIZED BY THE CONTRACTOR TO MAKE THESE EXAMINATIONS SHALL BE APPROVED BY THE ENGINEER. THE CONTRACTOR SHALL TAKE ALL PHOTOGRAPHS AS MAY BE NECESSARY OR ORDERED TO INDICATE THE EXISTING CONDITION OF NYCT STRUCTURE. ONE COPY OF EACH PHOTOGRAPH, EIGHT INCHES BY TEN INCHES IN SIZE, AND THE NEGATIVE IS TO BE SUBMITTED TO MR. PIERRE SYLDOR, SR. DIRECTOR, CIVIL/STRUCTURAL ENGINEERING, DEPT. OF SUBWAYS, 130 LIVINGSTON STREET, ROOM 8032F, BROOKLYN, NEW YORK 11201, TELEPHONE 718/694-1465 BEFORE THE START OF CONSTRUCTION.

40. ALL ARCHITECTURAL DETAILS (SERVICE BOOTHS, RAILINGS, DOORS, ETC.) ARE TO CONFORM TO THE LATEST NYCT STANDARDS. THESE STANDARDS ARE AVAILABLE AT NYCT.

41. STANDARD NYCT INSURANCE CLAUSES ARE TO BE MADE PART OF THE PROJECT'S CONTRACT DRAWINGS. PROOF THAT THE NECESSARY INSURANCE IS IN EFFECT WILL BE REQUIRED BEFORE WORK CAN COMMENCE.

42. AT THE CLOSE OF ANY PROJECT INVOLVING CONSTRUCTION OR ALTERATIONS TO TRANSIT FACILITIES, ONE SET OF VELLUMS OR MYLARS, FIVE SETS OF 35MM MICROFILM, AND ELECTRONIC COPIES COMPLYING TO MICROSTATION.DGN FORMAT OF “APPROVED AS-BUILTS” MUST BE PROVIDED TO NYCT FOR ITS RECORDS. FOR DETAILS OF SPECIFIC REQUIREMENTS CONTACT NYCT OUTSIDE PROJECTS.

43. AT LEAST THREE WEEKS PRIOR TO THE START OF CONSTRUCTION OPERATIONS, NOTIFICATION MUST BE GIVEN TO MR. PIERRE SYLDOR, SR. DIRECTOR, CIVIL/STRUCTURAL ENGINEERING, DEPT. OF SUBWAYS. THE CONTRACTOR TO PROVIDE TEMPORARY QUARTERS NEAR THE JOB SITE FOR NYCT INSPECTORS CONTAINING A DESK AND TELEPHONE.

NYCT "NOT FOR BENEFIT" INSURANCE REQUIREMENTS

SECTION A: INSURANCE REQUIREMENTS

THE PERMITTEE AT ITS SOLE COST AND EXPENSE SHALL CARRY AND MAINTAIN POLICIES OF INSURANCE AT ALL TIMES DURING THE PERIOD OF PERFORMANCE UNDER THIS AGREEMENT AS HEREIN SET FORTH BELOW:

1 WORKERS' COMPENSATION: INCLUDING EMPLOYER'S LIABILITY INSURANCE WITH LIMITS OF LIABILITY NOT LESS THAN $2,000,000 WHICH MAY BE MET BY A COMBINATION OF PRIMARY AND EXCESS INSURANCE MEETING THE STATUTORY LIMITS OF NEW YORK STATE.

2. COMMERCIAL GENERAL LIABILITY: (ISO 2001 FORM OR EQUIVALENT) APPROVED BY PERMITTOR IN THE PERMITTEE'S NAME WITH LIMITS OF LIABILITY IN THE AMOUNT OF NOT LESS THAN $3,000,000 FOR EACH OCCURRENCE ON A COMBINED SINGLE LIMIT BASIS FOR INJURIES TO PERSONS (INCLUDING DEATH) AND DAMAGE TO PROPERTY, $3,000,000 GENERAL AGGREGATE AND $3,000,000 IN THE AGGREGATE WITH RESPECT TO PRODUCTS/COMPLETED OPERATIONS. THE LIMITS MAY BE PROVIDED IN THE FORM OF A PRIMARY POLICY OR COMBINATION OF PRIMARY AND UMBRELLA/EXCESS POLICY. WHEN THE MINIMUM CONTRACT AMOUNTS CAN ONLY BE MET WHEN APPLYING THE UMBRELLA/EXCESS POLICY, THE UMBRELLA/EXCESS POLICY MUST FOLLOW FORM OF THE UNDERLYING POLICY AND BE EXTENDED TO "DROP DOWN" TO BECOME PRIMARY IN THE EVENT PRIMARY LIMITS ARE REDUCED OR AGGREGATE LIMITS ARE EXHAUSTED. SUCH INSURANCE SHALL BE PRIMARY AND NON-CONTRIBUTORY TO ANY OTHER VALID AND COLLECTIBLE INSURANCE AND MUST BE EXHAUSTED BEFORE IMPLICATING ANY PERMITTOR/MTA POLICY AVAILABLE.

    SUCH POLICY SHOULD BE WRITTEN ON AN OCCURRENCE FORM, AND SHALL INCLUDE THE FOLLOWING COVERAGES:

    - ADDITIONAL INSURED ENDORSEMENT (I.S.O. FORM CG 20 26 07/04) VERSION OR EQUIVALENT APPROVED BY THE PERMITTOR, SHALL NAME THE INDEMNITEES AS REFERENCED UNDER SECTION B OF THIS AGREEMENT AS ADDITIONAL INSUREDS.
    - CONTRACTUAL LIABILITY ASSUMED BY THE PERMITTEE UNDER THIS AGREEMENT;
    - PERSONAL AND ADVERTISING INJURY;
    - PRODUCTS-COMPLETED OPERATIONS;
    - INDEPENDENT CONTRACTORS;
    - "XCU" (EXPLOSION, COLLAPSE, AND UNDERGROUND HAZARDS) WHERE NECESSARY;
    - CONTRACTUAL LIABILITY EXCLUSION, APPLICABLE TO CONSTRUCTION OR DEMOLITION OPERATIONS TO BE PERFORMED WITHIN 50 FEET OF RAILROAD TRACKS, MUST BE REMOVED, WHERE NECESSARY;

3. BUSINESS AUTOMOBILE LIABILITY: (ISO FORM CA 00 01 10 01 OR EQUIVALENT) APPROVED BY THE PERMITTOR IS REQUIRED IF PERMITTEE'S VEHICLE ENTERS PERMITTOR'S PROPERTY. THE INSURANCE MUST BE IN THE NAME OF THE PERMITTEE OR ITS CONTRACTOR ENTERING THE PERMITTOR PROPERTY WITH LIMITS OF LIABILITY IN THE AMOUNT OF NOT LESS THAN $2,000,000 EACH ACCIDENT FOR CLAIMS FOR BODILY INJURIES (INCLUDING DEATH) TO PERSONS AND FOR DAMAGE TO PROPERTY ARISING OUT OF THE OWNERSHIP, MAINTENANCE OR USE OF ANY OWNED, HIRED OR NON-OWNED MOTOR VEHICLE.

4. RAILROAD PROTECTIVE LIABILITY: (ISO-RIMA OR EQUIVALENT FORM) APPROVED BY PERMITTOR COVERING THE WORK TO BE PERFORMED AT THE DESIGNATED JOB SITE AND AFFORDING PROTECTION FOR DAMAGES ARISING OUT OF BODILY INJURY OR DEATH, PHYSICAL DAMAGE TO OR DESTRUCTION OF PROPERTY, INCLUDING DAMAGE TO THE INSURED'S OWN PROPERTY AND CONFORMING TO THE FOLLOWING:

    - THE POLICY SHALL BE ISSUED TO THE "NAMED INSUREDS" LISTED UNDER SECTION B.
    - THE LIMIT OF LIABILITY SHALL BE NOT LESS THAN $2,000,000 PER OCCURRENCE, SUBJECT TO A $6,000,000 ANNUAL AGGREGATE;
    - POLICY MUST BE ENDORSED TO PROVIDE COVERAGE FOR CLAIMS ARISING FROM INJURY TO EMPLOYEES COVERED BY FEDERAL EMPLOYER'S LIABILITY ACT (FELA).
    - INDICATE THE NAME AND ADDRESS OF THE DESIGNATED CONTRACTOR, PROJECT LOCATION AND DESCRIPTION OF WORK, AND PERMIT NUMBER IF APPLICABLE.
    - EVIDENCE OF RAILROAD PROTECTIVE LIABILITY INSURANCE, MUST BE PROVIDED IN THE FORM OF A POLICY. A DETAILED INSURANCE BINDER (ACORD OR MANUSCRIPT FORM) WILL BE ACCEPTED PENDING ISSUANCE OF THE POLICY, WHICH MUST BE PROVIDED WITHIN 30 DAYS FROM THE EFFECTIVE DATE.

5. ENVIRONMENTAL INSURANCE: IN THE EVENT ENVIRONMENTAL OR POLLUTION EXPOSURES EXIST, THE PERMITTEE SHALL REQUIRE THE ENVIRONMENTAL CONTRACTOR OR SUB-CONTRACTOR TO PROVIDE THE APPLICABLE INSURANCE COVERING SUCH EXPOSURE. THE LIMITS AND TYPES OF INSURANCE PROVIDED MUST BE SATISFACTORY TO THE PERMITTOR AND APPROVED PRIOR TO THE START OF THE WORK.

SECTION B: INDEMNITEES (ADDITIONAL INSUREDS / NAMED INSUREDS)

NEW YORK CITY TRANSIT AUTHORITY ("NYCT"), THE MANHATTAN AND BRONX SURFACE TRANSIT OPERATING AUTHORITY ("MABSTOA"), THE STATEN ISLAND RAPID TRANSIT OPERATING AUTHORITY ("SIRTOA"), THE METROPOLITAN TRANSPORTATION AUTHORITY ("MTA") INCLUDING ITS SUBSIDIARIES AND AFFILIATES, MTA CAPITAL CONSTRUCTION ("MTACC"), MTA BUS COMPANY ("MTA BUS"), AND THE CITY OF NEW YORK ("CITY" AS OWNER) AND THE RESPECTIVE AFFILIATES AND SUBSIDIARIES EXISTING CURRENTLY OR IN THE FUTURE OF AND SUCCESSORS TO EACH INDEMNIFIED PARTIES LISTED HEREIN.

SECTION C: GENERAL INSURANCE REQUIREMENTS

1. INSURANCE COMPANIES: ALL OF THE INSURANCE REQUIRED BY THIS ARTICLE SHALL BE WITH COMPANIES LICENSED OR AUTHORIZED TO DO BUSINESS IN THE STATE OF NEW YORK WITH AN A.M. BEST COMPANY RATING OF NOT LESS THAN A-/VII OR BETTER AND REASONABLY APPROVED BY THE PERMITTOR/MTA.

2. FORMS: ALL FORMS SHALL COMPLY WITH THE INSURANCE SERVICES OFFICE, INC. ("ISO") OR ITS EQUIVALENT APPROVED BY THE INSURANCE DEPARTMENT OF THE STATE OF NEW YORK

3. POLICY DEDUCTIBLE / SELF INSURED RETENTION: INSURANCE MAY CONTAIN A DEDUCTIBLE AND OR SELF-INSURED RETENTION AND SHALL NOT EXCEED $100,000. THE PERMITTEE SHALL BE RESPONSIBLE FOR ALL CLAIM EXPENSES AND LOSS PAYMENTS WITHIN THE DEDUCTIBLE OR SELF-INSURED RETENTION.

4. POLICY TERMS: THESE POLICIES MUST: (I) BE WRITTEN IN ACCORDANCE WITH THE REQUIREMENTS OF THE PARAGRAPHS ABOVE, AS APPLICABLE; (II) BE ENDORSED IN FORM ACCEPTABLE TO INCLUDE A PROVISION THAT SHOULD THE POLICY BE CANCELED, MATERIALLY CHANGED, OR NOT RENEWED, NOTICE SHALL BE DELIVERED IN ACCORDANCE WITH THE INSURANCE POLICY PROVISIONS TO THE PERMITTOR, AND (III) STATE OR BE ENDORSED TO PROVIDE THAT THE COVERAGE AFFORDED UNDER THE PERMITTEE'S POLICIES SHALL APPLY ON A PRIMARY AND NOT ON AN EXCESS OR CONTRIBUTING BASIS WITH ANY POLICIES WHICH MAY BE AVAILABLE TO THE PERMITTOR/MTA, AND ALSO THAT THE PERMITTEE'S POLICIES, PRIMARY AND EXCESS, MUST BE EXHAUSTED BEFORE IMPLICATING ANY PERMITTOR/MTA POLICY AVAILABLE. (IV) IN ADDITION, PERMITTEE'S POLICIES SHALL STATE OR BE ENDORSED TO PROVIDE THAT, IF A SUBCONTRACTOR'S POLICY CONTAINS ANY PROVISION THAT MAY ADVERSELY AFFECT WHETHER PERMITTEE'S POLICIES ARE PRIMARY AND MUST BE EXHAUSTED BEFORE IMPLICATING ANY PERMITTOR/MTA POLICY AVAILABLE, PERMITTEE'S AND SUBCONTRACTOR'S POLICIES SHALL NEVERTHELESS BE PRIMARY AND MUST BE EXHAUSTED BEFORE IMPLICATING ANY PERMITTOR/MTA POLICY AVAILABLE. AT LEAST TWO (2) WEEKS PRIOR TO THE EXPIRATION OF THE POLICIES, THE PERMITTEE SHALL ENDEAVOR TO PROVIDE EVIDENCE OF RENEWAL OR REPLACEMENT POLICIES OF INSURANCE, WITH TERMS AND LIMITS NO LESS FAVORABLE THAN THE EXPIRING POLICIES.

SECTION D: SUBMISSION OF INSURANCE

CERTIFICATES OF INSURANCE MAY BE SUPPLIED AS EVIDENCE OF POLICIES EXCEPT FOR RAILROAD PROTECTIVE LIABILITY. HOWEVER, IF REQUESTED BY THE PERMITTOR, THE PERMITTEE SHALL DELIVER TO THE PERMITTOR WITHIN FORTY-FIVE (45) DAYS A COPY OF SUCH POLICIES, CERTIFIED BY THE INSURANCE CARRIER AS BEING TRUE AND COMPLETE. IF A CERTIFICATE OF INSURANCE IS SUBMITTED, IT MUST: (1) BE PROVIDED ON THE PERMITTOR CERTIFICATE OF INSURANCE; (2) BE SIGNED BY AN AUTHORIZED REPRESENTATIVE OF THE INSURANCE CARRIER OR PRODUCER AND NOTARIZED; (3) DISCLOSE ANY DEDUCTIBLE, SELF-INSURED RETENTION, SUB-LIMIT, AGGREGATE LIMIT OR ANY EXCLUSIONS TO THE POLICY THAT MATERIALLY CHANGE THE COVERAGE; (4) INDICATE THE ADDITIONAL INSUREDS AS REQUIRED HEREIN UNDER SECTION B; THE PERMITTEE MUST PROVIDE A COPY OF THE ADDITIONAL INSURED ENDORSEMENT (ISO) FORM CG 20 26 07/04 OR ITS EQUIVALENT AND MUST REFERENCE THE POLICY INFORMATION; (5) INDICATE PROJECT NAME AND LOCATION ON THE CERTIFICATE; AND (6) EXPRESSLY REFERENCE THE INCLUSION OF ALL REQUIRED ENDORSEMENTS.

THE PERMITTEE OR ITS CONTRACTOR/SUBCONTRACTOR PERFORMING THE WORK SHALL FURNISH EVIDENCE OF ALL POLICIES BEFORE ANY WORK IS STARTED TO THE APPROPRIATE DEPARTMENT:

NEW AGREEMENTS:
MTA/NYCT MOW ENGINEERING
ATTENTION: MR. PIERRE SYLDOR
130 LIVINGSTON STREET
BROOKLYN, NY 11201

RENEWAL INSURANCE:
MTA RISK INSURANCE MANAGEMENT
ATTENTION: RUTH APOSTOL
2 BROADWAY - 21ST FLOOR
NEW YORK, NY 10004

SECTION E: NO LIMIT OF LIABILITY

THE MINIMUM AMOUNTS OF INSURANCE REQUIRED IN THE DETAIL DESCRIPTION OF POLICIES ABOVE SHALL NOT BE CONSTRUED TO LIMIT THE EXTENT OF THE PERMITTEE'S LIABILITY UNDER THIS AGREEMENT.

SECTION F: RIGHT TO REQUEST ADDITIONAL INSURANCE

PERMITTEE FURTHER AGREES TO PROVIDE, AT PERMITTEE'S SOLE COST AND EXPENSE, SUCH INCREASED OR EXPANDED INSURANCE COVERAGE AS PERMITTOR MAY FROM TIME TO TIME AS DEEM APPROPRIATE.

SECTION G: EVENT OF DEFAULT

IF, AT ANY TIME DURING THE PERIOD OF THIS AGREEMENT, INSURANCE AS REQUIRED IS NOT IN EFFECT, OR PROOF THEREOF IS NOT PROVIDED TO THE PERMITTOR, THE PERMITTOR SHALL HAVE THE OPTIONS TO: (I) DIRECT THE PERMITTEE TO SUSPEND WORK OR OPERATION WITH NO ADDITIONAL COST OR EXTENSION OF TIME DUE ON ACCOUNT THEREOF; OR (II) TREAT SUCH FAILURE AS AN EVENT OF DEFAULT.

SECTION H: NOTICE OF CLAIM

THE PERMITTEE SHALL IMMEDIATELY FILE WITH NYCT/MTA'S TORT DIVISION (WITH A COPY TO THE PROJECT MANAGER), 130 LIVINGSTON STREET, 11TH FLOOR, BROOKLYN, NEW YORK 11201, A NOTICE OF ANY OCCURRENCE LIKELY TO RESULT IN A CLAIM AGAINST NYCT/MTA AND SHALL ALSO FILE WITH THE TORTS DIVISION DETAILED SWORN PROOF OF INTEREST AND LOSS WITH THE CLAIM. THIS PARAGRAPH SHALL SURVIVE THE EXPIRATION OR EARLIER TERMINATION OF THE CONTRACT.

LOCATION PLAN

GEODESIGN
INCORPORATED
Geotechnical | Construction | Environmental
Engineers and Scientists
60 PARK PLACE, SUITE 302 • NEWARK, NJ 07102
TELEPHONE: 973.803.4515
www.geodesign.net

CLIENT:

STORAGE CONSTRUCTION CO., LLC
26 WEST 17TH STREET, SUITE 801
NEW YORK, NY 10011

REVISIONS:

#	DATE	DESCRIPTION

PROJECT:

74 BOGART STREET
BROOKLYN, NY

DRAWING:

SUPPORT OF EXCAVATION
NYCTA NOTES & INSURANCE

DATE:	04/26/2019	DESIGNED BY:	AR
SCALE:	AS SHOWN	DRAWN BY:	RH
PROJECT NO:	4139-001	APPROVED BY:	TGT
		DRAWING NO.	

