Michael Quinlan
Senior Program Manager
Site Investigation and Remediation Department

nationalgrid

January 6, 2021

Mr. Scott Deyette
Chief, Inspection Unit
Remedial Bureau C
Division of Environmental Remediation
New York State Department of Environmental Conservation
625 Broadway
Albany, NY 12233

Subject: Remedial Action Work Plan
Babylon Former MGP Site
West Babylon, New York

Dear Mr. Deyette:

Attached please find a pdf file of the Remedial Action Work Plan (RAWP) for the Babylon Former MGP Site (Site). The document has been revised as follows to address your comments dated December 14, 2020:

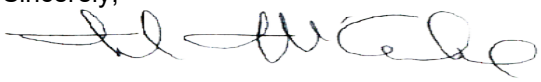
Section 3.1.5, Perimeter Air Monitoring:

- The addition of a discussion of the types of controls that would be implemented in the event that nuisance odors or exceedances of CAMP action levels are identified.
- The addition of a reference to the Fact Sheet that will be developed and distributed to stakeholders. The Fact Sheet will include contact information for NYSDEC and NYSDOH, as well as a Hot Line phone number for stakeholders to pose questions or register complaints about Site conditions.

We have also included a figure illustrating the revised locations of the groundwater monitoring wells on the off-site property (Figure 4-1).

As discussed previously, National Grid is in the process of preparing design/bid documents for the on-site solidification remedy and will forward the 95% design specification and drawings for review/comment. We will update the schedule provided in Section 6.1 once the specifications have been finalized. The initial phase of the off-site remedy, the installation of recovery and groundwater monitoring wells, will be implemented in the first quarter of 2021. Please call me at 516.220.4363 if we can provide any additional information to facilitate your review of the document.

Sincerely,



for

Michael Quinlan
Senior Program Manager
Environmental SIR Department

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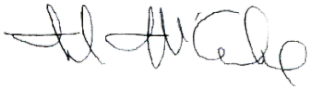
AECOM Imagine it. Delivered.

Remedial Action Work Plan

Former Babylon Manufactured Gas Plant Site
West Babylon, New York
Administrative Order on Consent Index A2-0552-0606

January, 2021

Quality information

Prepared by	Checked by
	
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Acronyms & Abreviations

AWQSGV	Ambient Water Quality Standards and Guidance Values
BTEX	Benzene, toluene, ethylbenzene and xylenes
CAMP	Community Air Monitoring Program
C&D	Construction and Demolition
CCR	Construction Completion Report
cm/sec	Centimeter per second
COC	Constituent of Concern
CY	Cubic Yard
DER-10	NYSDEC Division of Environmental Remediation Technical Guidance for Site Investigation and Remediation
DF	Driving Force
DNAPL	Dense Non Aqueous Phase Liqiud
DUSR	Data Usability Summary Report
ELAP	Environmental Laboratory Approval Protocol
EP	Entry Permit
FER	Final Engineering Report
FS	Feasibility Study
ft bgs	feet below ground surface
FWIA	Fish and Wildlife Impact Analysis
GGBFS	Ground Granulated Blast Furnace Slag
HASP	Health and Safety Plan
ISMP	Interim Site Management Plan
ISS	*in situ* Solidification
LILCO	Long Island Lightring Company
LIRR	Long Island Railroad
MGP	manufactured gas plant
NAPL	non-aqueous phase liquid
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PAHs	Polycyclic Aromatic Hydrocarbons
PC	Portland Cement
PCBs	Polychlorinated Biphenyls
PID	Photoionization Detector
PDI	Pre-Design Investigation
PM-10	Respirable Particulate
PPE	personal protective equipment

ppm	parts per million
PSA	Preliminary Site Assessment
PSI	pounds per square inch
PFAS	per- and polyfluoroalkyl substances
PSF	pounds per square foot
QA/QC	Quality Assurance/Quality Control
QEP	Qualified Environmental Professional
QHHEA	Qualitative Human Health Exposure Assessment
RAO	Remedial Action Objective
RF	Resisting Force
RI	Remedial Investigation
RIR	Remedial Investigation Report
ROD	Record of Decsion
ROW	Right of Way
RRUSCO	Restricted Residential Use Soil Cleanup Objective
SCDOHS	Suffolk County Department of Health Services
SCG	Standards, Criteria and Guidance
SMP	Site Management Plan
sq. ft.	Square Feet
SVOC	Semivolatile Organic Compound
TCLP	Toxicity Characteristic Leaching Procedure
TPH	Total Petroleum Hydrocarbons
TOC	Top of casing
UCS	Unconfined Compressive Strength
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
VOC	Volatile Organic Compound

Certification Statement

I Michael J. Gardner certify that I am currently a New York State registered professional engineer or Qualified Environmental Professional as in defined in 6 NYCRR Part 375 and that this Remedial Action Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the Division of Environmental Remediation (DER) Technical Guidance for Site Investigation and Remediation (DER-10).