SOE-002.00

SHEET 2 OF 7

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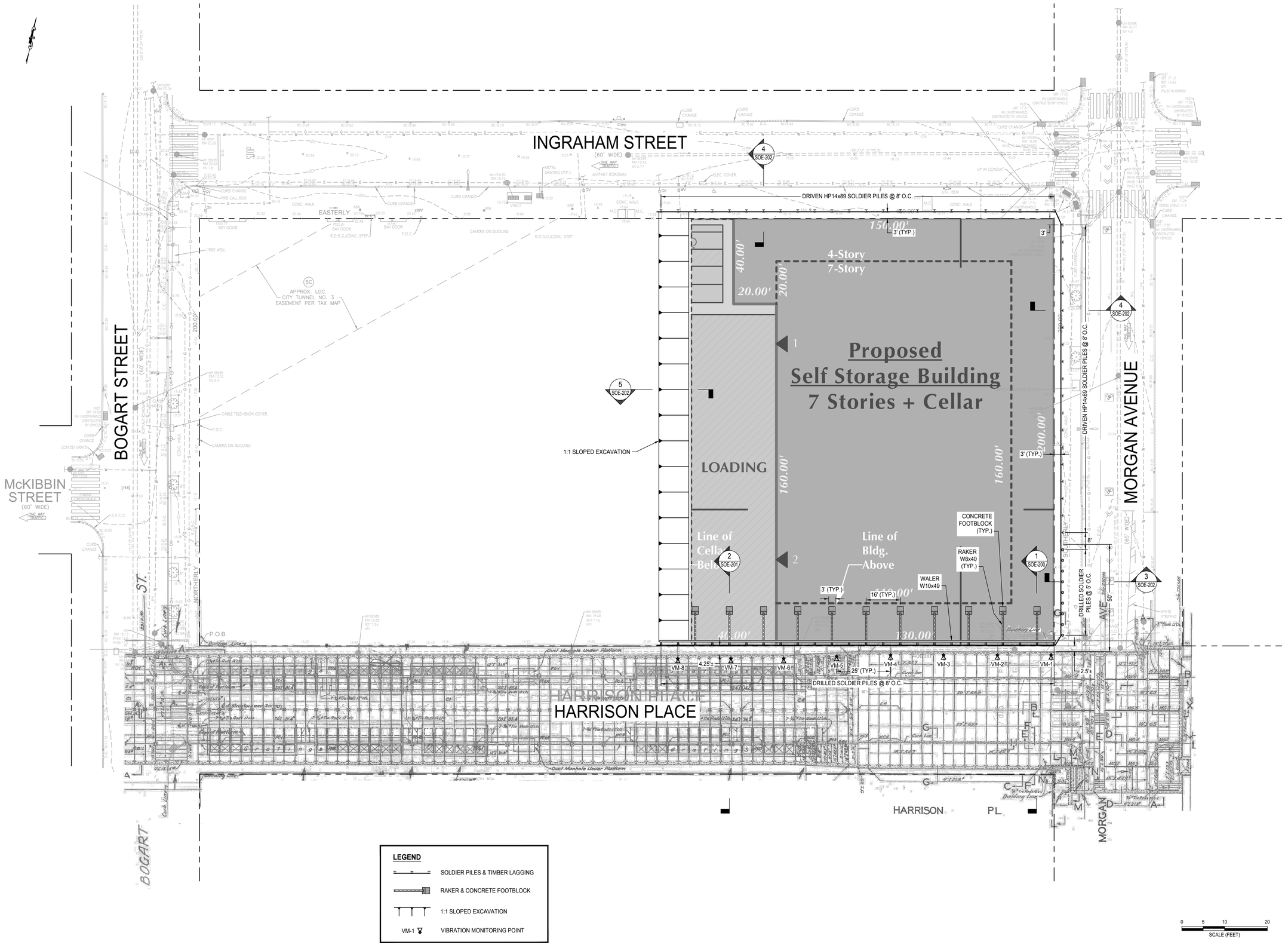

LEGEND

- SOLDIER PILES & TIMBER LAGGING
- RAKER & CONCRETE FOOTBLOCK
- 1:1 SLOPED EXCAVATION
- VM-1 VIBRATION MONITORING POINT

SCALE (FEET): 0 5 10 20

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REVISIONS:

#	DATE	DESCRIPTION

PROJECT:

74 BOGART STREET
BROOKLYN, NY

DRAWING:

SUPPORT OF EXCAVATION PLAN

DATE:	04/26/2019	DESIGNED BY:	AR
SCALE:	AS SHOWN	DRAWN BY:	RH
PROJECT NO:	4139-001	APPROVED BY:	TGT

DRAWING NO.

SOE-100.00

SHEET 3 OF 7

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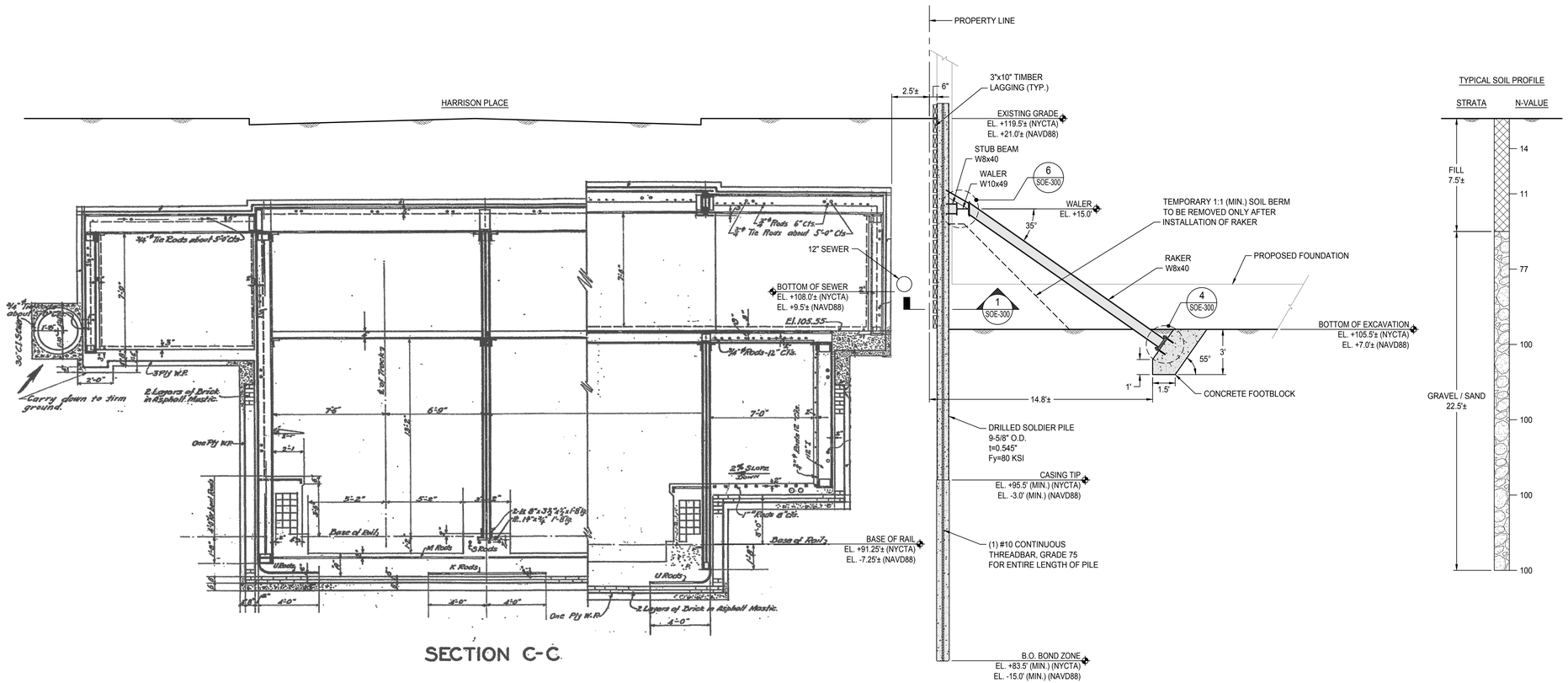

SECTION C-C

1 SOE-200 SECTION
SCALE: 1" = 4'

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www.geodesign.net

CLIENT:

STORAGE CONSTRUCTION CO., LLC
26 WEST 17TH STREET, SUITE 801
NEW YORK, NY 10011

REVISIONS:

#	DATE	DESCRIPTION

PROJECT:

74 BOGART STREET
BROOKLYN, NY

DRAWING:

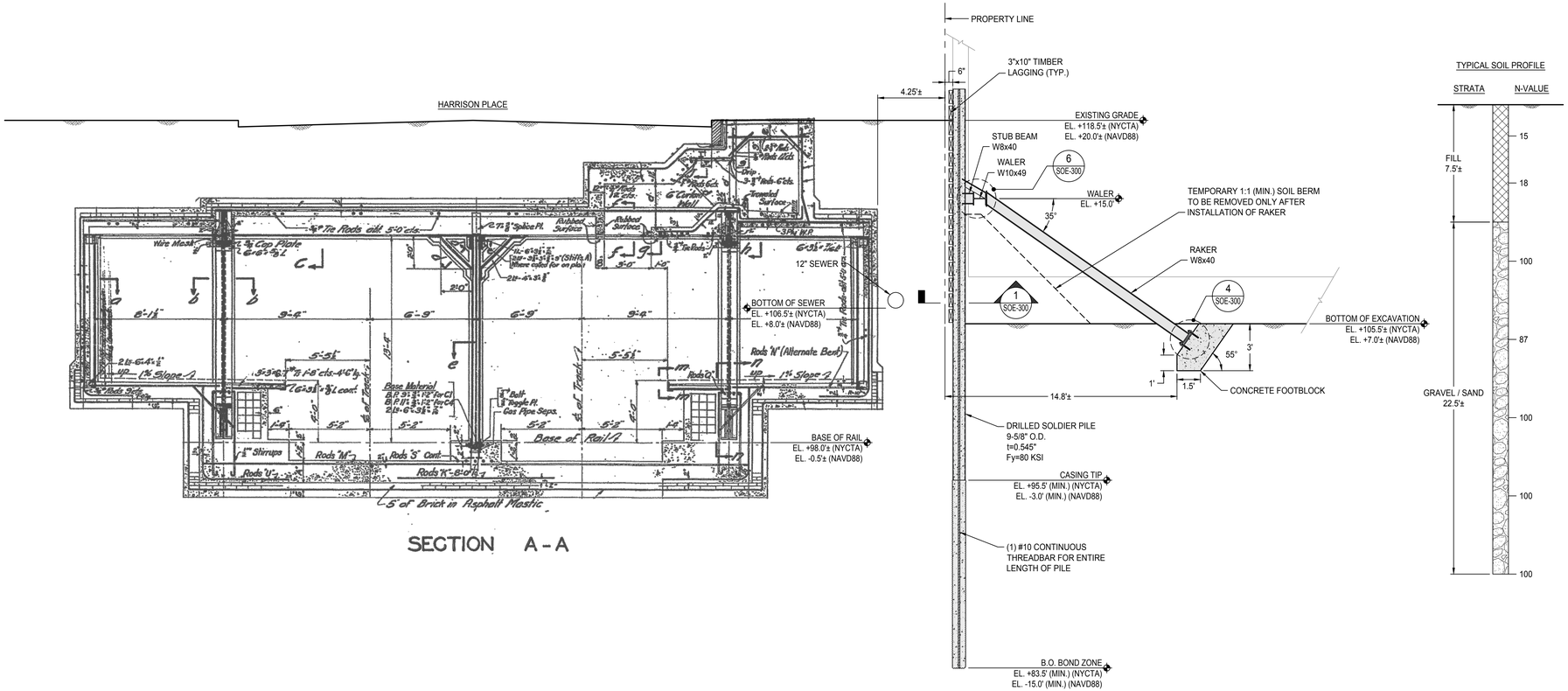
SUPPORT OF EXCAVATION CROSS SECTIONS

DATE:	04/26/2019	DESIGNED BY:	AR
SCALE:	AS SHOWN	DRAWN BY:	RH
PROJECT NO:	4139-001	APPROVED BY:	TGT

DRAWING NO.

SOE-200.00

SHEET 4 OF 7



2 SOE-201 **SECTION**
SCALE: 1" = 4'

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STORAGE CONSTRUCTION CO., LLC
26 WEST 17TH STREET, SUITE 801
NEW YORK, NY 10011

REVISIONS:

#	DATE	DESCRIPTION

PROJECT:

74 BOGART STREET
BROOKLYN, NY

DRAWING:

SUPPORT OF EXCAVATION
CROSS SECTIONS

DATE:	04/26/2019	DESIGNED BY:	AR
SCALE:	AS SHOWN	DRAWN BY:	RH
PROJECT NO:	4139-001	APPROVED BY:	TGT
		DRAWING NO.	

SOE-201.00

SHEET 5 OF 7

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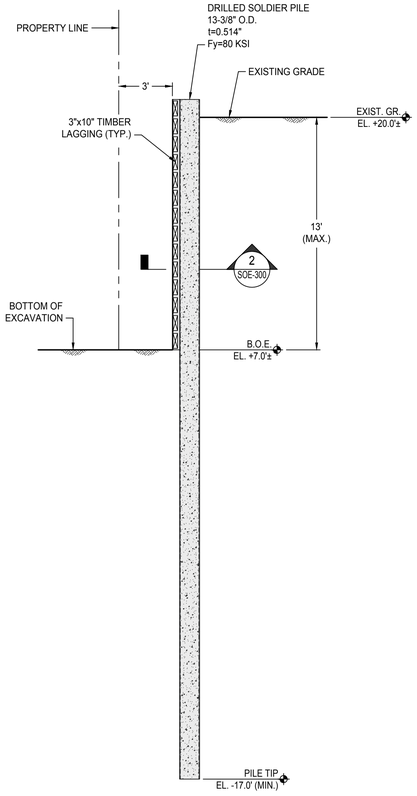

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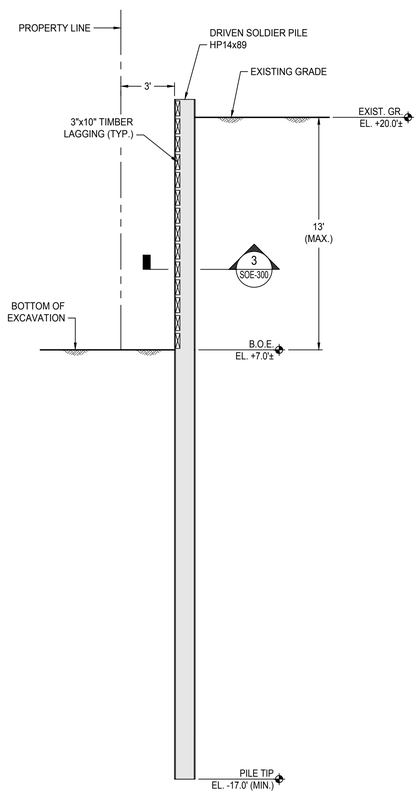

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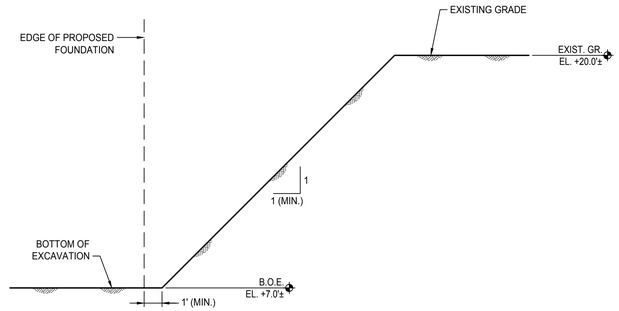

4 SOE-202 SECTION
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NEW YORK, NY 10011

REVISIONS:

#	DATE	DESCRIPTION

PROJECT:

74 BOGART STREET
BROOKLYN, NY

DRAWING:

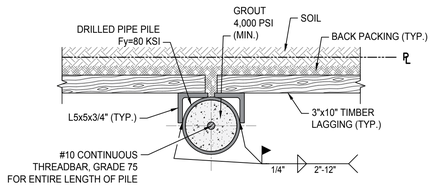
SUPPORT OF EXCAVATION
CROSS SECTIONS

DATE:	04/26/2019	DESIGNED BY:	AR
SCALE:	AS SHOWN	DRAWN BY:	RH
PROJECT NO:	4139-001	APPROVED BY:	TGT

DRAWING NO.

SOE-202.00

SHEET 6 OF 7



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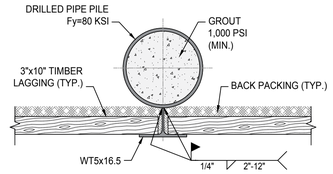

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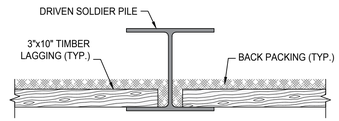

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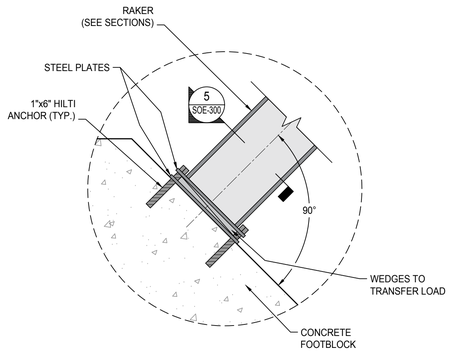

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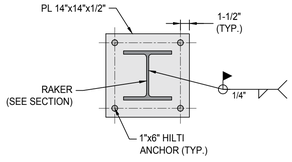

5 SOE-300 RAKER-FOOTBLOCK CONNECTION
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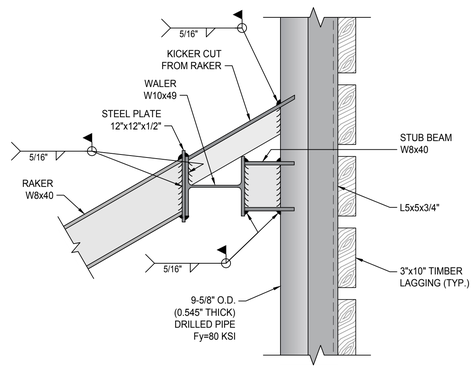

6 SOE-300 RAKER-WALER CONNECTION DETAILS
N.T.S.

GEODESIGN INCORPORATED
Geotechnical | Construction | Environmental
Engineers and Scientists
60 PARK PLACE, SUITE 302 • NEWARK, NJ 07102
TELEPHONE: 973.803.4515
www.geodesign.net

CLIENT:

STORAGE CONSTRUCTION CO., LLC
26 WEST 17TH STREET, SUITE 801
NEW YORK, NY 10011

REVISIONS:

#	DATE	DESCRIPTION

PROJECT:

74 BOGART STREET
BROOKLYN, NY

DRAWING:

SUPPORT OF EXCAVATION DETAILS

DATE:	04/26/2019	DESIGNED BY:	AR
SCALE:	AS SHOWN	DRAWN BY:	RH
PROJECT NO:	4139-001	APPROVED BY:	TGT

DRAWING NO.

SOE-300.00

SHEET 7 OF 7

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APPENDIX C
QUALITY ASSURANCE PROJECT/PLAN (QAPP)

QUALITY ASSURANCE PROJECT PLAN

for

2 Ingraham Street
Brooklyn, New York
NYSDEC BCP Site No. C224036

Prepared For:

74 Bogart LLC
26 West 17th Street, Suite 801
New York, New York 10011

Prepared By:

Langan Engineering, Environmental, Surveying,
Landscape Architecture and Geology, D.P.C.
21 Penn Plaza
360 West 31st Street, 8th Floor
New York, New York 10001

LANGAN

September 2019
Langan Project No. 170519402

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1.0 PROJECT DESCRIPTION

1.1 INTRODUCTION

The about 80,000-square-foot property is located at 2 Ingraham Street/74 Bogart Street in the East Williamsburg section of Brooklyn, New York (the "site"). Pursuant to a November 10, 2010 Brownfield Cleanup Agreement (BCA), the Site is enrolled in the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program, and is identified by the NYSDEC as Site No. C224036.

The site is bounded by Ingraham Street to the north, Morgan Avenue to the east, Harrison Place to the south, and Bogart Street to the west, and contains a one-story warehouse building encompassing the entire block. The building contains two partial cellars and has been vacant since around April 2016. Refer to the Interim Remedial Measures Work Plan (IRMWP) for additional details.

This Quality Assurance Project Plan (QAPP) specifies analytical methods and evaluation procedures to be used to ensure that data from the proposed interim remedial measures (IRM) at the Site are precise, accurate, representative, comparable, and complete.

1.2 PROJECT OBJECTIVES

The objective of this project is to address both emergency and non-emergency site conditions to prevent, mitigate, or remedy environmental damage associated with activities at the site, including, but not limited to: construction of diversion ditches; collection systems; drum removal; leachate collection systems; construction of fences or other barriers; installation of water filters; provision of alternative water systems; the removal of source areas; or plume control. The final remedial measure needed for a permanent remedy will be described in a forthcoming RAWP.

1.3 SCOPE OF WORK

The specific scope of work for this IRM is described in detail in Section 2.2 of the IRMWP. The proposed IRM consist of the following tasks:

1. Remediation of chromium-impacted building slabs and removal of footings during demolition of the entire existing one-story building;

2. Advancement of eight soil borings, installation of three soil vapor points, and collection of eight soil and three soil vapor samples to investigate known mercury impacts in the western portion of the site;

3. Placement of a temporary about 6-inch-thick clean cover layer in the western portion of the site over exposed residual soil, to be replaced with a Division of Environmental Remediation (DER)-10 compliant cover as part of the forthcoming final remedy;

4. Installation of support-of-excavation (SOE) soldier piles and lagging to a minimum of 36 feet below grade surface (bgs) (about elevation [el.] -15 feet[1] NAVD88) along the eastern site perimeter and the eastern half of the north and south site perimeters; and

5. Excavation and off-site disposal of historic fill material, impacted with semivolatile organic compounds (SVOCs) and metals, and native soil to about 14 feet bgs (about el. 7 feet) in the eastern portion of the site to achieve Track 2 Restricted Use Restricted-Residential (RURR]) Soil Cleanup Objectives (SCOs]).

Sections of the chromium-impacted slabs in the northwestern portion of the site and any areas with visible staining may be decontaminated and sampled prior to building demolition and off-site disposal. The samples will be analyzed for Toxicity Characteristic Leaching Procedure (TCLP) chromium and nickel. Liquid within the plastic decontamination totes will be sampled to determine proper disposal, and will include, at a minimum, chromium and nickel. Additional analysis may be required for compliance with disposal facility permits.

Eight soil borings and three soil vapor points will be advanced as part of a supplemental mercury investigation in the western portion of the site. One soil sample will be collected at each location from the interval of known mercury impacts and will be analyzed for total mercury and mercury selective sequential extraction (hereafter referred to as "mercury speciation"). Soil samples will be homogenized during sample collection and the sample volume will be split between two laboratories: Alpha Analytical Laboratories (Alpha) and Eurofins Frontier Global Sciences, Inc. (Eurofins). Alpha, a NYSDOH Environmental Laboratory Approval Program (ELAP)-certified laboratory in Westborough, Massachusetts, will analyze samples for total mercury. Mercury speciation will be conducted by Eurofins in Bothell, Washington, a NYSDOH ELAP-certified analytical laboratory, to quantify the concentrations of various mercury species that may be present in the mercury-impacted soil. Soil vapor samples will be collected using laboratory-provided, 6-liter air canisters equipped with 2-hour sample interval flow controllers. Soil vapor samples will be analyzed by Alpha, and for mercury vapor by Modified NIOSH Method 6009.

[1] Elevations herein are referenced to the North American Vertical Datum of 1988 (NAVD88), which is approximately 1.1 feet above mean sea level datum at Sandy Hook, New Jersey as defined by the USGS (USGS NGVD 1929). In this IRMWP, references to "below grade surface" are relative to the building slab elevation.

At eight locations distributed evenly throughout the site, soil samples will be collected from 0 to 2 feet bgs for analysis for emerging contaminants (per- and polyfluoroalkyl substances [PFAS] and 1,4-dioxane).

Excavated soil will be screened with a photoionization detector (PID) equipped with a 10.6 electron volt (eV) lamp. Waste characterization samples will be collected from the material proposed for excavation and disposal during implementation of the IRM per disposal facility requirements. Waste characterization samples will be submitted to a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP)-approved laboratory for analysis in accordance with this QAPP. The following list is provided for planning purposes and may not reflect the analyses performed for waste characterization:

- 6 NYCRR Part 375/Total Compound List (TCL)/New Jersey Department of Environmental Protection (NJDEP) VOCs, extractable petroleum hydrocarbon (EPH), SVOCs, pesticides, herbicides, polychlorinated biphenyls (PCB), and target analyte list (TAL) metals (including hexavalent chromium);
- Toxicity Characteristic Leaching Procedure (TCLP) VOCs, SVOCs, pesticides, herbicides, and metals;
- Resource Conservation and Recovery Act (RCRA) characteristics, including ignitability, corrosivity, and reactivity (sulfide and cyanide);
- Total cyanide; and
- Paint filter analysis.

One documentation soil sample will be collected for every 900 square feet of excavation base in accordance with DER-10. A Track 2 cleanup requires the top 15 feet of soil to meet the RURR SCOs; therefore, additional documentation soil samples will be collected at 15 feet bgs (1 foot beneath the excavation base) at a frequency of one samples per 900 square feet. Sidewall soil samples will be collected at a frequency of one per every 30 linear feet along the western perimeter of the excavation. Samples will be collected to document remedial performance and will be analyzed for the Part 375 list of VOCs, SVOCs, PCBs, pesticides and metals.

If underground storage tanks (UST) or other previously unidentified contaminant sources are found during construction of the containment barrier, sampling will be performed on product, if encountered, and surrounding subsurface materials (e.g., soil, stone, etc.). Chemical analysis will include full scan parameters (Part 375 VOCs, SVOCs, PCBs, pesticides, and metals).

The IRM will be performed in accordance with applicable federal, state, and city regulations and a Construction Health and Safety Plan (CHASP), which is provided as Appendix A of the IRMWP.

1.4 DATA QUALITY OBJECTIVES AND PROCESSES

Data Quality Objectives (DQOs) are qualitative and quantitative statements to help ensure that data of known and appropriate quality are obtained during the project. DQOs for sampling activities are determined by evaluating five factors:

- Data needs and uses: The types of data required and how the data will be used after it is obtained.
- Parameters of Interest: The types of chemical or physical parameters required for the intended use.
- Level of Concern: Levels of constituents, which may require remedial actions or further investigations.
- Required Analytical Level: The level of data quality, data precision, and QA/QC documentation required for chemical analysis.
- Required Detection Limits: The detection limits necessary based on the above information.

The quality assurance and quality control objectives for all measurement data include:

- **Precision** – an expression of the reproducibility of measurements of the same parameter under a given set of conditions. Field sampling precision will be determined by analyzing coded duplicate samples and analytical precision will be determined by analyzing internal QC duplicates and matrix spike duplicates.

- **Accuracy** – a measure of the degree of agreement of a measured value with the true or expected value of the quantity of concern. Sampling accuracy will be determined through the assessment of the analytical results of equipment blanks and trip blanks (organic analysis of aqueous matrices only) for each sample set. Analytical accuracy will be assessed by examining the percent recoveries of surrogate compounds that are added to each sample (organic analyses only), internal standards, laboratory method blanks, instrument calibration, and the percent recoveries of matrix spike compounds added to selected samples and laboratory blanks.

- **Representativeness** – expresses the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Representativeness is dependent upon the adequate design of the sampling program and will be satisfied by ensuring that the scope of work is followed and that specified sampling and analysis techniques are used. Representativeness in the laboratory is ensured by compliance to nationally-recognized analytical methods, meeting sample holding times, and maintaining sample integrity while the samples are in the laboratory's possession. This is accomplished by following

all applicable methods, laboratory-issued standard operating procedures (SOPs), the laboratory's Quality Assurance Manual, and this QAPP. The laboratory is required to be properly certified and accredited.

- **Completeness** – the percentage of measurements made which are judged to be valid. Completeness will be assessed through data validation. The QC objective for completeness is generation of valid data for at least 90 percent of the analyses requested.

- **Comparability** – expresses the degree of confidence with which one data set can be compared to another. The comparability of all data collected for this project will be ensured using several procedures, including standard methods for sampling and analysis, instrument calibrations, using standard reporting units and reporting formats, and data validation.

- **Sensitivity** – the ability of the instrument or method to detect target analytes at the levels of interest. The project manager will select, with input from the laboratory and QA personnel, sampling and analytical procedures that achieve the required levels of detection.

The above objectives are discussed in detail in Section 3.0.

2.0 PROJECT ORGANIZATION

The IRM will be overseen by Langan on behalf of 74 Bogart LLC. Langan will oversee soil screening, decommissioning of monitoring wells, waste characterization, soil staging and stockpiling, material loading and transport, documentation samples, and import of backfill and clean fill material. Langan will collect soil and waste characterization samples as outlined by the IRMWP. The analytical services will be provided by Alpha Analytical Inc. (Alpha) and Eurofins Frontier Global Sciences, Inc. (Eurofins).

Key contacts for this project are summarized below; Langan resumes are included in Attachment A:

Personnel	Investigation Role	Contact Information
Patrick Farnham, P.E. Langan Engineering	Langan Project Manager	Phone – 212-479-5578 Email – pfarnham@langan.com
Jason Hayes, P.E. Langan Engineering	Langan Quality Assurance Officer (QAO)	Phone – 212-479-5427 Email – jahayes@langan.com
Gerald Nicholls, P.E. Langan Engineering	Program Quality Assurance Monitor	Phone – 212-479-5559 Email – gnicholls@langan.com
Emily Strake Langan Engineering	Data Validator / Program Quality Assurance Manager	Phone – 215-491-6500 Email – estrake@langan.com
Ben Rao Alpha Analytical Laboratories	Laboratory Representative	Phone – 201-812-2633 Email – brao@alphalab.com
Dave Wunderlich Eurofins Frontier Global Sciences	Laboratory Representative	Phone – 425-686-3578 Email – davidwunderlich@eurofinsus.com

3.0 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) OBJECTIVES FOR MEASUREMENT OF DATA

The quality assurance and quality control objectives for all measurement data include precision, accuracy, representativeness, completeness, comparability, and sensitivity. These objectives are defined in following subsections. Variances from the quality assurance objectives at any stage of the investigation will result in the implementation of appropriate corrective measures and an assessment of the impact of corrective measures on the usability of the data.

3.1 PRECISION

Precision is a measure of the degree to which two or more measurements are in agreement. Field precision is assessed through the collection and measurement of field duplicates. Laboratory precision and sample heterogeneity also contribute to the uncertainty of field duplicate measurements. This uncertainty is taken into account during the data assessment process. For field duplicates, results less than 2x the reporting limit (RL) meet the precision criteria if the absolute difference is less than ±2x the RL. For results greater than 2x the RL, the acceptance criteria is a relative percent difference (RPD) of ≤50% (soil), and <30% (waste water). RLs and method detection limits (MDL) are provided in Attachment B.

3.2 ACCURACY

Accuracy is the measurement of the reproducibility of the sampling and analytical methodology. It should be noted that precise data may not be accurate data. For the purpose of this QAPP, bias is defined as the constant or systematic distortion of a measurement process, which manifests itself as a persistent positive or negative deviation from the known or true value. This may be due to (but not limited to) improper sample collection, sample matrix, poorly calibrated analytical or sampling equipment, or limitations or errors in analytical methods and techniques.

Accuracy in the field is assessed through the use of field blanks and through compliance with all sample handling, preservation, and holding time requirements. All field blanks should be non-detect when analyzed by the laboratory. Any contaminant detected in an associated field blank will be evaluated against laboratory blanks (preparation or method) and evaluated against field samples collected on the same day to determine potential for bias. Trip blanks are not required for non-aqueous matrices, but will be considered for non-aqueous matrices where high concentrations of VOCs are anticipated based on field screening.

Laboratory accuracy is assessed by evaluating the percent recoveries of matrix spike/matrix spike duplicate (MS/MSD) samples, laboratory control samples (LCS), surrogate compound recoveries, and the results of method preparation blanks. MS/MSD, LCS, and surrogate

percent recoveries will be compared to either method-specific control limits or laboratory-derived control limits. Sample volume permitting, samples displaying outliers should be reanalyzed. All associated method blanks should be non-detect when analyzed by the laboratory.

3.3 REPRESENTATIVENESS

Representativeness expresses the degree to which data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition within a defined spatial and/or temporal boundary. Representativeness is dependent upon the adequate design of the sampling program and will be satisfied by ensuring that the scope of work is followed and that specified sampling and analysis techniques are used. This is performed by following applicable SOPs and this QAPP. All field technicians will be given copies of appropriate documents prior to sampling events and are required to read, understand, and follow each document as it pertains to the tasks at hand.

Representativeness in the laboratory is ensured by compliance to nationally-recognized analytical methods, meeting sample holding times, and maintaining sample integrity while the samples are in the laboratory's possession. This is performed by following all applicable analytical methods, laboratory-issued SOPs, the laboratory's Quality Assurance Manual, and this QAPP. The laboratory is required to be properly certified and accredited.

3.4 COMPLETENESS

Laboratory completeness is the ratio of total number of samples analyzed and verified as acceptable compared to the number of samples submitted to the fixed-base laboratory for analysis, expressed as a percent. Three measures of completeness are defined:

- Sampling completeness, defined as the number of valid samples collected relative to the number of samples planned for collection;
- Analytical completeness, defined as the number of valid sample measurements relative to the number of valid samples collected; and
- Overall completeness, defined as the number of valid sample measurements relative to the number of samples planned for collection.

Soil and soil vapor data will meet a 90% completeness criterion. If the criterion is not met, sample results will be evaluated for trends in rejected and unusable data. The effect of unusable data required for a determination of compliance will also be evaluated.

3.5 COMPARABILITY

Comparability expresses the degree of confidence with which one data set can be compared to another. The comparability of all data collected for this project will be ensured by:

- Using identified standard methods for both sampling and analysis phases of this project;
- Requiring traceability of all analytical standards and/or source materials to the U.S. Environmental Protection Agency (USEPA) or National Institute of Standards and Technology (NIST);
- Requiring that all calibrations be verified with an independently prepared standard from a source other than that used for calibration (if applicable);
- Using standard reporting units and reporting formats including the reporting of QC data;
- Performing a complete data validation on documentation sampling analytical results, including the use of data qualifiers in all cases where appropriate; and
- Requiring that all validation qualifiers be used any time an analytical result is used for any purpose.

These steps will ensure all future users of either the data or the conclusions drawn from them will be able to judge the comparability of these data and conclusions.

3.6 SENSITIVITY

Sensitivity is the ability of the instrument or method to detect target analytes at the levels of interest. The project director will select, with input from the laboratory and QA personnel, sampling and analytical procedures that achieve the required levels of detection and QC acceptance limits that meet established performance criteria. Concurrently, the project director will select the level of data assessment to ensure that only data meeting the project DQOs are used in decision-making.

Field equipment will be used that can achieve the required levels of detection for analytical measurements in the field. In addition, the field sampling staff will collect and submit full volumes of samples as required by the laboratory for analysis, whenever possible. Full volume aliquots will help ensure achievement of the required limits of detection and allow for reanalysis if necessary. The concentration of the lowest level check standard in a multi-point calibration curve will represent the reporting limit.

Analytical methods and quality assurance parameters associated with the sampling program are presented in Attachment C. The frequency of associated field blanks and duplicate samples will be based on the recommendations listed in the Division of Environmental Remediation (DER)-10, and as described in Section 4.9.

Site-specific MS and MSD samples will be prepared and analyzed by the analytical laboratory by spiking an aliquot of submitted sample volume with analytes of interest. An MS/MSD analysis will be analyzed at a rate of 1 out of every 20 samples, or one per analytical batch.

4.0 SAMPLING PROGRAM

4.1 INTRODUCTION

The sampling program will include:

- Sampling of chromium-contaminated concrete slabs
- Sampling of rinsate water generated by cleaning of chromium-contaminated concrete slabs
- Sampling of soil and soil vapor in areas of known mercury impacts
- Collection of soil samples for emerging contaminants
- Documentation soil sampling
- Sampling of in-situ soil that will be removed and disposed of off-site.

This section presents sample container preparation procedures, sample preservation procedures, sample holding times, and field QC sample requirements.

4.2 SAMPLE COLLECTION

Concrete Slab and Rinsate Samples

Green and yellow crystals were observed on the surface of the concrete slab during the SRI and appeared to be concentrated near the former metal plating trench in AOC 2. The crystals may comprise calcium, sodium, or potassium chromate associated with chromium contamination caused by the former metal plating operation. The chromium-impacted concrete slab and footings in the northwestern portion of the site and any other concrete with visible staining will need to be decontaminated and/or sampled prior to off-site disposal.

If the slabs are decontaminated in place before disposal, the decontamination will be performed in accordance with the procedure described below:

1. Wash the concrete slab using a hot power-washer and detergent, and remove water/detergent utilizing a ride-on floor scrubber with a rear squeegee. The detergent will consist of a non-toxic floor cleaner prescribed for use with a ride-on floor scrubber. Wastes accumulated within the ride-on floor scrubber will be pumped into 250-gallon plastic totes or similar.

2. Perform a rinse after the third washing/fluid collection cycle. Collect and analyze a concrete slab and rinsate sample following the third rinse. Concrete samples will be analyzed for TCLP chromium and nickel, and compared to typical disposal facility criteria

in preparation for disposal. Rinsate sample results will be compared to the NYSDEC TOGS Class GA SGVs.

3. Perform additional decontamination using a hot water power-washer and detergent/ ride on floor scrubber as needed until no evidence of metals contamination remains on the surface of the slab and laboratory results of the rinsate samples meet the NYSDEC TOGS Class GA SGVs.

4. Liquid within the totes will be sampled to coordinate disposal facility acceptance. Waste characterization analyses will include, at a minimum, total and hexavalent chromium and nickel. Additional analyses may be required for compliance with disposal facility permits.

As an alternative, the chromium-impacted concrete slab may be demolished in-place, sampled for waste characterization, and disposed of as chromium-impacted construction and demolition (C&D) debris.

Waste Characterization Samples

Waste characterization samples will be collected from soil, chromium-impacted or decontaminated concrete, and rinsate water (if applicable) proposed for disposal during implementation of the IRM. Samples will be analyzed per disposal facility requirements. This activity will be coordinated and overseen by a representative of the RE. Samples will be representative of the material requiring disposal and will occur at a frequency consistent with disposal facility requirements.

Waste characterization samples will be submitted to a NYSDOH ELAP-approved laboratory for analysis in accordance with the QAPP provided in Appendix C. Waste characterization samples will be analyzed for parameters that are typically required by disposal facilities. The following list is provided for planning purposes and may not reflect the analyses performed for waste characterization:

- 6 NYCRR Part 375/TCL/NJDEP VOCs, EPH, SVOCs, pesticides, herbicides, PCBs, and TAL metals (including hexavalent chromium);
- TCLP VOCs, SVOCs, pesticides, herbicides, and metals;
- RCRA characteristics, including ignitability, corrosivity, and reactivity (sulfide and cyanide);
- Total cyanide; and
- Paint filter analysis.

Documentation Soil Samples

One documentation soil sample will be collected for every 900 square feet of excavation base, at about 14 feet bgs, in accordance with DER-10. A Track 2 cleanup requires the top 15 feet of soil to meet the RURR SCOs; therefore, additional documentation soil samples will be collected at 15 feet bgs (1 foot beneath the excavation base) at a frequency of one sample per 900 square feet. Sidewall soil samples will be collected at a frequency of one per every 30 linear feet along the western perimeter of the excavation. Sidewall samples will not be collected from the northern, eastern, or southern excavation perimeters, because the SOE system will preclude access to soil sidewalls. Samples will be collected to document remedial performance, transported under standard chain-of-custody protocol to an NYSDOH ELAP-approved laboratory and will be analyzed for the following analyses:

- Part 375 VOCs (USEPA Method 8260C), SVOCs (USEPA Method 8270D), PCBs (USEPA Method 8082A), pesticides (USEPA Method 8081B), and metals (USEPA Method 6010C/7000 series)

Laboratory analyses will be conducted in accordance with USEPA SW-846 methods and reported in the NYSDEC Analytical Services Protocol (ASP) Category B deliverable format. QA/QC procedures required by the NYSDEC ASP and SW-846 methods will be followed, including instrument calibration, standard compound spikes, surrogate compound spikes, and analysis of quality control samples. The laboratory will provide sample bottles, which are pre-cleaned and preserved. Where there are differences in the SW-846 and NYSDEC ASP requirements, the NYSDEC ASP shall take precedence.

Supplemental Mercury Soil Samples

An environmental drilling subcontractor will be retained to advance eight soil borings in locations biased towards the maximum mercury concentrations observed during previous investigations. A Langan field scientist or engineer will document the work, screen the soil samples for environmental impacts and collect samples. Soil will be screened continuously to the boring termination depth for TOV concentration using a PID equipped with a 10.6 eV bulb, and for visual and olfactory indications of environmental impacts (e.g., staining and odor). Soil will also be screened with a Jerome® J405 mercury vapor analyzer (or equivalent).

One soil sample will be collected at each location from the interval of known mercury impacts, with samples biased toward historic fill observed to contain ash and coal, and will be analyzed for total mercury and mercury selective sequential extraction (hereafter referred to as "mercury speciation"). Soil samples will be homogenized during sample collection and the sample volume will be split between two laboratories: Alpha and Eurofins. Alpha will analyze samples for total mercury by USEPA Method 7471B. Mercury selective sequential extraction will be conducted by Eurofins to quantify the concentrations of various mercury analytes that

are present by USEPA Method 3200. The objective of the mercury speciation is to aid in the protection of human health and identify the phase of mercury present at the site.

Non-disposable, down-hole drilling equipment and sampling apparatus will be decontaminated between locations with Alconox® (or similar) and water where grossly-impacted material is identified. Following sampling, each soil boring will be backfilled with non-impacted soil cuttings and/or clean sand. Grossly-contaminated soil or excess non-impacted soil that cannot fit down the borehole will be containerized in 55-gallon drums for off-site disposal.