Michael Gardner P.E.

1/04/2021 DATE

It is a violation of Article 145 of New York State Education Law for any person to alter this document in any way without the express written verification of adoption by any New York State licensed engineer in accordance with Section 7209(2), Article 145, New York State Education Law.

Executive Summary

This Remedial Action Work Plan details the approach for addressing the requirements of the Record of Decision (ROD) for the West Babylon Former Manufactured Gas Plant (MGP) Site (NYSDEC, 2014). The work plan has been developed in accordance with New York State Department of Environmental Conservation (NYSDEC) Division of Environmental Remediation (DER) Technical Guidance for Site Investigation and Remediation (DER-10) to describe the approach for addressing impacts on the location of the former MGP (on-site property) and an adjacent, active commercial facility (off-site property).

In accordance with the ROD, the remedy will include the following activities:

- Solidification of 1,300 Cubic Yards (CY) of on-site soil and disposal of 350 CY of excess solidification reagent (spoils).
- Recovery of non-aqueous phase liquid (NAPL) from three wells on the off-site commercial property.
- Natural Attenuation of dissolved-phase groundwater impacts on both the on-site and off-site properties.
- Implementation of Site Management Plans (SMPs) on the on-site and off-site properties.

Post remediation activities will include NAPL recovery, groundwater monitoring and periodic inspections to ensure that the institutional controls detailed in the SMPs for both properties continue to be implemented and remain effective.

1. Introduction

1.1 Background and History

The West Babylon former Manufactured Gas Plant (MGP) site (Site) is located at 29 Evergreen Street in a mixed commercial and residential area of West Babylon, Suffolk County, New York (Figure 1-1). The property is approximately 0.79 acres in size, bounded to the south and southwest by the Long Island Railroad (LIRR) tracks, to the west and northwest by residential dwellings, and to the east and northeast by an assisted-living facility. Note that a commercial property is located to the south of the LIRR right of way (ROW). The majority of the Site surface (60 percent) is covered by asphalt paving. Approximately 30 percent of the Site area is comprised of a gravel surface and the footprint of a multi-story building located on the eastern end of the Site. The remaining area is covered by grass. The Site is secured by a gated perimeter fence and its topography is essentially flat.

1.2 Site History

Manufactured gas production (Lowe Process) began at the Site during January 1911 and continued through 1917, under the ownership of the South Shore Gas Company. After the Long Island Lighting Company (LILCO) was founded in 1910, it absorbed the South Shore Gas Company. Gas production for the plant was attributed to LILCO in 1918, and there is no information available regarding any gas production after 1918. LILCO was the owner of the site until 1961.

Subsequently, the property was occupied by a manufacturer of fluorescent lights (Crown Light Manufacturing), although the precise dates of ownership and/or occupancy are not known. Park Avenue Fuel Oil, Inc. occupied the Site starting in 1980. An environmental remediation program, in which three underground storage tanks (USTs) were removed, was conducted in late 2000. The Site is currently owned by the same proprietor that owned Park Avenue Fuel Oil, Inc. A boat storage business has utilized the Site from approximately 2006 until National Grid leased the property in 2019.

1.3 Previous Investigations

National Grid has conducted a Preliminary Site Assessment (PSA) and Remedial Investigation (RI) at the Site. The results have been documented in the following reports:

- Preliminary Site Assessment Report, (VHB, 2003)
- Remedial Investigation Report (Tetra Tech, 2012)

The investigation locations are illustrated in Figure 1-2. Summaries of the findings are provided below.

1.3.1 Site Geology

The Site is located within the Atlantic Coastal Plain Physiographic Province (Geologic Map, 1970). The southern portion of Long Island is comprised of a low glacial outwash plain. This outwash slopes southward towards the Atlantic Ocean from the southernmost terminal moraine deposited by glacial advances during the Pleistocene Era. The area near the site is underlain by eight geologic units comprised of unconsolidated deposits of sand, gravel, and clay deposited in parallel beds overlying bedrock.

Previous investigations identified fill, consisting of sand, silt, gravel, and debris, from 1 to 5 feet below ground surface (ft. bgs). Concrete, asphalt and subbase were observed at the surface. The fill is located above a layer of sand (5-13 ft. bgs) underlain by a gravel layer from 13 to 19 ft. bgs. Below the gravel is a second sand layer from 19 to 35 ft. bgs. The water table is located at approximately 8 ft. bgs.