Supplemental Mercury Soil Vapor Samples

At three of the speciation sample locations, the driller will install soil vapor points in accordance with the October 2006 NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York, revised May 2017. Each soil vapor point will consist of a dedicated 1-7/8-inch polyethylene implant threaded into polyethylene tubing that will extend to surface grade. The soil vapor points will be installed at the same depth as the corresponding total mercury and mercury speciation soil samples, in a new borehole advanced within about 5 feet of the corresponding soil boring. A clean sand filter pack will be placed around the screen implant and the remaining annular space will be sealed with hydrated bentonite. A seal check will be performed at each installed soil vapor point with a helium tracer gas before and after sample collection. Prior to sampling, three tubing volumes will be purged from the soil vapor point using a multi-gas monitor, with a flow rate of about 0.15 liters per minute. The multi-gas monitor and Jerome® J405 mercury vapor analyzer (or equivalent) will also be used to screen the vapor for the presence of VOCs and mercury vapor.

Soil vapor samples will be collected using laboratory-provided, 6-liter air canisters equipped with 2-hour sample interval flow controllers. Soil vapor samples will be analyzed by Alpha for mercury vapor by NIOSH Method 6009.

Supplemental Emerging Contaminant Samples

At eight locations distributed evenly throughout the site, soil samples will be collected from 0 to 2 feet bgs for analysis for emerging contaminants (PFAS and 1,4-dioxane).

4.3 FIELD DATA AND NOTES

Field notebooks contain the documentary evidence regarding procedures conducted by field personnel. Hard cover, bound field notebooks will be used because of their compact size, durability, and secure page binding. The pages of the notebook will not be removed.

Entries will be made in waterproof, permanent blue or black ink. No erasures will be allowed. If an incorrect entry is made, the information will be crossed out with a single strike mark and the change initialed and dated by the team member making the change. Each entry will be

dated. Entries will be legible and contain accurate and complete documentation of the individual or sampling team's activities or observations made. The level of detail will be sufficient to explain and reconstruct the activity conducted. Each entry will be signed by the person(s) making the entry.

The following types of information will be provided for each sampling task, as appropriate:

- Project name and number
- Reasons for being on-site or taking the sample
- Date and time of activity
- Sample identification numbers
- Geographical location of sampling points with references to the site, other facilities or a map coordinate system; sketches will be made in the field logbook when appropriate
- Physical location of sampling locations such as depth below ground surface
- Description of the method of sampling including procedures followed, equipment used and any departure from the specified procedures
- Description of the sample including physical characteristics, odor, etc.
- Readings obtained from health and safety equipment
- Weather conditions at the time of sampling and previous meteorological events that may affect the representative nature of a sample
- Photographic information including a brief description of what was photographed, the date and time, the compass direction of the picture and the number of the picture on the camera
- Other pertinent observations such as the presence of other persons on the site, actions by others that may affect performance of site tasks, etc.
- Names of sampling personnel and signature of persons making entries

Field records will also be collected on field data sheets including boring logs, which will be used for geologic and drilling data during soil boring activities. Field data sheets will include the project-specific number and stored in the field project files when not in use. At the completion of the field activities, the field data sheets will be maintained in the central project file.

4.4 SAMPLE CONTAINER PREPARATION AND SAMPLE PRESERVATION

Sample containers will be properly washed and decontaminated prior to their use by either the analytical laboratory or the container vendor to the specifications required by the USEPA. Copies of the sample container QC analyses will be provided by the laboratory for each container lot used to obtain samples. The containers will be labeled and the appropriate preservatives will be added. The types of containers and preservatives are shown in Attachment C.

Preservatives will be added to the sample bottles by the laboratory prior to their shipment in sufficient quantities to ensure that proper sample pH is met. Following sample collection, the sample bottles should be placed on ice in the shipping cooler, cooled to 40C with ice or "blue ice", and delivered to the laboratory within 48 hours of collection. Blue ice will not be used to cool PFAS samples. Chain-of-custody procedures are described in Section 5.

4.5 PFAS TARGET ANALYTE LIST

DER has developed a PFAS target analyte list. At minimum, the laboratory will report the following PFAS target compounds:

Group	Analyte Name	Abbreviation	CAS #
Perfluoroalkyl carboxylates	Perfluorobutanoic acid	PFBA	375-22-4
	Perfluoropentanoic acid	PFPeA	2706-90-3
	Perfluorohexanoic acid	PFHxA	307-24-4
	Perfluoroheptanoic acid	PFHpA	375-85-9
	Perfluorooctanoic acid	PFOA	335-67-1
	Perfluorononanoic acid	PFNA	375-95-1
	Perfluorodecanoic acid	PFDA	335-76-2
	Perfluoroundecanoic acid	PFUA/PFUdA	2058-94-8
	Perfluorododecanoic acid	PFDoA	307-55-1
	Perfluorotridecanoic acid	PFTriA/PFTrDA	72629-94-8
	Perfluorotetradecanoic acid	PFTA/PFTeDA	376-06-7
Perfluoroalkyl sulfonates	Perfluorobutanesulfonic acid	PFBS	375-73-5
	Perfluorohexanesulfonic acid	PFHxS	355-46-4
	Perfluoroheptanesulfonic acid	PFHpS	375-92-8
	Perfluorooctanessulfonic acid	PFOS	1763-23-1
	Perfluorodecanesulfonic acid	PFDS	335-77-3
Fluorinated Telomer Sulfonates	6:2 Fluorotelomer sulfonate	6:2 FTS	27619-97-2
	8:2 Fluorotelomer sulfonate	8:2 FTS	39108-34-4
Perfluorooctane-sulfonamides	Perfluroroctanesulfonamide	FOSA	754-91-6
Perfluorooctane-sulfonamidoacetic acids	N-methyl perfluorooctanesulfonamidoacetic acid	N-MeFOSAA	2355-31-9
	N-ethyl perfluorooctanesulfonamidoacetic acid	N-EtFOSAA	2991-50-6

4.6 SAMPLE HOLDING TIMES

The sample holding times for organic and inorganic parameters are given in Attachment C and must be in accordance with the NYSDEC ASP requirements. The NYSDEC ASP holding times must be strictly adhered to by the laboratory. Any holding time exceedances must be reported to Langan.

4.7 DECONTAMINATION PROCEDURES

Decontamination procedures will be used for non-dedicated sampling equipment. Decontamination of field personnel is discussed in the CHASP included in Appendix A of the IRMWP. Field sampling equipment that is to be reused will be decontaminated in the field in accordance with the following procedures:

1. Laboratory-grade glassware detergent and tap water scrub to remove visual contamination

2. Generous tap water rinse

3. Distilled/de-ionized water rinse

Field personnel will wear nitrile gloves while collecting and handling samples.

4.8 RESIDUALS MANAGEMENT

Debris (e.g., paper, plastic and disposable PPE) will be collected in plastic garbage bags and disposed of as non-hazardous industrial waste. Debris is expected to be transported to a local municipal landfill for disposal. If applicable, residual solids (e.g., leftover soil cuttings) will be placed back in the borehole from which they were sampled. If gross contamination is observed, soil will be collected and stored in Department of Transportation (DOT)-approved 55-gallon drums in a designated storage area at the Site. The residual materials stored in a designated storage area at the site for further characterization, treatment or disposal.

4.9 FIELD QUALITY CONTROL SAMPLES

To assess field sampling and decontamination performance, a rinsate blank sample will be collected and submitted to the laboratory for analyses. In addition, the precision of field sampling procedures will be assessed by collecting coded field duplicates and MS/MSDs. The blanks will include:

a. Field Blanks - Field blanks will be taken at a minimum frequency of one per sample matrix per sampling day for waste characterization samples, and at a frequency of one per 20 samples per sample matrix for documentation samples. Field blanks are used to determine the effectiveness of the decontamination procedures for sampling equipment. The field blank will consist of a sample of analyte-free, deionized, distilled water provided by the laboratory that has poured directly into a sampling container in the field. The field blank may be analyzed for all or some of the parameters of interest.

b. Coded Field Duplicates - To determine the representativeness of the sampling methods, coded field duplicates will be collected at a minimum frequency of one per 20 field samples. The samples are termed "coded" because they will be labeled in such a manner that the laboratory will not be able to determine that they are a duplicate sample. This will eliminate any possible bias that could arise. The field duplicate precision criteria are provided in Section 3.1.

c. Matrix Spike/Matrix Spike Duplicate - MS/MSD samples (MS/MSD for organics; MS and laboratory duplicate for inorganics) will be taken at a frequency of one pair per 20 field samples. These samples are used to assess the effect of the sample matrix on the recovery of target compounds or target analytes. The recovery limits and RPDs for each analyte are statistically derived at the laboratory on an ongoing basis.

5.0 SAMPLE TRACKING AND CUSTODY

5.1 INTRODUCTION

This section presents sample custody procedures for both the field and laboratory. Implementation of proper custody procedures for samples generated in the field is the responsibility of field personnel. Both laboratory and field personnel involved in the Chain-of-custody (COC) and transfer of samples will be trained as to the purpose and procedures prior to implementation.

Evidence of sample traceability and integrity is provided by COC procedures. These procedures document the sample traceability from the selection and preparation of the sample containers by the laboratory, to sample collection, to sample shipment, to laboratory receipt and analysis. The sample custody flowchart is shown in Figure 5.1. A sample is considered to be in a person's custody if the sample is:

- In a person's possession;
- Maintained in view after possession is accepted and documented;
- Locked and tagged with Custody Seals so that no one can tamper with it after having been in physical custody; or
- In a secured area which is restricted to authorized personnel.

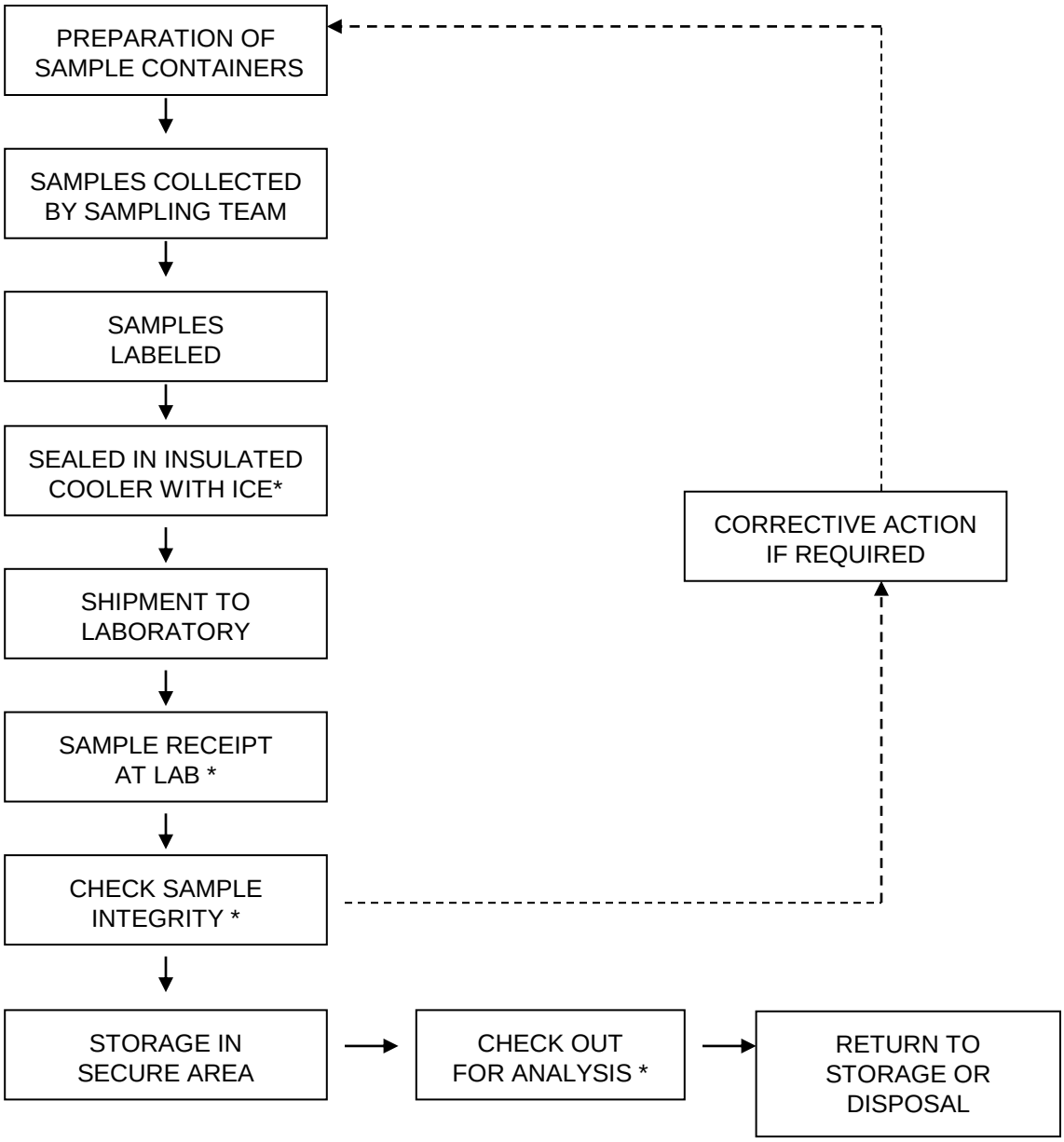
5.2 FIELD SAMPLE CUSTODY

A COC record (Figure 5.2 or similar) accompanies the sample containers from selection and preparation at the laboratory, during shipment to the field for sample containment and preservation, and during return to the laboratory. Triplicate copies of the COC must be completed for each sample set collected.

The COC lists the field personnel responsible for taking samples, the project name and number, the name of the analytical laboratory to which the samples are sent, and the method of sample shipment. The COC also lists a unique description of every sample bottle in the set. If samples are split and sent to different laboratories, a copy of the COC record will be sent with each sample.

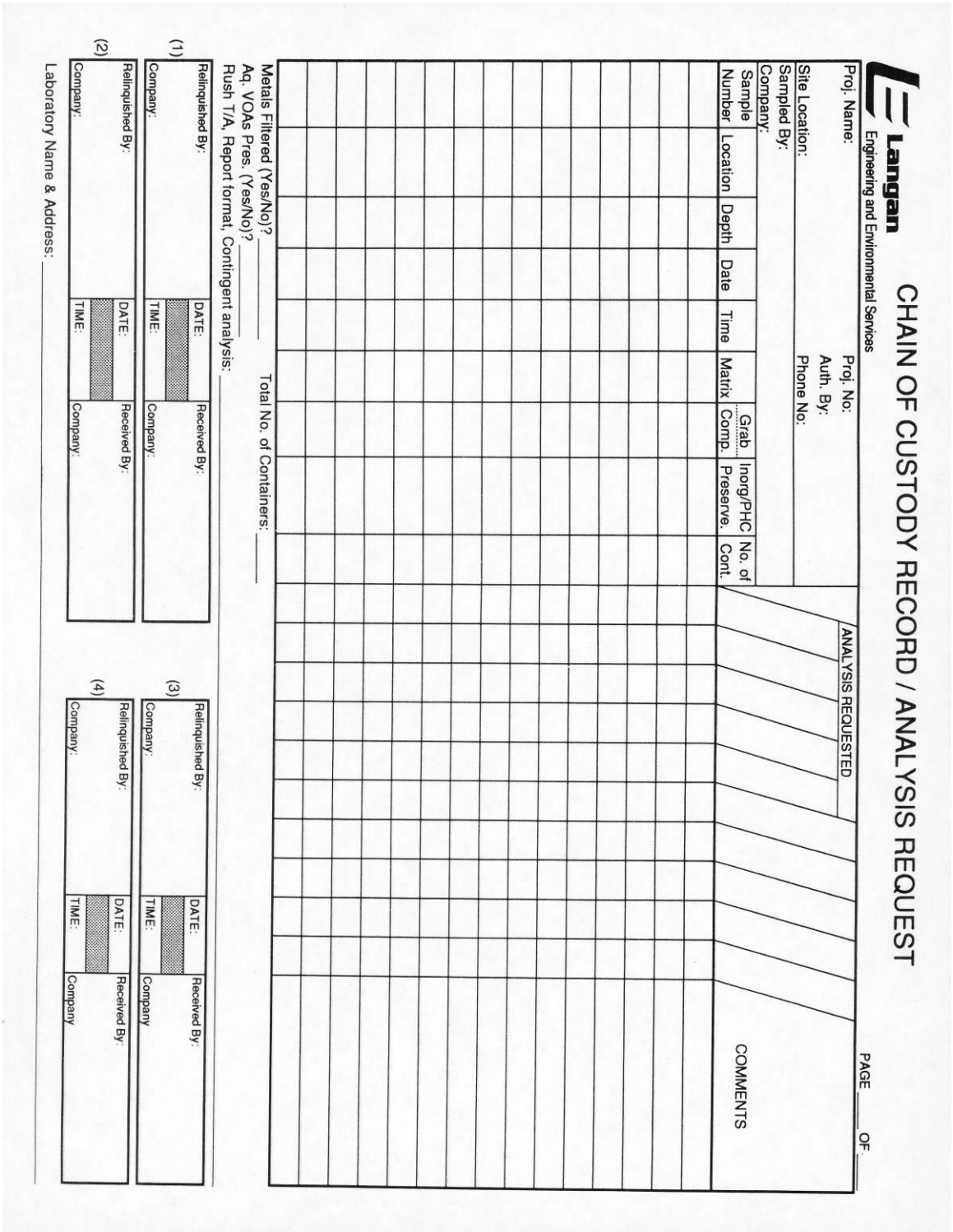
The REMARKS space on the COC is used to indicate if the sample is a MS, MSD, or any other sample information for the laboratory. Since they are not specific to any one sample point, trip and field blanks are indicated on separate rows. Once all bottles are properly accounted for on the form, a sampler will write his or her signature and the date and time on the first RELINQUISHED BY space. The sampler will also write the method of shipment, the shipping cooler identification number, and the shipper airbill number on the top of the COC.

Figure 5.1 - Sample Custody



* REQUIRES SIGN-OFF ON CHAIN-OF-CUSTODY FORM

Figure 5.2 - Sample Chain-of-Custody Form



Mistakes will be crossed out with a single line in ink and initialed by the author.

One copy of the COC is retained by sampling personnel (notations identifying blind duplicate samples will be added to this copy of the COC but not the others that will go to the laboratory) and the other two copies are put into a sealable plastic bag and taped inside the lid of the shipping cooler. The cooler lid is closed, custody seals provided by the laboratory are affixed to the latch and across the back and front lids of the cooler, and the person relinquishing the samples signs their name across the seal. The seal is taped, and the cooler is wrapped tightly with clear packing tape. It is then relinquished by field personnel to personnel responsible for shipment, typically an overnight carrier. The COC seal must be broken to open the container. Breakage of the seals before receipt at the laboratory may indicate tampering. If tampering is apparent, the laboratory will contact the Project Manager, and the sample will not be analyzed.

5.3 LABORATORY SAMPLE CUSTODY

The Project Manager or Field Team Leader will notify the laboratory of upcoming field sampling activities, and the subsequent shipment of samples to the laboratory. This notification will include information concerning the number and type of samples to be shipped as well as the anticipated date of arrival.

The following laboratory sample custody procedures will be used:

- The laboratory will designate a sample custodian who will be responsible for maintaining custody of the samples, and for maintaining all associated records documenting that custody.

- Upon receipt of the samples, the custodian will check cooler temperature, and check the original COC documents and compare them with the labeled contents of each sample container for correctness and traceability. The sample custodian will sign the COC record and record the date and time received.

- Care will be exercised to annotate any labeling or descriptive errors. In the event of discrepant documentation, the laboratory will immediately contact the Project Manager or Field Team Leader as part of the corrective action process. A qualitative assessment of each sample container will be performed to note any anomalies, such as broken or leaking bottles. This assessment will be recorded as part of the incoming chain-of-custody procedure.

- The samples will be stored in a secured area at a temperature of approximately 4°C until analyses commence.

- A laboratory tracking record will accompany the sample or sample fraction through final analysis for control.

- A copy of the tracking record will accompany the laboratory report and will become a permanent part of the project records.

6.0 FIELD INSTRUMENT CALIBRATION AND MAINTENANCE

A PID equipped with a 10.6 eV bulb will be used during the sampling activities to evaluate work zone action levels, collect pre- and post-sample readings for soil vapor samples, screen soil samples, and collect monitoring well headspace readings. Field calibration and/or field checking of the PID will be the responsibility of the field team leader and the site HSO, and will be accomplished by following the procedures outlined in the operating manual for the instrument. At a minimum, field calibration and/or field equipment checking will be performed once daily, prior to use. Field calibration will be documented in the field notebook. Entries made into the logbook regarding the status of field equipment will include the following information:

- Date and time of calibration
- Type of equipment serviced and identification number (such as serial number)
- Reference standard used for calibration
- Calibration and/or maintenance procedure used
- Other pertinent information

Equipment that fails calibration or becomes inoperable during use will be removed from service and segregated to prevent inadvertent utilization. The equipment will be properly tagged to indicate that it is out of calibration. Such equipment will be repaired and recalibrated to the manufacturer's specifications by qualified personnel. Equipment that cannot be repaired will be replaced.

Off-site calibration and maintenance of field instruments will be conducted as appropriate throughout the duration of project activities. All field instrumentation, sampling equipment and accessories will be maintained in accordance with the manufacturer's recommendations and specifications and established field equipment practice. Off-site calibration and maintenance will be performed by qualified personnel. A logbook will be kept to document that established calibration and maintenance procedures have been followed. Documentation will include both scheduled and unscheduled maintenance.

7.0 DATA REDUCTION, VALIDATION, AND REPORTING

7.1 INTRODUCTION

Data collected during the field investigation will be reduced and reviewed by the laboratory QA personnel, and a report on the findings will be tabulated in a standard format. The criteria used to identify and quantify the analytes will be those specified for the applicable methods in the USEPA SW-846 and subsequent updates. The data package provided by the laboratory will contain all items specified in the analytical methodology (Attachment C) appropriate for the analyses to be performed, and be reported in standard format.

The completed copies of the Chain-of-custody records (both external and internal) accompanying each sample from time of initial bottle preparation to completion of analysis shall be attached to the analytical reports.

7.2 DATA REDUCTION

The ASP Category B data packages and an electronic data deliverable (EDD) will be provided by the laboratory after receipt of a complete sample delivery group. The Project Manager will immediately arrange for archiving the results and preparation of result tables. These tables will form the database for assessment of the site contamination condition.

Each EDD deliverable must be formatted using a Microsoft Windows operating system and the NYSDEC data deliverable format for EQuIS™. To avoid transcription errors, data will be loaded directly into the ASCII format from the laboratory information management system (LIMS). If this cannot be accomplished, the consultant should be notified via letter of transmittal indicating that manual entry of data is required for a particular method of analysis. All EDDs must also undergo a QC check by the laboratory before delivery. The original data, tabulations, and electronic media are stored in a secure and retrievable fashion.

The Project Manager or Task Manager will maintain close contact with the QA reviewer to ensure all non-conformance issues are acted upon prior to data manipulation and assessment routines. Once the QA review has been completed, the Project Manager may direct the Team Leaders or others to initiate and finalize the analytical data assessment.

7.3 DATA VALIDATION

Data validation of documentation soil sample results will be performed in accordance with the USEPA Region II validation guidelines for organic and inorganic data review and the National functional Guidelines (USEPA 2017, USEPA 2017b). Validation will include the following:

- Verification of the QC sample results,
- Verification of the identification of sample results (both positive hits and non-detects),
- Preparation of Data Usability Summary Reports (DUSR).

A DUSR will be prepared and reviewed by the Quality Assurance Officer (QAO) before issuance. The DUSR will present the results of data validation, including a summary assessment of laboratory data packages, sample preservation and COC procedures, and a summary assessment of precision, accuracy, representativeness, comparability, and completeness for each analytical method. A detailed assessment of each SDG will follow. For each of the organic analytical methods, the following will be assessed:

- Holding times;
- Instrument tuning;
- Instrument calibrations;
- Blank results;
- System monitoring compounds or surrogate recovery compounds (as applicable);
- Internal standard recovery results;
- MS and MSD results;
- Target compound identification;
- Chromatogram quality;
- Pesticide cleanup;
- Compound quantitation and reported detection limits;
- System performance; and
- Results verification.

For each of the inorganic compounds, the following will be assessed:

- Holding times;
- Calibrations;
- Blank results;
- Interference check sample;
- Laboratory check samples;
- Duplicates;
- Matrix Spike;
- Furnace atomic absorption analysis QC;
- ICP serial dilutions; and

- Results verification and reported detection limits.

Based on the results of data validation, the validated analytical results reported by the laboratory will be assigned one of the following usability flags:

- "U" - Not detected. The associated number indicates the approximate sample concentration necessary to be detected significantly greater than the level of the highest associated blank;
- "UJ" - Not detected. Quantitation limit may be inaccurate or imprecise;
- "J" - Analyte is present. Reported value may be associated with a higher level of uncertainty than is normally expected with the analytical method
- "N" – Tentative identification. Analyte is considered present in the sample;
- "R" – Unreliable result; data is rejected or unusable. Analyte may or may not be present in the sample; and
- No Flag - Result accepted without qualification.

7.4 Reporting

Upon receipt of validated analytical results, NYSDEC format EDDs, compatible with EQuIS™, will be prepared and submitted to the NYSDEC.

8.0 QUALITY ASSURANCE, PERFORMANCE, AND SYSTEM AUDITS

8.1 INTRODUCTION

Quality assurance audits may be performed by the project quality assurance group under the direction and approval of the QAO. These audits will be implemented to evaluate the capability and performance of project and subcontractor personnel, items, activities, and documentation of the measurement system(s). Functioning as an independent body and reporting directly to corporate quality assurance management, the QAO may plan, schedule, and approve system and performance audits based upon procedures customized to the project requirements. At times, the QAO may request additional personnel with specific expertise from company and/or project groups to assist in conducting performance audits. However, these personnel will not have responsibility for the project work associated with the performance audit.

8.2 SYSTEM AUDITS

System audits may be performed by the QAO or designated auditors, and encompass a qualitative evaluation of measurement system components to ascertain their appropriate selection and application. In addition, field and laboratory quality control procedures and associated documentation may be system audited. These audits may be performed once during the performance of the project. However, if conditions adverse to quality are detected or if the Project Manager requests, additional audits may occur.

8.3 PERFORMANCE AUDITS

The laboratory may be required to conduct an analysis of Performance Evaluation samples or provide proof that Performance Evaluation samples submitted by USEPA or a state agency have been analyzed within the past twelve months.

8.4 FORMAL AUDITS

Formal audits refer to any system or performance audit that is documented and implemented by the QA group. These audits encompass documented activities performed by qualified lead auditors to a written procedure or checklists to objectively verify that quality assurance requirements have been developed, documented, and instituted in accordance with contractual and project criteria. Formal audits may be performed on project and subcontractor work at various locations.

Audit reports will be written by auditors who have performed the site audit after gathering and evaluating all data. Items, activities, and documents determined by lead auditors to be in noncompliance shall be identified at exit interviews conducted with the involved management.

Non-compliances will be logged, and documented through audit findings, which are attached to and are a part of the integral audit report. These audit-finding forms are directed to management to satisfactorily resolve the noncompliance in a specified and timely manner.

The Project Manager has overall responsibility to ensure that all corrective actions necessary to resolve audit findings are acted upon promptly and satisfactorily. Audit reports must be submitted to the Project Manager within fifteen days of completion of the audit. Serious deficiencies will be reported to the Project Manager within 24 hours. All audit checklists, audit reports, audit findings, and acceptable resolutions are approved by the QAO prior to issue. Verification of acceptable resolutions may be determined by re-audit or documented surveillance of the item or activity. Upon verification acceptance, the QAO will close out the audit report and findings.

9.0 CORRECTIVE ACTION

9.1 INTRODUCTION

The following procedures have been established to ensure that conditions adverse to quality, such as malfunctions, deficiencies, deviations, and errors, are promptly investigated, documented, evaluated, and corrected.

9.2 PROCEDURE DESCRIPTION

When a significant condition adverse to quality is noted at site, laboratory, or subcontractor location, the cause of the condition will be determined and corrective action will be taken to preclude repetition. Condition identification, cause, reference documents, and corrective action planned to be taken will be documented and reported to the QAO, Project Manager, Field Team Leader and involved contractor management, at a minimum. Implementation of corrective action is verified by documented follow-up action.

All project personnel have the responsibility, as part of the normal work duties, to promptly identify, solicit approved correction, and report conditions adverse to quality. Corrective actions will be initiated as follows:

- When predetermined acceptance standards are not attained;
- When procedure or data compiled are determined to be deficient;
- When equipment or instrumentation is found to be faulty;
- When samples and analytical test results are not clearly traceable;
- When quality assurance requirements have been violated;
- When designated approvals have been circumvented;
- As a result of system and performance audits;
- As a result of a management assessment;
- As a result of laboratory/field comparison studies; and
- As required by USEPA SW-846, and subsequent updates, or by the NYSDEC ASP.

Project management and staff, such as field investigation teams, remedial response planning personnel, and laboratory groups, monitor on-going work performance in the normal course of daily responsibilities. Work may be audited at the sites, laboratories, or contractor locations. Activities, or documents ascertained to be noncompliant with quality assurance requirements will be documented. Corrective actions will be mandated through audit finding sheets attached to the audit report. Audit findings are logged, maintained, and controlled by the Task Manager.

Personnel assigned to quality assurance functions will have the responsibility to issue and control Corrective Action Request (CAR) Forms (Figure 9.1 or similar). The CAR identifies the out-of-compliance condition, reference document(s), and recommended corrective action(s) to be administered. The CAR is issued to the personnel responsible for the affected item or activity. A copy is also submitted to the Project Manager. The individual to whom the CAR is addressed returns the requested response promptly to the QA personnel, affixing his/her signature and date to the corrective action block, after stating the cause of the conditions and corrective action to be taken. The QA personnel maintain the log for status of CARs, confirms the adequacy of the intended corrective action, and verifies its implementation. CARs will be retained in the project file for the records.

Any project personnel may identify noncompliance issues; however, the designated QA personnel are responsible for documenting, numbering, logging, and verifying the close out action. The Project Manager will be responsible for ensuring that all recommended corrective actions are implemented, documented, and approved.

Figure 9.1 - Corrective Action Request

CORRECTIVE ACTION REQUEST
Number: _____ Date: _____
TO: _____ You are hereby requested to take corrective actions indicated below and as otherwise determined by you to (a) resolve the noted condition and (b) to prevent it from recurring. Your written response is to be returned to the project quality assurance manager by _____
CONDITION:
REFERENCE DOCUMENTS:
RECOMMENDED CORRECTIVE ACTIONS:
_____ _____ _____ _____ _____ _____ Originator Date Approval Date Approval Date
RESPONSE
CAUSE OF CONDITION
CORRECTIVE ACTION (A) RESOLUTION (B) PREVENTION (C) AFFECTED DOCUMENTS
C.A. FOLLOWUP: CORRECTIVE ACTION VERIFIED BY: _____ DATE:_____

10.0 REFERENCES

1. NYSDEC. Division of Environmental Remediation. DER-10/Technical Guidance for Site Investigation and Remediation, dated May 3, 2010.

2. NYSDOH. Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York, dated October 2006.

3. USEPA, 2014. "Test Method for Evaluating Solid Waste," Update V dated July 2014 U.S. Environmental Protection Agency, Washington, D.C.

4. USEPA, 2016. Region II Standard Operating Procedure (SOP) #HW-34, "Trace Volatile Data Validation" (September 2016, Revision 1), USEPA Hazardous Waste Support Section. USEPA Region II

5. USEPA, 2016. Region II SOP #HW-33A, "Low/Medium Volatile Data Validation" (September 2016, Revision 1), USEPA Hazardous Waste Support Section. USEPA Region II

6. USEPA, 2016. Region II SOP #HW-35A, "Semivolatile Data Validation" (September 2016, Revision 1), USEPA Hazardous Waste Support Section. USEPA Region II

7. USEPA, 2016. Region II SOP #HW-36A, "Pesticide Data Validation" (October 2016, Revision 1), USEPA Hazardous Waste Support Section. USEPA Region II

8. USEPA, 2010. Region II SOP #HW-17, "Validating Chlorinated Herbicides" (December 2010, Revision 3.1), USEPA Hazardous Waste Support Section. USEPA Region II

9. USEPA, 2015. Region II SOP #HW-37A, "PCB Aroclor Data Validation" (June 2015, Revision 0), USEPA Hazardous Waste Support Section. USEPA Region II

10. USEPA 2015. Region II SOP #HW-3a, "ICP-AES Data Validation" (July 2015, Revision 0), USEPA Hazardous Waste Support Section. USEPA Region II

11. USEPA, 2016. Region II SOP #HW-3b, "ICP-MS Data Validation" (September 2016, Revision 1), USEPA Hazardous Waste Support Section. USEPA Region II

12. USEPA, 2016. Region II SOP #HW-3c, "Mercury and Cyanide Data Validation" (September 2016, Revision 1), USEPA Hazardous Waste Support Section. USEPA Region II

13. USEPA 2017. National Functional Guidelines for Superfund Organic Methods Data Review, Office of Superfund Remediation and Technology Innovation, EPA-540-R-2017-002, January 2017.

14. USEPA 2017b. National Functional Guidelines for Superfund Inorganic Methods Data Review, Office of Superfund Remediation and Technology Innovation, EPA-540-R-201 7-001, January 2017.

ATTACHMENT A

RESUMES

MICHAEL D. BURKE, PG, CHMM, LEED AP

PRINCIPAL/VICE PRESIDENT

ENVIRONMENTAL ENGINEERING AND REMEDIATION

Mr. Burke is a geologist/environmental scientist whose practice involves site investigation and remediation, transactional due diligence, environmental site assessments, in-situ remedial technology, and manufactured gas plant (MGP) site characterization and remediation. His additional services include multi-media compliance audits, sub-slab depressurization system design, non-hazardous and hazardous waste management, emergency response, community air monitoring programs, environmental and geotechnical site investigations, and health and safety monitoring. He has experience with projects in the New York State Department of Environmental Conservation (NYSDEC) and New York State Brownfield Cleanup (NYS BCP) Programs; Inactive Hazardous Waste, and Spill Programs, and New York City Office of Environmental Remediation (OER) e-designated and New York City Voluntary Cleanup Program (NYC VCP) sites.

SELECTED PROJECTS

- 432 Rodney Street, NYS Brownfield Cleanup Program, Petroleum and Chlorinated Volatile Organic Compound Investigation and Remediation, Brooklyn, NY
- 563 Sacket Street, NYS Brownfield Cleanup Program Site, MGP Investigation, and Remediation, Brooklyn, NY
- New York University Tandon School of Engineering, Spill Investigation/Remediation Dual Phase Recovery, and Laser Fluorescence Investigation, Brooklyn, NY
- Former Watermark Locations, NYS Brownfield Cleanup Program, Chlorinated Volatile Organic Compound Investigation and Remediation; AS/SVE, Brooklyn, NY
- Urban Health Plan, Medical Building, NYS Brownfield Cleanup Program CVOC Investigation and Remediation, Bronx, NY
- Whitehead Realty Solvent Site, Inactive Hazardous Waste site, CVOC Investigation and Remediation, Brooklyn, NY
- Con Edison on Governors Island, Dielectric Fluid Spill, Investigation and Remediation, New York, NY
- West 17th Street Development, NYS Brownfield Cleanup Program, MGP Investigation and Remediation, New York, NY
- Montefiore Medical Center, Emergency Response, PCB Remediation, Bronx, NY
- New York University, 4 Washington Square Village Fuel Oil Remediation, New York, NY
- Residential Building at 82 Irving Place, Environmental Remediation, New York, NY
- 420 Kent Avenue, NYS Brownfield Cleanup Program, Brooklyn, NY
- 572 Eleventh Avenue, NYC VCP, New York, NY
- 537 Sackett Street, Gowanus Canal Due Diligence/MGP Site, Brooklyn, NY
- 431 Carroll Street, Gowanus Canal Due Diligence, Brooklyn, NY

EDUCATION

M.S., Environmental Geology
Rutgers University

B.S., Geological Sciences
Rutgers University

B.S., Environmental Science
Rutgers University

PROFESSIONAL REGISTRATION

Professional Geologist (PG) in NY

Certified Hazardous Materials Manager – CHMM No. 15998

LEED Accredited Professional (LEED AP)

OSHA Certification for Hazardous Waste Site Supervisor

OSHA 29 CFR 1910.120 Certification for Hazardous Waste Operations and Emergency Response

NJDEP Certification for Community Noise Enforcement

Troxler Certification for Nuclear Densometer Training

JASON J. HAYES, PE, LEED AP

PRINCIPAL/VICE PRESIDENT

ENVIRONMENTAL ENGINEERING

Mr. Hayes has experience in New York, New Jersey, Washington D.C., California, Washington, Oregon, Alaska, and Internationally. His experience includes Environmental Protection Agency (EPA), New York State (NYS) Brownfields applications, investigation, and remediation; New York City Department of Environmental Protection (NYCDEP) and New York City Office of Environmental Remediation (OER) E-designated site applications, investigations, and remediation. His expertise also includes Phase I and II Environmental Site Investigations and Assessments; contaminated building cleanup and demolition; Underground Storage Tank (UST) permitting, removal specifications, and closure reporting; soil vapor intrusion investigation and mitigation system design (depressurization systems, etc.); development of groundwater contaminant plume migration models; environmental analysis; and oversight, design and specification generation for remediation operations with contaminants of concern to include polychlorinated biphenyls (PCBs), solvents, mercury, arsenic, petroleum products, asbestos, mold and lead.

SELECTED PROJECTS

- Confidential Location (Remediation for Mercury-Contaminated Site), New York, NY
- NYC School Construction Authority (PCB Remediation), Various Locations, New York, NY
- 28-29 High Line (Phase I ESA, Phase II ESI, and Environmental Remediation), New York, NY
- New York Aquarium, Shark Tank and Animal Care Facility (Environmental Remediation), Coney Island, NY
- International Leadership Charter School (Environmental Remediation), Bronx, NY
- Hudson Yards Redevelopment (Phase I ESA and Phase II ESI), New York, NY
- 268 West Street (BCP Application, RI and RIWP), New York, NY
- Confidential Multiple Mixed-Use Tower Location (BCP Application, RI, Phase I ESA, and Phase II ESI), New York, NY
- Confidential Location (Phase II ESI and Remedial Design for Mercury Impacted Site), Brooklyn, NY
- Dock 72 at Brooklyn Navy Yard, (NYS Voluntary Cleanup Program), Brooklyn, NY
- 627 Smith Street (RI and Report), Brooklyn, NY
- Bushwick Inlet Park (Phase I ESA, Approvals for NYC E-Designation), Brooklyn, NY
- 261 Hudson Street (Phase I ESA, Phase II ESI, BCP, and RAWP), New York, NY
- Riverside Center, Building 2 (BCP, Phase I ESA and Phase II ESI), New York, NY
- New York Police Academy, (Sub-Slab Depressurization and Vapor Barrier System), College Point, NY

EDUCATION

M.S., Environmental Engineering
Columbia University

B.S., Chemistry, Environmental Toxicology Humboldt State University

Business Administration (minor)
Humboldt State University

PROFESSIONAL REGISTRATION

Professional Engineer (PE) in NY

LEED Accredited Professional (LEED AP)

Troxler Certification for Nuclear Densometer Training

CPR and First Aid Certification

OSHA 40-Hour HAZWOPER

OSHA HAZWOPER Site Supervisor

AFFILIATIONS

US Green Building Council, NYC Chapter (USGBC), Communications Committee

Urban Land Institute (ULI), member

Commercial Real Estate Development Associations (NAIOP), member

NYC Brownfield Partnership, member

GERALD F. NICHOLLS, PE, CHMM

ASSOCIATE

ENVIRONMENTAL ENGINEERING & HAZARDOUS MATERIALS MANAGMENT

Mr. Nicholls' expertise includes management of remediation and site investigations, brownfield cleanups, remedial design, industrial hygiene, air monitoring and environmental health and safety projects including data collection, inspection and reporting for projects throughout New York and New Jersey. He works closely with various private, Department of Defense, state, commercial, industrial, and municipal clients, acting as a liaison between the client and project team.

As an Associate, Mr. Nicholls is responsible for supervising project staff; conducting technical review; maintaining quality control; budget forecasting and control; and managing the technical and financial aspects of active projects.

In 2019, Real Estate Weekly named Mr. Nicholls one of the Rising Stars of Real Estate.