1.3.2 Site Hydrogeology

1.3.2.1 Groundwater

The unconsolidated materials overlying bedrock comprise Long Island's groundwater resources. Three major aquifers are identified: Upper Glacial aquifer, Magothy aquifer, and a deeper, less accessible Lloyd aquifer overlying the Paleozoic metamorphic basement rocks. Two major confining units are identified: 1) the Pleistocene Gardiners Clay is found mainly on the southern part of Long Island and generally restricts groundwater flow between the Upper Glacial and Magothy aquifers, and 2) the Raritan confining unit. The Raritan confining unit is approximately 200 feet thick and restricts groundwater flow between the Lloyd and Magothy aquifers (USDA, 1987).

Groundwater in the vicinity of the site is not currently used as a drinking water source, nor is it expected to be used in the future. West Babylon relies on the Suffolk County Water Authority, a municipal supply system, to provide water to residences and businesses. The public supply wells nearest the site are located 0.5-mile northwest of the Site, at the Albin Avenue Well Field. The three wells at this location are screened between 557 and 592 feet bgs. Little potential exists for current and/or future use of shallow groundwater at the Site to be a source of drinking water because the local water supply is from the deeper Magothy aquifer and not from the shallow Glacial aquifer.

Three shallow monitoring wells (MW-1, MW-2 and MW-3) were installed on the Site during the RI field program. The shallow monitoring wells were screened across the water table and the screen intervals ranged from 8 to 18 feet bgs. Groundwater levels measured on February 20, 2020 ranged from 7.06 feet below top of inner casing at MW-01 to 8.47 feet below the top of inner casing at MW-03. Based on these groundwater levels, groundwater generally flows to the southeast.

1.3.3 Summary of Media Impacts

1.3.3.1 Soil

The areas where MGP impacts were observed in soil are illustrated in Figure 1-3 (Cross Section Plan View) and Figures 1-3a through 1-3c (Cross Sections). The area of impacted soil has been defined using the following criteria:

- Locations where concentrations in subsurface soils that are greater than the New York State Department of Environmental Conservation (NYSDEC) CP-51 criteria for polynuclear aromatic hydrocarbons (PAHs) and NYSDEC Part 375 commercial criteria for other constituents.
- Locations where observations from boring logs indicate the presence of "lenses" of more concentrated residuals such as NAPL.

The locations where those criteria have been met are summarized in Appendix A, and discussed below:

- **On-site** – The most significant MGP impacts are limited to a defined area of the site immediately adjacent to the downgradient property line, i.e., abutting the LIRR property. Approximately 200 cubic yards (CY) of soil have constituent concentrations that are above the NYSDEC CP-51 criteria for PAHs. The material is present at depths ranging from 8 to 25 ft. bgs. Evidence of lenses of impact was also observed on-site at depths of 8 to 25 ft. bgs (250 CY). Lesser impacts, as defined by observations of stringers and blebs, were observed at depths of 12 to 25 ft. bgs (300 CY).
- **Off-site Commercial Property** – Analytical results did not indicate constituent concentrations that are greater than the applicable NYSDEC criteria, but lenses of impact were observed at depths of 34 to 40 ft. bgs (100 CY). Lesser impacts, i.e., stringers and blebs, were observed at depths of 11 to 44 ft. bgs (1,000 CY).

The soil under the LIRR is not readily accessible. For this evaluation, it is assumed that impacted soil, i.e., with possible constituent concentrations above the applicable NYSDEC criteria and visible impacts, is present under the LIRR property at depths and locations consistent with the adjacent on-site and off-site commercial property areas.

1.3.3.2 Groundwater

A summary of the results from the PSA and RI sampling is provided below. The area where MGP dissolved-phase impacts were observed is illustrated in Figure 1-4.

- **On-Site** - One round of groundwater samples was collected from three on-site monitoring wells on February 2, 2009. NAPL was not detected in the monitoring wells during the 2009 sampling event. VOCs and SVOCs were detected in groundwater from the three monitoring wells at levels below NYSDEC Ambient Water Quality Standards and Guidance Values (AWQSGV) for Class GA Groundwater.
- **Off-Site -** Discrete groundwater samples were collected from Hydropunch™ samplers at 12 locations on the off-site property. Benzene, ethylbenzene, isopropylbenzene and naphthalene were detected at concentrations above the NYSDEC standard at five locations. The groundwater samples also contained concentrations of 1,1-biphenyl, benzo(a)anthracene, benzo(a)pyrene, chrysene, fluorene, and phenanthrene above their respective NYSDEC standards and guidance values at a single location. Total cyanide was detected in only one groundwater sample, at a level that is significantly below the NYSDEC standard.