SELECTED PROJECTS

- 140 6th Avenue, Sub-Membrane Depressurization System Design, Spill Remediation, Subslab Remediation and Monitoring Well Piping Design, Remediation Oversight, and Construction Administration, New York, NY
- 23-01 42nd Road, Phase I, Phase II Remedial Investigation, Remedial Action Work Plan, Sub-Membrane Depressurization System Design, Underground Storage Tank Closure and Remediation, Brownfield Cleanup Program, Remediation Oversight, Construction Administration, Long Island City, NY
- 23-10 Queens Plaza South, Phase I, Phase II Remedial Investigation, Remedial Action Work Plan, Sub-Membrane Depressurization System Design, Underground Storage Tank Closure and Remediation, Brownfield Cleanup Program, Remediation Oversight, Construction Administration, Long Island City, NY
- 170 Amsterdam Avenue, Remedial Action Work Plan, Voluntary Cleanup Program, Remediation Oversight, Construction Administration, New York, NY
- West 17th Street Development, DNAPL Assessment, DNAPL Recovery, Remedial Design, Closure through Brownfield Cleanup Program, Remediation Oversight, Bid Documents, ISS and Containment Wall Design, Construction Administration, New York, NY
- Surfactant Remediation Project, In-Situ Chemical Oxidation Design and Implementation and Site Closure, Margate City, NJ
- NYU Langone Medical Center, New Science Building, Remediation Oversight and Construction Administration, Voluntary Cleanup Program, New York, NY
- Gowanus Canal Northside, Demolition and Decommissioning of MOSF, Remediation Investigation, Brownfield Cleanup Program, Brooklyn, NY

EDUCATION

M.S., Environmental Engineering New Jersey Institute of Technology

B.S., Chemistry and Environmental Studies (Double Major) Ursinus College

PROFESSIONAL REGISTRATION

Professional Engineer (PE) in NY

Certified Hazardous Materials Manager (CHMM)

AFFILIATIONS

City of Jersey City Environmental Commission, Former Commission, Vice Chair and Chair

Alliance of Hazardous Materials Professionals (AHMP)

Academy of Hazardous Materials Managers (ACHMM), NJ Chapter

American Chemical Society

Association of NJ Environmental Commissions (ANJEC)

PATRICK T. FARNHAM, PE, LEED GA

PROJECT ENGINEER

ENVIRONMENTAL ENGINEERING

Mr. Farnham has experience in environmental, civil, and biological engineering. His expertise includes environmental quality engineering, soil and water remediation, solid waste engineering, hydrology, physical/chemical processes in wastewater treatment, and water and landscape engineering. Mr. Farnham's responsibilities have also included project management, air monitoring, air/water/soil sampling, construction oversight, waste characterization, emergency spill response, Phase I ESAs and Phase II ESIs, and waste disposal oversight.

Mr. Farnham was named as one of the 2017 Young Professional of Year Winners by the American Council of Engineering Companies.

SELECTED PROJECTS

- Hudson Yards Development, remediation oversight at former MGP, New York, NY
- Columbia University, Manhattanville Campus, remediation oversight and management, New York, NY
- 160 Leroy Street, remediation management (Voluntary Cleanup Program), New York, NY
- 140 Sixth Avenue, remediation oversight, former gas station, New York, NY
- Gowanus Canal Northside, remediation management (Brownfield Cleanup Program), Brooklyn, NY
- Peter Cooper Village/Stuyvesant Town, remediation oversight at former MGP, New York, NY
- 42 West Street, Residential Conversion, remediation oversight, Brooklyn, NY
- Public Safety Answering Center II, remediation oversight, Bronx, NY
- 855 Sixth Avenue, remediation oversight, New York, NY
- 261 Hudson Street, remediation oversight, New York NY
- 23-01 42nd Road, remediation oversight, Long Island City, NY
- 309 Gold Street, remediation oversight, Brooklyn, NY
- 535 4th Avenue, remediation oversight, Brooklyn, NY
- 2nd Avenue Subway (96th Street Station), community and worker safety air monitoring at former MGP, New York, NY
- 111 Leroy Street, Phase II ESI and RAWP Preparation (Voluntary Cleanup Program), New York, NY
- NYU Washington Square Campus, SPCC plan preparation and compliance oversight, New York, NY
- New York University, Tandon School of Engineering, SPCC compliance oversight, Brooklyn, NY
- Jacob K. Javits Center, New York, NY
- New York City School Construction Authority (NYCSCA), Various Projects, NY
- The Shops at Atlas Park, AS/SVE and SSDS monitoring and maintenance, Glendale, NY

EDUCATION

M. Eng., Civil and Environmental Engineering
Cornell University

B.S., Biological and Environmental Engineering
Cornell University

PROFESSIONAL REGISTRATION

Professional Engineer (PE) in NY

LEED Green Associate (LEED GA)

NISTM 3rd New York Storage Tank Conference

40-Hour OSHA HAZWOPER

OSHA 8-Hour Health & Safety Refresher

OSHA Confined Space Entry Training

AFFILIATIONS

Engineers Without Borders, New York Professionals Chapter, Vice President Emeritus

American Society of Civil Engineers (ASCE)

American Council of Engineering Companies

EMILY STRAKE, CEP

SENIOR PROJECT CHEMIST / RISK ASSESSOR

HUMAN HEALTH RISK ASSESSMENT / CHEMICAL DATA VALIDATION

Ms. Strake has 18 years of environmental chemistry, risk assessment, auditing, and quality assurance experience. Ms. Strake has extensive experience assessing potential adverse health effect to humans from exposure to hazardous contaminants in soil, sediment, groundwater, surface water, ambient and indoor air, and various types of animal, fish, and plant materials. She has experience in site-specific strategy development, which has enabled her to perform assessments to focus areas of investigation and identify risk-based alternatives for reducing remediation costs. Ms. Strake is a member of the Interstate Technology and Regulatory Council Risk Assessment Team responsible for the development and review of organizational risk assessment guidance documents and serves as a National Trainer in risk assessment for the organization.

Ms. Strake has broad experience in environmental data validation, focused on ensuring laboratory deliverables follow specific guidelines as described by regulatory agencies and the analytical methods employed. She is experienced in auditing laboratory and field-sampling activities for compliance with Quality Assurance Project Plans (QAPPs), the National Environmental Laboratory Accreditation Conference Standards Quality Systems manual, and applicable USEPA Guidance.

SELECTED PROJECTS

- 365 Bond Street Development, Brooklyn, NY
- 420 Kent Avenue, Brooklyn, NY
- 521-539 4th Ave, Brooklyn, NY
- 1525 Bedford Avenue, Brooklyn, NY
- Avon, Rye, NY
- FONF Expansion/Sabre Park BCP, Niagara Falls, NY
- Whitehead Realty - Former ACME Sites, Brooklyn, NY
- 55 Bank Street, White Plains, NY
- 268 West Street, New York, NY
- 2420 - 2430 Amsterdam Avenue, New York, NY
- Air Products and Chemicals, Edison, NJ
- Alcatel-Lucent, Holmdel, NJ
- Fairlawn Superfund Site, Fairlawn, NJ
- Former Plessey Dynamics Site, Hillside, NJ
- Honeywell, Highland Park, NJ
- Mannington Mills, Mannington, NJ
- Paulsboro Packaging Inc, Paulsboro, NJ
- Ryder, Hartford, CT
- John Evans Superfund, Lansdale, PA
- Floreffe Terminal, Pittsburgh, PA
- Rohm and Haas, Philadelphia, PA
- Sunoco Refineries, Philadelphia, PA
- 300 Jackson Ave. RA/RI, Downingtown, PA

EDUCATION

M.B.A., Business Administration
The University of Scranton

B.S., Chemistry
Cedar Crest College

CERTIFICATION

Board Certified Environmental Professional (CEP) in Assessment

MEMBERSHIPS

Interstate Technology and Regulatory Council

Montgomery Township Environmental Advisory Committee, Vice-Chair, Term ending 1/1/2022.

Society for Risk Analysis

TRAINING

40 hr. OSHA HAZWOPER Training/Nov 2002

8 hr. HAZWOPER Supervisor/June 2004

8 hr. OSHA HAZWOPER Refresher/Oct 2017

ATTACHMENT B

LABORATORY REPORTING LIMITS AND METHOD DETECTION LIMITS

LANGAN

Date Created: 04/04/19
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Langan Engineering & Environmental

TCL Volatiles - EPA 8260C/5035 High&Low (SOIL)

Holding Time: 14 days
Container/Sample Preservation: 1 - 1 Vial MeOH/2 Vial Water

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Methylene chloride	75-09-2	5	2.29	ug/kg	70-130	30	70-130	30	30			
1,1-Dichloroethane	75-34-3	1	0.145	ug/kg	70-130	30	70-130	30	30			
Chloroform	67-66-3	1.5	0.14	ug/kg	70-130	30	70-130	30	30			
Carbon tetrachloride	56-23-5	1	0.23	ug/kg	70-130	30	70-130	30	30			
1,2-Dichloropropane	78-87-5	1	0.125	ug/kg	70-130	30	70-130	30	30			
Dibromochloromethane	124-48-1	1	0.14	ug/kg	70-130	30	70-130	30	30			
1,1,2-Trichloroethane	79-00-5	1	0.267	ug/kg	70-130	30	70-130	30	30			
Tetrachloroethene	127-18-4	0.5	0.196	ug/kg	70-130	30	70-130	30	30			
Chlorobenzene	108-90-7	0.5	0.127	ug/kg	70-130	30	70-130	30	30			
Trichlorofluoromethane	75-69-4	4	0.695	ug/kg	70-139	30	70-139	30	30			
1,2-Dichloroethane	107-06-2	1	0.257	ug/kg	70-130	30	70-130	30	30			
1,1,1-Trichloroethane	71-55-6	0.5	0.167	ug/kg	70-130	30	70-130	30	30			
Bromodichloromethane	75-27-4	0.5	0.109	ug/kg	70-130	30	70-130	30	30			
trans-1,3-Dichloropropene	10061-02-6	1	0.273	ug/kg	70-130	30	70-130	30	30			
cis-1,3-Dichloropropene	10061-01-5	0.5	0.158	ug/kg	70-130	30	70-130	30	30			
1,3-Dichloropropene, Total	542-75-6	0.5	0.158	ug/kg				30	30			
1,1-Dichloropropene	563-58-6	0.5	0.159	ug/kg	70-130	30	70-130	30	30			
Bromoform	75-25-2	4	0.246	ug/kg	70-130	30	70-130	30	30			
1,1,2,2-Tetrachloroethane	79-34-5	0.5	0.166	ug/kg	70-130	30	70-130	30	30			
Benzene	71-43-2	0.5	0.166	ug/kg	70-130	30	70-130	30	30			
Toluene	108-88-3	1	0.543	ug/kg	70-130	30	70-130	30	30			
Ethylbenzene	100-41-4	1	0.141	ug/kg	70-130	30	70-130	30	30			
Chloromethane	74-87-3	4	0.932	ug/kg	52-130	30	52-130	30	30			
Bromomethane	74-83-9	2	0.581	ug/kg	57-147	30	57-147	30	30			
Vinyl chloride	75-01-4	1	0.335	ug/kg	67-130	30	67-130	30	30			
Chloroethane	75-00-3	2	0.452	ug/kg	50-151	30	50-151	30	30			
1,1-Dichloroethene	75-35-4	1	0.238	ug/kg	65-135	30	65-135	30	30			
trans-1,2-Dichloroethene	156-60-5	1.5	0.137	ug/kg	70-130	30	70-130	30	30			
Trichloroethene	79-01-6	0.5	0.137	ug/kg	70-130	30	70-130	30	30			
1,2-Dichlorobenzene	95-50-1	2	0.144	ug/kg	70-130	30	70-130	30	30			
1,3-Dichlorobenzene	541-73-1	2	0.148	ug/kg	70-130	30	70-130	30	30			
1,4-Dichlorobenzene	106-46-7	2	0.171	ug/kg	70-130	30	70-130	30	30			
Methyl tert butyl ether	1634-04-4	2	0.201	ug/kg	66-130	30	66-130	30	30			
p/m-Xylene	179601-23-1	2	0.56	ug/kg	70-130	30	70-130	30	30			
o-Xylene	95-47-6	1	0.291	ug/kg	70-130	30	70-130	30	30			
Xylene (Total)	1330-20-7	1	0.291	ug/kg				30	30			
cis-1,2-Dichloroethene	156-59-2	1	0.175	ug/kg	70-130	30	70-130	30	30			
1,2-Dichloroethene (total)	540-59-0	1	0.137	ug/kg				30	30			
Dibromomethane	74-95-3	2	0.238	ug/kg	70-130	30	70-130	30	30			
Styrene	100-42-5	1	0.196	ug/kg	70-130	30	70-130	30	30			
Dichlorodifluoromethane	75-71-8	10	0.915	ug/kg	30-146	30	30-146	30	30			
Acetone	67-64-1	10	4.811	ug/kg	54-140	30	54-140	30	30			

Please Note that the RL information provided in this table is calculated using a 100% Solids factor (Soil/Solids only)
Please Note that the information provided in this table is subject to change at anytime at the discretion of Alpha Analytical, In

Langan Engineering & Environmental

TCL Volatiles - EPA 8260C/5035 High&Low (SOIL)

Holding Time: 14 days
Container/Sample Preservation: 1 - 1 Vial MeOH/2 Vial Water

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Carbon disulfide	75-15-0	10	4.55	ug/kg	59-130	30	59-130	30	30			
2-Butanone	78-93-3	10	2.22	ug/kg	70-130	30	70-130	30	30			
Vinyl acetate	108-05-4	10	2.15	ug/kg	70-130	30	70-130	30	30			
4-Methyl-2-pentanone	108-10-1	10	1.28	ug/kg	70-130	30	70-130	30	30			
1,2,3-Trichloropropane	96-18-4	2	0.127	ug/kg	68-130	30	68-130	30	30			
2-Hexanone	591-78-6	10	1.18	ug/kg	70-130	30	70-130	30	30			
Bromochloromethane	74-97-5	2	0.205	ug/kg	70-130	30	70-130	30	30			
2,2-Dichloropropane	594-20-7	2	0.202	ug/kg	70-130	30	70-130	30	30			
1,2-Dibromoethane	106-93-4	1	0.279	ug/kg	70-130	30	70-130	30	30			
1,3-Dichloropropane	142-28-9	2	0.167	ug/kg	69-130	30	69-130	30	30			
1,1,1,2-Tetrachloroethane	630-20-6	0.5	0.132	ug/kg	70-130	30	70-130	30	30			
Bromobenzene	108-86-1	2	0.145	ug/kg	70-130	30	70-130	30	30			
n-Butylbenzene	104-51-8	1	0.167	ug/kg	70-130	30	70-130	30	30			
sec-Butylbenzene	135-98-8	1	0.146	ug/kg	70-130	30	70-130	30	30			
tert-Butylbenzene	98-06-6	2	0.118	ug/kg	70-130	30	70-130	30	30			
o-Chlorotoluene	95-49-8	2	0.191	ug/kg	70-130	30	70-130	30	30			
p-Chlorotoluene	106-43-4	2	0.108	ug/kg	70-130	30	70-130	30	30			
1,2-Dibromo-3-chloropropane	96-12-8	3	0.998	ug/kg	68-130	30	68-130	30	30			
Hexachlorobutadiene	87-68-3	4	0.169	ug/kg	67-130	30	67-130	30	30			
Isopropylbenzene	98-82-8	1	0.109	ug/kg	70-130	30	70-130	30	30			
p-Isopropyltoluene	99-87-6	1	0.109	ug/kg	70-130	30	70-130	30	30			
Naphthalene	91-20-3	4	0.65	ug/kg	70-130	30	70-130	30	30			
Acrylonitrile	107-13-1	4	1.15	ug/kg	70-130	30	70-130	30	30			
n-Propylbenzene	103-65-1	1	0.171	ug/kg	70-130	30	70-130	30	30			
1,2,3-Trichlorobenzene	87-61-6	2	0.322	ug/kg	70-130	30	70-130	30	30			
1,2,4-Trichlorobenzene	120-82-1	2	0.272	ug/kg	70-130	30	70-130	30	30			
1,3,5-Trimethylbenzene	108-67-8	2	0.193	ug/kg	70-130	30	70-130	30	30			
1,2,4-Trimethylbenzene	95-63-6	2	0.334	ug/kg	70-130	30	70-130	30	30			
1,4-Dioxane	123-91-1	80	35.1	ug/kg	65-136	30	65-136	30	30			
1,4-Diethylbenzene	105-05-5	2	0.177	ug/kg	70-130	30	70-130	30	30			
4-Ethyltoluene	622-96-8	2	0.384	ug/kg	70-130	30	70-130	30	30			
1,2,4,5-Tetramethylbenzene	95-93-2	2	0.191	ug/kg	70-130	30	70-130	30	30			
Ethyl ether	60-29-7	2	0.341	ug/kg	67-130	30	67-130	30	30			
trans-1,4-Dichloro-2-butene	110-57-6	5	1.42	ug/kg	70-130	30	70-130	30	30			
1,2-Dichloroethane-d4	*17060-07-0*									*70-130*		
2-Chloroethoxyethane												
Toluene-d8	*2037-26-5*									*70-130*		
4-Bromofluorobenzene	*460-00-4*									*70-130*		
Dibromofluoromethane	*1868-53-7*									*70-130*		

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Langan Engineering & Environmental

NYTCL Semivolatiles - EPA 8270D (SOIL)

Holding Time: 14 days
Container/Sample Preservation: 1 - Glass 250ml/8oz unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Acenaphthene	83-32-9	133.6	17.3012	ug/kg	31-137	50	31-137	50	50			
1,2,4-Trichlorobenzene	120-82-1	167	19.1048	ug/kg	38-107	50	38-107	50	50			
Hexachlorobenzene	118-74-1	100.2	18.704	ug/kg	40-140	50	40-140	50	50			
Bis(2-chloroethyl)ether	111-44-4	150.3	22.6452	ug/kg	40-140	50	40-140	50	50			
2-Chloronaphthalene	91-58-7	167	16.5664	ug/kg	40-140	50	40-140	50	50			
1,2-Dichlorobenzene	95-50-1	167	29.9932	ug/kg	40-140	50	40-140	50	50			
1,3-Dichlorobenzene	541-73-1	167	28.724	ug/kg	40-140	50	40-140	50	50			
1,4-Dichlorobenzene	106-46-7	167	29.1582	ug/kg	28-104	50	28-104	50	50			
3,3'-Dichlorobenzidine	91-94-1	167	44.422	ug/kg	40-140	50	40-140	50	50			
2,4-Dinitrotoluene	121-14-2	167	33.4	ug/kg	40-132	50	40-132	50	50			
2,6-Dinitrotoluene	606-20-2	167	28.6572	ug/kg	40-140	50	40-140	50	50			
Fluoranthene	206-44-0	100.2	19.1716	ug/kg	40-140	50	40-140	50	50			
4-Chlorophenyl phenyl ether	7005-72-3	167	17.869	ug/kg	40-140	50	40-140	50	50			
4-Bromophenyl phenyl ether	101-55-3	167	25.4842	ug/kg	40-140	50	40-140	50	50			
Bis(2-chloroisopropyl)ether	108-60-1	200.4	28.5236	ug/kg	40-140	50	40-140	50	50			
Bis(2-chloroethoxy)methane	111-91-1	180.36	16.7334	ug/kg	40-117	50	40-117	50	50			
Hexachlorobutadiene	87-68-3	167	24.4488	ug/kg	40-140	50	40-140	50	50			
Hexachlorocyclopentadiene	77-47-4	477.62	151.302	ug/kg	40-140	50	40-140	50	50			
Hexachloroethane	67-72-1	133.6	27.0206	ug/kg	40-140	50	40-140	50	50			
Isophorone	78-59-1	150.3	21.6766	ug/kg	40-140	50	40-140	50	50			
Naphthalene	91-20-3	167	20.3406	ug/kg	40-140	50	40-140	50	50			
Nitrobenzene	98-95-3	150.3	24.716	ug/kg	40-140	50	40-140	50	50			
NitrosoDiPhenylAmine(NDPA)/DPA	86-30-6	133.6	19.0046	ug/kg	36-157	50	36-157	50	50			
n-Nitrosodi-n-propylamine	621-64-7	167	25.7848	ug/kg	32-121	50	32-121	50	50			
Bis(2-Ethylhexyl)phthalate	117-81-7	167	57.782	ug/kg	40-140	50	40-140	50	50			
Butyl benzyl phthalate	85-68-7	167	42.084	ug/kg	40-140	50	40-140	50	50			
Di-n-butylphthalate	84-74-2	167	31.6632	ug/kg	40-140	50	40-140	50	50			
Di-n-octylphthalate	117-84-0	167	56.78	ug/kg	40-140	50	40-140	50	50			
Diethyl phthalate	84-66-2	167	15.4642	ug/kg	40-140	50	40-140	50	50			
Dimethyl phthalate	131-11-3	167	35.07	ug/kg	40-140	50	40-140	50	50			
Benzo(a)anthracene	56-55-3	100.2	18.8042	ug/kg	40-140	50	40-140	50	50			
Benzo(a)pyrene	50-32-8	133.6	40.748	ug/kg	40-140	50	40-140	50	50			
Benzo(b)fluoranthene	205-99-2	100.2	28.1228	ug/kg	40-140	50	40-140	50	50			
Benzo(k)fluoranthene	207-08-9	100.2	26.72	ug/kg	40-140	50	40-140	50	50			
Chrysene	218-01-9	100.2	17.368	ug/kg	40-140	50	40-140	50	50			
Acenaphthylene	208-96-8	133.6	25.7848	ug/kg	40-140	50	40-140	50	50			
Anthracene	120-12-7	100.2	32.565	ug/kg	40-140	50	40-140	50	50			
Benzo(ghi)perylene	191-24-2	133.6	19.6392	ug/kg	40-140	50	40-140	50	50			
Fluorene	86-73-7	167	16.2324	ug/kg	40-140	50	40-140	50	50			
Phenanthrene	85-01-8	100.2	20.3072	ug/kg	40-140	50	40-140	50	50			
Dibenzo(a,h)anthracene	53-70-3	100.2	19.3052	ug/kg	40-140	50	40-140	50	50			
Indeno(1,2,3-cd)Pyrene	193-39-5	133.6	23.2798	ug/kg	40-140	50	40-140	50	50			

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Langan Engineering & Environmental

NYTCL Semivolatiles - EPA 8270D (SOIL)

Holding Time: 14 days
Container/Sample Preservation: 1 - Glass 250ml/8oz unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Pyrene	129-00-0	100.2	16.5998	ug/kg	35-142	50	35-142	50	50			
Biphenyl	92-52-4	380.76	38.744	ug/kg	54-104	50	54-104	50	50			
4-Chloroaniline	106-47-8	167	30.394	ug/kg	40-140	50	40-140	50	50			
2-Nitroaniline	88-74-4	167	32.1976	ug/kg	47-134	50	47-134	50	50			
3-Nitroaniline	99-09-2	167	31.4962	ug/kg	26-129	50	26-129	50	50			
4-Nitroaniline	100-01-6	167	69.138	ug/kg	41-125	50	41-125	50	50			
Dibenzofuran	132-64-9	167	15.7982	ug/kg	40-140	50	40-140	50	50			
2-Methylnaphthalene	91-57-6	200.4	20.1736	ug/kg	40-140	50	40-140	50	50			
Acetophenone	98-86-2	167	20.6746	ug/kg	14-144	50	14-144	50	50			
2,4,6-Trichlorophenol	88-06-2	100.2	31.6632	ug/kg	30-130	50	30-130	50	50			
P-Chloro-M-Cresol	59-50-7	167	24.883	ug/kg	26-103	50	26-103	50	50			
2-Chlorophenol	95-57-8	167	19.7394	ug/kg	25-102	50	25-102	50	50			
2,4-Dichlorophenol	120-83-2	150.3	26.8536	ug/kg	30-130	50	30-130	50	50			
2,4-Dimethylphenol	105-67-9	167	55.11	ug/kg	30-130	50	30-130	50	50			
2-Nitrophenol	88-75-5	360.72	62.792	ug/kg	30-130	50	30-130	50	50			
4-Nitrophenol	100-02-7	233.8	68.136	ug/kg	11-114	50	11-114	50	50			
2,4-Dinitrophenol	51-28-5	801.6	77.822	ug/kg	4-130	50	4-130	50	50			
4,6-Dinitro-o-cresol	534-52-1	434.2	80.16	ug/kg	10-130	50	10-130	50	50			
Pentachlorophenol	87-86-5	133.6	36.74	ug/kg	17-109	50	17-109	50	50			
Phenol	108-95-2	167	25.217	ug/kg	26-90	50	26-90	50	50			
2-Methylphenol	95-48-7	167	25.885	ug/kg	30-130.	50	30-130.	50	50			
3-Methylphenol/4-Methylphenol	106-44-5	240.48	26.1522	ug/kg	30-130	50	30-130	50	50			
2,4,5-Trichlorophenol	95-95-4	167	31.9972	ug/kg	30-130	50	30-130	50	50			
Benzoic Acid	65-85-0	541.08	169.004	ug/kg	10-110	50	10-110	50	50			
Benzyl Alcohol	100-51-6	167	51.102	ug/kg	40-140	50	40-140	50	50			
Carbazole	86-74-8	167	16.2324	ug/kg	54-128	50	54-128	50	50			
2-Fluorophenol	*367-12-4*									*25-120*		
Phenol-d6	*13127-88-3*									*10-120*		
Nitrobenzene-d5	*4165-60-0*									*23-120*		
2-Fluorobiphenyl	*321-60-8*									*30-120*		
2,4,6-Tribromophenol	*118-79-6*									*10-136*		
4-Terphenyl-d14	*1718-51-0*									*18-120*		

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TCL PCBs - EPA 8082A (SOIL)

Holding Time: 14 days
Container/Sample Preservation: 1 - Glass 250ml/8oz unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Aroclor 1016	12674-11-2	33.5	2.9748	ug/kg	40-140	50	40-140	50	50			
Aroclor 1221	11104-28-2	33.5	3.3567	ug/kg	40-140	50	40-140	50	50			
Aroclor 1232	11141-16-5	33.5	7.102	ug/kg	40-140	50	40-140	50	50			
Aroclor 1242	53469-21-9	33.5	4.5158	ug/kg	40-140	50	40-140	50	50			
Aroclor 1248	12672-29-6	33.5	5.025	ug/kg	40-140	50	40-140	50	50			
Aroclor 1254	11097-69-1	33.5	3.6649	ug/kg	40-140	50	40-140	50	50			
Aroclor 1260	11096-82-5	33.5	6.1908	ug/kg	40-140	50	40-140	50	50			
Aroclor 1262	37324-23-5	33.5	4.2545	ug/kg	40-140	50	40-140	50	50			
Aroclor 1268	11100-14-4	33.5	3.4706	ug/kg	40-140	50	40-140	50	50			
PCBs, Total	1336-36-3	33.5	2.9748	ug/kg				50	50			
2,4,5,6-Tetrachloro-m-xylene	*877-09-8*									*30-150*		
Decachlorobiphenyl	*2051-24-3*									*30-150*		

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TCL Pesticides - EPA 8081B (SOIL)

Holding Time: 14 days
Container/Sample Preservation: 1 - Glass 250ml/8oz unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
Delta-BHC	319-86-8	1.6008	0.31349	ug/kg	30-150	30	30-150	50	50			
Lindane	58-89-9	0.667	0.298149	ug/kg	30-150	30	30-150	50	50			
Alpha-BHC	319-84-6	0.667	0.189428	ug/kg	30-150	30	30-150	50	50			
Beta-BHC	319-85-7	1.6008	0.60697	ug/kg	30-150	30	30-150	50	50			
Heptachlor	76-44-8	0.8004	0.358846	ug/kg	30-150	30	30-150	50	50			
Aldrin	309-00-2	1.6008	0.563615	ug/kg	30-150	30	30-150	50	50			
Heptachlor epoxide	1024-57-3	3.0015	0.90045	ug/kg	30-150	30	30-150	50	50			
Endrin	72-20-8	0.667	0.27347	ug/kg	30-150	30	30-150	50	50			
Endrin aldehyde	7421-93-4	2.001	0.70035	ug/kg	30-150	30	30-150	50	50			
Endrin ketone	53494-70-5	1.6008	0.412206	ug/kg	30-150	30	30-150	50	50			
Dieldrin	60-57-1	1.0005	0.50025	ug/kg	30-150	30	30-150	50	50			
4,4'-DDE	72-55-9	1.6008	0.370185	ug/kg	30-150	30	30-150	50	50			
4,4'-DDD	72-54-8	1.6008	0.570952	ug/kg	30-150	30	30-150	50	50			
4,4'-DDT	50-29-3	3.0015	1.28731	ug/kg	30-150	30	30-150	50	50			
Endosulfan I	959-98-8	1.6008	0.378189	ug/kg	30-150	30	30-150	50	50			
Endosulfan II	33213-65-9	1.6008	0.534934	ug/kg	30-150	30	30-150	50	50			
Endosulfan sulfate	1031-07-8	0.667	0.317492	ug/kg	30-150	30	30-150	50	50			
Methoxychlor	72-43-5	3.0015	0.9338	ug/kg	30-150	30	30-150	50	50			
Toxaphene	8001-35-2	30.015	8.4042	ug/kg	30-150	30	30-150	50	50			
cis-Chlordane	5103-71-9	2.001	0.557612	ug/kg	30-150	30	30-150	50	50			
trans-Chlordane	5103-74-2	2.001	0.528264	ug/kg	30-150	30	30-150	50	50			
Chlordane	57-74-9	13.0065	5.30265	ug/kg	30-150	30	30-150	50	50			
2,4,5,6-Tetrachloro-m-xylene	*877-09-8*									*30-150*		
Decachlorobiphenyl	*2051-24-3*									*30-150*		

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NJ Herbicides -EPA 8151A (SOIL)

Holding Time: 14 days
Container/Sample Preservation: 1 - Glass 250ml/8oz unpreserved

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria		
2,4-D	94-75-7	0.1665	0.0104895	mg/kg	30-150	30	30-150	30	30			
2,4,5-T	93-76-5	0.1665	0.0051615	mg/kg	30-150	30	30-150	30	30			
2,4,5-TP (Silvex)	93-72-1	0.1665	0.0044289	mg/kg	30-150	30	30-150	30	30			
DCAA	*19719-28-9*									*30-150*		

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METALS by 6010D (SOIL)

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria	Holding Time	Container/Sample Preservation
Aluminum, Total	7429-90-5	4	1.08	mg/kg	48-151		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Antimony, Total	7440-36-0	2	0.152	mg/kg	1-208		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Arsenic, Total	7440-38-2	0.4	0.0832	mg/kg	79-121		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Barium, Total	7440-39-3	0.4	0.0696	mg/kg	83-117		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Beryllium, Total	7440-41-7	0.2	0.0132	mg/kg	83-117		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Cadmium, Total	7440-43-9	0.4	0.0392	mg/kg	83-117		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Calcium, Total	7440-70-2	4	1.4	mg/kg	81-119		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Chromium, Total	7440-47-3	0.4	0.0384	mg/kg	80-120		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Cobalt, Total	7440-48-4	0.8	0.0664	mg/kg	84-115		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Copper, Total	7440-50-8	0.4	0.1032	mg/kg	81-118		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Iron, Total	7439-89-6	2	0.3612	mg/kg	45-155		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Lead, Total	7439-92-1	2	0.1072	mg/kg	81-117		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Magnesium, Total	7439-95-4	4	0.616	mg/kg	76-124		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Manganese, Total	7439-96-5	0.4	0.0636	mg/kg	81-117		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Nickel, Total	7440-02-0	1	0.0968	mg/kg	83-117		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Potassium, Total	7440-09-7	100	5.76	mg/kg	71-129		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Selenium, Total	7782-49-2	0.8	0.1032	mg/kg	78-122		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Silver, Total	7440-22-4	0.4	0.1132	mg/kg	75-124		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Sodium, Total	7440-23-5	80	1.26	mg/kg	72-127		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Thallium, Total	7440-28-0	0.8	0.126	mg/kg	80-120		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Vanadium, Total	7440-62-2	0.4	0.0812	mg/kg	78-122		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved
Zinc, Total	7440-66-6	2	0.1172	mg/kg	82-118		75-125	20	20		180 days	Metals Only-Glass 60mL/2oz unpreserved

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METALS by 6020B (WATER)

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria	Holding Time	Container/Sample Preservation
Aluminum, Total	7429-90-5	0.01	0.00327	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Antimony, Total	7440-36-0	0.004	0.000429	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Arsenic, Total	7440-38-2	0.0005	0.000165	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Barium, Total	7440-39-3	0.0005	0.000173	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Beryllium, Total	7440-41-7	0.0005	0.000107	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Cadmium, Total	7440-43-9	0.0002	0.0000599	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Calcium, Total	7440-70-2	0.1	0.0394	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Chromium, Total	7440-47-3	0.001	0.000178	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Cobalt, Total	7440-48-4	0.0005	0.000163	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Copper, Total	7440-50-8	0.001	0.000384	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Iron, Total	7439-89-6	0.05	0.0191	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Lead, Total	7439-92-1	0.001	0.000343	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Magnesium, Total	7439-95-4	0.07	0.0242	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Manganese, Total	7439-96-5	0.001	0.00044	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Nickel, Total	7440-02-0	0.002	0.000556	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Potassium, Total	7440-09-7	0.1	0.0309	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Selenium, Total	7782-49-2	0.005	0.00173	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Silver, Total	7440-22-4	0.0004	0.000163	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Sodium, Total	7440-23-5	0.1	0.0293	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Thallium, Total	7440-28-0	0.0005	0.000143	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Vanadium, Total	7440-62-2	0.005	0.00157	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved
Zinc, Total	7440-66-6	0.01	0.00341	mg/l	80-120		75-125	20	20		180 days	1 - Plastic 500ml HNO3 preserved

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METALS by 7471B (SOIL)

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria	Holding Time	Container/Sample Preservation
Mercury, Total	7439-97-6	0.08	0.016896	mg/kg	72-128		80-120	20	20		28 days	Metals Only-Glass 60mL/2oz unpreserved

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WETCHEM (SOIL)

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Method	Holding Time	Container/Sample Preservation
Chromium, Hexavalent	18540-29-9	0.8	0.16	mg/kg	80-120	20	75-125	20	20	7196A	30 days	1 - Glass 120ml/4oz unpreserved
Cyanide, Total	57-12-5	1	0.212	mg/kg	80-120	35	75-125	35	35	9010C/9012B	14 days	1 - Glass 250ml/8oz unpreserved

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Date Created: 04/12/19
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WETCHEM (SOIL)

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Method	Holding Time	Container/Sample Preservation
Cyanide, Reactive	57-12-5	10	10	mg/kg	30-125	40		40	40	7.3	14 days	1 - Glass 250ml/8oz unpreserved
Sulfide, Reactive	NONE	10	10	mg/kg	60-125	40		40	40	7.3	14 days	1 - Glass 250ml/8oz unpreserved
pH	12408-02-5	0		SU	99-101			5	5	9045D	24 hours	1 - Glass 250ml/8oz unpreserved

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METALS by 6009(M) (AIR MEDIA)

Analyte	CAS #	RL	MDL	Units	LCS Criteria	LCS RPD	MS Criteria	MS RPD	Duplicate RPD	Surrogate Criteria	Holding Time	Container/Sample Preservation
Mercury, Total	7439-97-6	0.02	0.002	ug/cart	90-110			20	20		30 days	1 - Sorbent Tube (Disposable)

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Hg Selective Sequential Extractions (SSE):

General Method Description:

The following describes the method developed by Eurofins Frontier Global Sciences that uses a selective sequential extraction technique to accurately assess the type and concentration of mercury compounds typically found in contaminated geological sites. This method provides specific information about the expected mobility and bioaccessability of various compounds which offers a behavioural profile of the contaminant and data that can be used to assess its potential effect.

Step	Extractant	Description	Typical Compounds
F0	headspace gas	vapor equilibrium	Hg^0
F1	deionized water	water	$HgCl_2$, $HgSO_4$
F2	pH 2 HCl/HO Ac	"stomach acid"	HgO
F3	1N KOH	organo-complexed	Hg-humics, Hg_2Cl_2
F4	$12NHNO_3$	strong-complexed	mineral lattice, Hg_2, Hg^0
F5	aqua regia	cinnabar	HgS, m-HgS, HgSe, HgAu
F6	HNO_3/HCl/HF	mineral-bound	Hg in crystal lattice
FS	-	sum	total Hg

Scope:

This method is for the selective extraction of geological samples (soils, sediments, ores, mine tailings, etc.), with the goal of determining the biogeochemically relevant associations of inorganic Hg within, and leachability of inorganic Hg from, the solid phase.

When applied exactly as written, this method defines the following extraction fractions (F-0 through F-5, and F-S). The representativeness of each fraction varies from sample to sample, depending upon ancillary parameters such as TOC, soil pH, co-leached substances (i.e., Cl^-, $SO_4^=$, etc.) and actual solid phase speciation of the analyte. Additional ancillary chemistry measurements or kinetic studies may be required to fully interpret the extraction pattern for each sample.

Basic Principles:

Prior to digestion, the sample should be sieved through a 2-mm plastic mesh screen to remove large chunks, and as an aid in homogenization. Inherently fine-grained samples do not need to be sieved prior to extraction.

Fresh samples should be extracted in a form as close to their natural state as possible. Under no circumstances should samples be dried or pulverized prior to extraction, as this may lead to dramatic changes in leachability.

This method involves the sequential extraction of the ***same sample aliquot*** through a sequence of different extractants of increasing chemical strength. Recovery in a wide range of geological materials, as the sum of the selective extraction fractions was found to typically be 100 ± 15% (Table 2).

Summary Table of Eurofins Frontier Global Sciences' Mercury Selective Extraction Procedure

Fraction	Extraction Conditions	Expected Species	Expected Mobility	Expected water solubility range (20° Celsius, 1 atm)
F-0	Ambient temperature gaseous purging	Free elemental Hg	Relatively low mobility	Saturates at a concentration between 25-50 µg/L
F-1	Reagent water	Water soluble Hg salts such as $HgCl_2$, $Hg(NO_3)_2$	Highly mobile	Soluble (1 to 10 g/100 mL, $HgCl_2$ 6.57 g/100 mL)
F-2	Hydrochloric acid at a pH less than 2	Low pH soluble salts of mercury	Relatively low mobility	Slightly soluble (0.1 to 1 g/100 mL)
F-3	1 N potassium hydroxide	Organic bound mercury compounds (Hg(II) bound to sludge or humic matter)	Mobility strongly dependant on various factors	Solubility is strongly dependant on several factors including redox conditions and presence of competing complexing agents)
F-4	12 N nitric acid	All other non sulfide or silicate bound mercury compounds (can include amalgamated elemental mercury)	Low mobility	Insoluble less than 0.1 g/100 mL. Redox conditions can strongly affect the species and subsequent solubility.
F-5	Aqua regia	Sulfide bound mercury compounds only	Relatively immobile	Insoluble (HgS solubility is 2.943E-25 g/100 mL)
F-6	Combination of aqua regia and hydrofluoric acid	Silicate or aluminosilicate bound mercury compounds	Relatively immobile	Insoluble (solubility lower than HgS)

Detailed Description Of Each Step:

Volatile Elemental Mercury (Hg^o) This test is performed by placing a measured mass of the soil sample in a trace clean, teflon bomb vessel with an inlet and outlet and allowing and srubbed, Hg free nitrogen to pass over and purge the samples of free gaseous elemental Hg which in turn is captured at the outlet of the vessel using an EPA I-05/EPA 30B Hg sorbent trap. The trap is then digested using EFGS-009 and analyzed for Total Hg which represents free elemental gaseous Hg that came off the sample and reported in ng Hg (gaseous elemental Hg / gram of soil sample).

F-1 Water Soluble Mercury. Mercury extracted in this test is useful in assessing the potential leaching of soils by rain or groundwater, and is a reasonably good (±50%) predictor of the performance of the sample on an official TCLP or EP-toxicity leaching test. At high solid phase concentrations, the water soluble salts such as $HgCl_2$, $Hg(NO_3)_2$, etc., will appear largely in this fraction, but as total Hg concentrations decrease, the percentage found in this fraction decreases dramatically, due to adsorption of the free Hg on the soil particles. This fraction is extremely dependent upon the co-leached soil components such as Cl-, I-, DOC, and pH. Increases in any of these co-leached Hg complexing agents will generally greatly increase the solubility of water-soluble mercury compounds.

F-2 pH 2 Soluble Mercury. Mercury extracted in this fraction is a surrogate for what might be extracted by the human stomach upon ingestion, or of leachability under the conditions of acid mine drainage or other industrial process. In cases where the sample contains high TOC, this fraction is usually the lowest in Hg, because of readsorption of Hg(II) by coagulated humic matter at this pH. High concentrations of pH 2 leachable Hg might warrant additional testing that more accurately models the human digestive tract in terms of pH regime and contact time, or acid mine drainage conditions present at the contaminated site.

F-3 1N KOH Extractable Mercury. Under the conditions of this extraction, most of the Hg associated with humic organic matter appears to be solubilized, while none of the HgS is co-solubilized. 1N KOH soluble Hg dominates marine and freshwater sediments, as well as the soil humus layer. Not only does most of the CH_3Hg in the sample also leach out in this fraction, but also this fraction has been found to strongly correlate with *in situ* CH_3Hg concentrations, and the potential methylatability of the sample. The contribution of the CH_3Hg content to the total Hg extracted is usually small, but if high concentrations of methyl Hg (greater than 1% of total) are measured in the samples (FGS-045), a correction might be appropriate. The most appropriate way to correct this data is to also measure CH_3Hg directly on the 1N KOH extract, and subtract it from the measured total Hg value on the same extract.

F-4 12N HNO_3 Soluble Mercury. This fraction serves largely to separate out all remaining non-HgS, so that the final measured fraction may safely be taken to represent the HgS content of the sample. In cases where F-0 detected a saturation level of Hg^0, and the fractions F-1 through F-3 are small by comparison to F-4, the latter fraction may be interpreted as representing essentially the total Hg^0 content of the sample. At lower Hg concentrations in natural samples, much of the non-humic bound Hg(II) is found in this fraction, because it is strongly adsorbed to the particle surfaces, and so not leachable by the weak extractants F-1 and F-2.

F-5 Aqua Regia Soluble Mercury (Residue). If the previous steps of the extraction scheme have been carried out accurately, this fraction consists of the cinnabar and meta-cinnabar (HgS) content of the samples. Also included in this fraction, if present in the sample) would be HgSe, and amalgams of Hg with noble metals such as gold and platinum. Hg is leached from the surface of these amalgams, but the bulk concentrations require the dissolution of the noble metal particles, which is accomplished readily by aqua regia.

F-6 Mineral-Bound Mercury. For hard mineral samples, such as bauxite, the F5 (aqua regia) step is not vigorous enough to release all mercury from the crystal lattice. In samples of this type, an aggressive HF Bomb digest is necessary to recover all the mercury in the sample (SOP FGS-111).

F-S Total Mercury by the Sum of Species. The sum of all of the fractions, F-0 through F-6 is the total Hg in the sample. It is ***inadvisable*** to try to measure total Hg (FGS-137) on a separate aliquot of the sample, unless this is being done only for the purpose of assessing sample homogeneity. For real-world samples, heterogeneity is often so great that direct comparison of selective extraction on one aliquot and total Hg on a separate aliquot will produce misleading conclusions (such as that there is a "missing" Hg species, in cases where the total is much greater than the sum of species). For very fine, homogeneous samples such as CRMs, F-S should compare to the independently measured total to within ± 20%.

This leaching is optimized for and only applicable to Hg analysis. Other leaching procedures are necessary to obtain reliable and biogeochemically meaningful results for other trace metals.

This method is a protocol for the extraction only. All recovered aqueous fractions are then analyzed by an appropriate Hg quantification technique. Because of its low detection limits and high tolerance for complex matrices, EPA Method 1631 (ref 10.2), with preparation described in Frontier SOP FGS-012 (Total Hg in aqueous media) and analysis in EFGS-137 (Total Hg analysis) are recommended, as indicated in the text below.

Typical Minimum Detection Limits/Minimum Reporting Limits For Each Fraction:

Soil/Sediment

				Duplicate	Matrix Spike		Blank Spike/LCS	
Analyte	**MDL**	**MRL**	**Units**	**RPD**	**%Recovery**	**RPD**	**%Recovery**	**RPD**
Elemental Hg in soil/sediment by CV-AFS (EPA 1631 Mod)								
Mercury (0)	0.344	2.00	ng/g	24	71 - 125	25	80 - 120	24
SSE of Hg in solids (F1) (FGS-069)								
Mercury F-1	1.00	3.12	ng/g	25	75 - 125	25	0 - 125	25
SSE of Hg in solids (F2) (FGS-069)								
Mercury F-2	1.00	3.12	ng/g	25	75 - 125	25	0 - 125	25
SSE of Hg in solids (F3) (FGS-069)								
Mercury F-3	2.00	6.25	ng/g	25	75 - 125	25	0 - 125	25
SSE of Hg in solids (F4) (FGS-069)								
Mercury F-4	5.00	15.6	ng/g	25	75 - 125	25	0 - 125	25
SSE of Hg in solids (F5) (FGS-069)								
Mercury F-5	0.110	1.00	ng/g	25	75 - 125	25	0 - 125	25

ATTACHMENT C

ANALYTICAL METHODS/QUALITY ASSURANCE SUMMARY TABLE

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ATTACHMENT C
ANALYTICAL METHODS/QUALITY ASSURANCE SUMMARY TABLE

Matrix Type	No. Samples (w/o QA/QC)	Field Parameters	Laboratory Parameters	Analytical Methods	Sample Preservation	Sample Container Volume and Type	Sample Hold Time	Field Duplicate Samples	Field Blank Samples	Trip Blank Samples	MS/MSD Samples
Concrete Chips	5 samples		TCLP/Total Chromium and Nickel	EPA 1311/6020B	Cool to 4°C	4 oz. jar*	6 months	1 per 20 samples (minimum 1)	1 per 20 samples (minimum 1)	NA	1 per 20 samples
Tote Water	5 samples		Total Chromium and Nickel	EPA 1311/6020B	Cool to 4°C; HNO_3 to pH <2	500 mL plastic	6 months	1 per 20 samples (minimum 1)	1 per 20 samples (minimum 1)	NA	1 per 20 samples
Soil	95 samples	Total VOCs via PID	Part 375 VOCs	EPA 8260C	Cool to 4°C	Terra Core Samplers (two 40-mL VOC Vials with 5mL H_2O, one with MeOH); OR	Analyze within 48 hours of sampling if not frozen or extruded into methanol or water. If frozen or extruded into methanol or water, analyze within 14 days of collection	1 per 20 samples (minimum 1)	1 per 20 samples (minimum 1)	NA	1 per 20 samples
						3 EnCore Samplers (separate container for % solids)	Analyze within 48 hours of sampling if not frozen or extruded into methanol or water. If frozen or extruded into methanol, analyze within 14 days of collection				
			Part 375 SVOCs	EPA 8270D		4 oz. jar*	14 days to extract; 40 days after extraction to analysis				
			Part 375 Pesticides	EPA 8081B		4 oz. jar*	14 days to extract; 40 days after extraction to analysis				
			Part 375 Herbicides	EPA 8151A							
			PCBs	EPA 8082A							
			Part 375 Inorganics	EPA 6010C, 7471B, 9010C/9014		2 oz. jar*	6 months, except Mercury 28 days and Cyanide 14 days				
			Hexavalent Chromium	EPA 7196A		2 oz. jar*	30 days to extract; 7 days after extraction to analysis				
			Percent Solids	SM 2540G		NA	NA		NA		NA
	8 samples		NY PFAS	EPA 537(M)		8 oz. bottle	14 days to extract; 40 days after extraction to analysis		1 per 20 samples (minimum 1)		1 per 20 samples
			1,4-Dioxane	EPA 8270D with SIM		8 oz. jar*	14 days to extract; 40 days after extraction to analysis				
			Mercury	EPA 7471B		2 oz. jar*	28 days				
			Mercury Speciation	EPA 3200		2 oz. jar*	5 days				
Soil Vapor	3 samples	Total VOCs via PID	Mercury Vapor	NIOSH 6009	Ambient Temperature	Sorbent Tube	Analyze within 30 days of collection	1 per 20 samples (minimum 1)	NA	NA	NA
Waste Characterization Soil	24 samples	Total VOCs via PID	TCLP/Part 375/TCL VOCs	EPA 1311/8260C	Cool to 4°C	Terra Core Samplers (two 40-mL VOC Vials with 5mL H_2O, one with MeOH); OR	Analyze within 48 hours of sampling if not frozen or extruded into water. If frozen or extruded into water, analyze within 14 days of collection	1 per sample matrix per sampling day (minimum 1)	1 per sample matrix per sampling day (minimum 1)	NA	1 per 20 samples
			TCLP/Part 375/TCL SVOCs	EPA 1311/8270D		8 oz. jar*	14 days to extract; 40 days after extraction to analysis				
			EPH	NJEPH		4 oz. jar*	14 Days				
			TCLP/Part 375/TCL Pesticides	EPA 1311/8081B		4 oz. jar*	14 days to extract; 40 days after extraction to analysis				
			TCLP/Part 375/TCL Herbicides	EPA 1311/8151A							
			TCLP/Part 375/TCL PCBs	EPA 1311/8082A							
			TCLP/Part 375/TAL Metals	EPA 1311/6020B, 7470A		2 oz. jar*	6 months, except Mercury 28 days				
			Hexavalent Chromium	EPA 1311/7196A		2 oz. jar*	30 days to extract; 7 days after extraction to analysis				
			Total Cyanide	EPA 9010C/9014		8 oz. jar*	14 Days				
			Reactive Cyanide	SW-846 Chapter 7.3		4 oz. jar*	14 Days				
			Reactive Sulfide	SW-846 Chapter 7.3			14 Days				
			pH	SW-846 9045D			24 Hours				
			Ignitability	Method 1030			As soon as possible				
			Paint Filter Test	Method 9095B			As soon as possible				
			Total Solids	SM 2540G		4 oz. jar*	NA		NA		NA
Imported Soil	3 samples	Total VOCs via PID	NY PFAS	EPA 537(M)	Cool to 4°C	8 oz. bottle	14 days to extract; 40 days after extraction to analysis	1 per 20 samples (minimum 1)	1 per 20 samples (minimum 1)	NA	1 per 20 samples
			1,4-Dioxane	EPA 8270D with SIM		8 oz. jar*	14 days to extract; 40 days after extraction to analysis				

Notes:
VOCs - Volatile Organic Compounds
SVOCs - Semivolatile Organic Compounds
PCBs - Polychlorinated Biphenyls
Inorganics - Metals, Mercury, and Cyanide
RCRA Characteristics - Ignitability, Corrosivity, Reactivity, Paint Filter
HCl - Hydrochloric Acid
HNO_3 - Nitric Acid
MeOH - Methanol
N/A - Not Applicable
*Can be combined in one or more 8 oz. jars

ATTACHMENT D

PFAS SAMPLING PROTOCOL

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EPA 537 Field Sampling Guidelines

Sampling for PFAAs via EPA 537 can be challenging due to the prevalence of these compounds in consumer products. The following guidelines are strongly recommended when conducting sampling.

Reference-NHDES https://www.des.nh.gov/organization/divisions/waste/hwrb/documents/pfc-stakeholder-notification-20161122.pdf

Field Clothing and PPE

- No clothing or boots containing Gore-TexTM
- All safety boots made from polyurethane and PVC
- No materials containing Tyvek®
- Do not use fabric softener on clothing to be worn in field
- Do not used cosmetics, moisturizers, hand cream, or other related products the morning of sampling
- Do not use unauthorized sunscreen or insect repellant (see reference above for acceptable products)

Sample Containers

- All sample containers made of HDPE or polypropylene
- Caps are unlined and made of HDPE or polypropylene

Wet Weather (as applicable)

Wet weather gear made of polyurethane and PVC only

Equipment Decontamination

- "PFC-free" water on-site for decontamination of sample equipment. No other water sources to be used.
- Only Alconox and Liquinox can be used as decontamination materials

Food Considerations

- No food or drink on-site with exception of bottled water and/or hydration drinks (i.e., Gatorade and Powerade) that is available for consumption only in the staging area

Other Recommendations

Sample for PFCs first! Other containers for other methods may have PFCs present on their sampling containers

Field Equipment

- Must not contain Teflon® (aka PTFE) or LDPE materials
- All sampling materials must be made from stainless steel, HDPE, acetate, silicon, or polypropylene
- No waterproof field books can be used
- No plastic clipboards, binders, or spiral hard cover notebooks can be used
- No adhesives (i.e.Post-It Notes) can be used
- Sharpies and permanent markers not allowed; regular ball point pens are acceptable
- Aluminum foil must not be used
- Keep PFC samples in separate cooler, away from sampling containers that may contain PFCs
- Coolers filled with regular ice only. Do not use chemical (blue) ice packs.

EPA Method 537 (PFAS) Sampling Instructions

Please read instructions entirely prior to sampling event.

*Sampler must wash hands before wearing nitrile gloves in order to limit contamination during sampling.

Each sample set* requires a set of containers to comply with the method as indicated below.
*sample set is composed of samples collected from the same sample site and at the same time.

Container Count	Container Type	Preservative
3 Sampling Containers - Empty	250 mL container	Pre preserved with 1.25 g Trizma
Reagent Water for Field Blank use	250 mL container	Pre preserved with 1.25 g Trizma
1 Field Blank (FRB) Container - Empty	250 mL container	Unpreserved

**** Sampling container must be filled to the neck. For instructional purposes a black line has been drawn to illustrate the required fill level for each of the 3 Sample containers****

Field blanks are recommended and the containers have been provided, please follow the instructions below.

Field Blank Instructions:

1. Locate the Reagent Water container from the bottle order. The Reagent Water container will be prefilled with PFAS-free water and is preserved with Trizma.
2. Locate the empty container labeled “Field Blank”.
3. Open both containers and proceed to transfer contents of the “Reagent Water” container into the “Field Blank” container.
4. If field blanks are to be analyzed, they need to be noted on COC, and will be billed accordingly as a sample.

Both the empty Reagent Water container and the filled Field Blank container must be returned to the laboratory along with the samples taken.

Sampling Instructions:

1. Each sampling event requires 3 containers to be filled to the neck of the provided containers for each sampling location.
2. Before sampling, remove faucet aerator, run water for 5 min, slow water to flow of pencil to avoid splashing and fill sample containers to neck of container (as previously illustrated) and invert 5 times.
3. Do not overfill or rinse the container.
4. Close containers securely. Place containers in sealed ZipLoc bags, and in a separate cooler (no other container types).
5. Ensure Chain-of-Custody and all labels on containers contain required information.Place sample, Field Blank and empty Reagent Blank containers in ice filled cooler (do not use blue ice) and return to the laboratory. Samples should be kept at 4°C ±2. Samples must not exceed 10°C during first 48 hours after collection. Hold time is 14 days.

Please contact your project manager with additional questions or concerns.

Groundwater Sampling for Emerging Contaminants

February 2018

Issue: NYSDEC has committed to analyzing representative groundwater samples at remediation sites for emerging contaminants (1,4-dioxane and PFAS) as described in the below guidance.

Implementation

NYSDEC project managers will be contacting site owners to schedule sampling for these chemicals. Only groundwater sampling is required. The number of samples required will be similar to the number of samples where "full TAL/TCL sampling" would typically be required in a remedial investigation. If sampling is not feasible (e.g., the site no longer has any monitoring wells in place), sampling may be waived on a site-specific basis after first considering potential sources of these chemicals and whether there are water supplies nearby.

Upon a new site being brought into any program (i.e., SSF, BCP), PFAS and 1,4-dioxane will be incorporated into the investigation of groundwater as part of the standard "full TAL/TCL" sampling. Until an SCO is established for PFAS, soil samples do not need to be analyzed for PFAS unless groundwater contamination is detected. Separate guidance will be developed to address sites where emerging contaminants are found in the groundwater. The analysis currently performed for SVOCs in soil is adequate for evaluation of 1,4-dioxane, which already has an established SCO.

Analysis and Reporting

Labs should provide a full category B deliverable including preparation of a DUSR.

The work plan should explicitly describe analysis and reporting requirements.

PFAS sample analysis: Samples should be analyzed by an environmental laboratory certified by ELAP to use EPA method 537 or ISO 25101. ELAP does not currently offer certification for PFAS analysis of non-drinking water samples (including groundwater, soil and sediment), so there is no requirement to use an ELAP certified method. The preferred method is the modified EPA Method 537. Labs have been able to achieve reporting limits for PFOA and PFOS of 2 ng/l (part per trillion). If labs are not able to achieve similar reporting limits, the NYSDEC project manager will make case-by-case decisions as to whether the analysis can meet the needs for the specific site.

PFAS sample reporting: DER has developed a PFAS target analyte list (below) with the intent of achieving reporting consistency between labs for commonly reportable analytes. It is expected that reported results for PFAS will include, at a minimum, all the compounds listed. This list may be updated in the future as new information is learned and as labs develop new capabilities. If lab and/or matrix specific issues are encountered for any particular compounds, the NYSDEC project manager will make case-by-case decisions as to whether particular analytes may be temporarily or permanently discontinued from analysis for each site. Any technical lab issues should be brought to the attention of a NYSDEC chemist.

Some sampling using this full PFAS target analyte list is needed to understand the nature of contamination. It may also be critical to differentiate PFAS compounds associated with a site from other sources of these chemicals. Like routine refinements to parameter lists based on investigative findings, the full PFAS target analyte list may not be needed for all sampling intended to define the extent of

contamination. Project managers may approve a shorter analyte list (e.g., just the UCMR3 list) for some reporting on a case by case basis.

1,4-Dioxane Analysis and Reporting: The method detection limit (MDL) for 1,4-dioxane should be no higher than 0.28 µg/l (ppb). ELAP offers certification for both EPA Methods 8260 and 8270. In order to get the appropriate detection limits, the lab would need to run either of these methods in "selective ion monitoring" (SIM) mode. DER is advising PMS to use 8270, since this method provides a more robust extraction procedure, uses a larger sample volume, and is less vulnerable to interference from chlorinated solvents (we acknowledge that 8260 has been shown to have a higher recovery in some studies).

Full PFAS Target Analyte List

Perfluoroalkyl sulfonates	**Perfluorobutanesulfonic acid**	**PFBS**	**375-73-5**
	Perfluorohexanesulfonic acid	**PFHxS**	**355-46-4**
	Perfluoroheptanesulfonic acid	PFHpS	375-92-8
	Perfluorooctanessulfonic acid	**PFOS**	**1763-23-1**
	Perfluorodecanesulfonic acid	PFDS	335-77-3
Perfluoroalkyl carboxylates	Perfluorobutanoic acid	PFBA	375-22-4
	Perfluoropentanoic acid	PFPeA	2706-90-3
	Perfluorohexanoic acid	PFHxA	307-24-4
	Perfluoroheptanoic acid	**PFHpA**	**375-85-9**
	Perfluorooctanoic acid	**PFOA**	**335-67-1**
	Perfluorononanoic acid	**PFNA**	**375-95-1**
	Perfluorodecanoic acid	PFDA	335-76-2
	Perfluoroundecanoic acid	PFUA/PFUdA	2058-94-8
	Perfluorododecanoic acid	PFDoA	307-55-1
	Perfluorotridecanoic acid	PFTriA/PFTrDA	72629-94-8
	Perfluorotetradecanoic acid	PFTA/PFTeDA	376-06-7
Fluorinated Telomer Sulfonates	6:2 Fluorotelomer sulfonate	6:2 FTS	27619-97-2
	8:2 Fluorotelomer sulfonate	8:2 FTS	39108-34-4
Perfluorooctane-sulfonamides	Perfluroroctanesulfonamide	FOSA	754-91-6
Perfluorooctane-sulfonamidoacetic acids	N-methyl perfluorooctanesulfonamidoacetic acid	N-MeFOSAA	2355-31-9
	N-ethyl perfluorooctanesulfonamidoacetic acid	N-EtFOSAA	2991-50-6

Bold entries depict the 6 original UCMR3 chemicals

Collection of Groundwater Samples for Perfluorooctanoic Acid (PFOA) and Perfluorinated Compounds (PFCs) from Monitoring Wells Sample Protocol

Samples collected using this protocol are intended to be analyzed for perfluorooctanoic acid (PFOA) and other perfluorinated compounds by Modified (Low Level) Test Method 537.

The sampling procedure used must be consistent with the NYSDEC March 1991 SAMPLING GUIDELINES AND PROTOCOLS
http://www.dec.ny.gov/regulations/2636.html with the following materials limitations.

At this time acceptable materials for sampling include: stainless steel, high density polyethylene (HDPE) and polypropylene. Additional materials may be acceptable if proven not to contain PFCs. **NOTE: Grunfos pumps and bladder pumps are known to contain PFC materials (e.g. Teflon™ washers for Grunfos pumps and LDPE bladders for bladder pumps).** All sampling equipment components and sample containers should not come in contact with aluminum foil, low density polyethylene (LDPE), glass or polytetrafluoroethylene (PTFE, Teflon™) materials including sample bottle cap liners with a PTFE layer. Standard two step decontamination using detergent and clean water rinse should be considered for equipment that does come in contact with PFC materials. Clothing that contains PTFE material (including GORE-TEX®) or that have been waterproofed with PFC materials must be avoided. Many food and drink packaging materials and "plumbers thread seal tape" contain PFCs.

All clothing worn by sampling personnel must have been laundered multiple times. The sampler must wear nitrile gloves while filling and sealing the sample bottles.

Pre-cleaned sample bottles with closures, coolers, ice, sample labels and a chain of custody form will be provided by the laboratory.

1. Fill two pre-cleaned 500 mL HDPE or polypropylene bottle with the sample.
2. Cap the bottles with an acceptable cap and liner closure system.
3. Label the sample bottles.
4. Fill out the chain of custody.
5. Place in a cooler maintained at 4 ± 2º Celsius.

Collect one equipment blank for every sample batch, not to exceed 20 samples.

Collect one field duplicate for every sample batch, not to exceed 20 samples.

Collect one matrix spike / matrix spike duplicate (MS/MSD) for every sample batch, not to exceed 20 samples.

Request appropriate data deliverable (Category A or B) and an electronic data deliverable.