The Suffolk County Department of Health Services (SCDOHS) installed six monitoring wells (R-1 though R-6) located approximately 450 feet downgradient of the Site along Railroad Avenue and Great East Neck Road. SCDOHS sample the wells in February and April 2011 and determined that constituent concentrations were in compliance with the AWQSGV.

The results from the monitoring of the three on-site wells in February 2020 demonstrate that the concentrations of the principal MGP constituents of interest, benzene, toluene, ethylbenzene and xylenes (BTEX), PAHs and cyanide were less than the AWQSGV at levels below the analytical reporting limits. A summary of the field information from the event as well as the analytical report and Data Summary Usability Report (DUSR) are provided in Appendix B.

1.4 Qualitative Human Health Exposure Assessment

The Qualitative Human Health Exposure Assessment (QHHEA) in the Remedial Investigation Report (RIR) presented an evaluation of the complete and potentially complete exposure pathways associated with human exposure to constituents of concern (COCs) at the Site. The QHHEA was prepared in accordance with guidance provided in the NYSDEC Division of Environmental Remediation Technical Guidance for Site Investigation and Remediation (DER-10, NYSDEC, 2010).

1.4.1 Soil

The results from site investigations indicate limited on-site areas where constituent levels in surface soil are elevated above NYSDEC criteria for direct contact. A review of data from subsurface locations indicate more widespread areas with evidence of MGP and petroleum residuals, including staining, sheens, blebs, lenses, and stringers of petroleum impacts and MGP-related impacts with associated petroleum-like and/or naphthalene odors, respectively. Petroleum-related impacts were generally observed in the shallower zones, closer to the water table, while the MGP-related impacts were generally observed at greater depth. However, the Site currently has most recently been used for boat storage and is covered with asphalt. The asphalt cover reduces potential exposure of current/potential future receptors to Site soil.

To the south of the railroad ROW, which parallels the Site boundary, is a commercial/ light industrial property that includes a large warehouse, production facilities and large asphalt parking areas. Investigation locations on this property exhibited subsurface soils that had MGP-related impacts such as coatings and lenses of MGP residuals with associated odors, or petroleum-related impacts consisting of sheens or staining with associated fuel-like odors. However, the depth of these impacts (11 to 45 ft. bgs) reduces the risk of potential exposure to current/potential future receptors.

1.4.2 Groundwater

As indicated previously in Section 1.3.2.1, the West Babylon community relies on a public water source to supply water to residences and businesses. Therefore, current or future use of site-specific groundwater beneath the site via a private well as a source of drinking water is unlikely.

1.5 Fish and Wildlife Impact Analysis

A Fish and Wildlife Impact Analysis (FWIA) was conducted in and provided the following results:

- There are no significant fish and wildlife resources on the Site.
- Potential exposure pathways are present for surface soils in only a small fraction (<0.25 acres) of the Site where native vegetation is present. The majority of the Site is covered by gravel, asphalt, or building footprint.

Given the small size of the Site, lack of terrestrial or aquatic habitat present, and the limited number of criteria exceedances in surface soils and under current conditions, the Site does not pose a significant risk to fish or wildlife resources.

1.5.1 Feasibility Study

A Feasibility Study (FS) was developed in accordance with NYSDEC DER-10 Guidance to define remedial action goals/objectives and identify an appropriate approach to address the environmental conditions encountered at the Site. Summaries of activities/conclusions associated with the sequential steps in the alternative analysis process are provided in the following sections.

1.5.1.1 Remedial Action Goals and Objectives

The goal for remedial activities at the Babylon site is to eliminate or mitigate the potential risk posed by MGP residuals, and to remove the source of MGP impacts to the extent feasible. Achieving the Remedial Goal for the site will require that the remediation activities result in the elimination of the potential exposure pathways identified in the QHHEA for media that exceed the applicable standards, criteria, and guidance (SCGs); and remove sources of MGP impacts to the extent practicable. Therefore, the following generic Remedial Action Objectives (RAOs) developed by NYSDEC were used for the accessible areas of the Site:

- Prevent ingestion/direct contact with contaminated soil.
- Prevent ingestion of groundwater with contaminant levels above drinking water standards.
- Prevent migration of contaminants that would result in groundwater contamination, to the extent practicable.
- Remove the source of groundwater contamination, to the extent practicable.

The RAOs were used in the subsequent phases of the alternative analysis to facilitate the evaluation of general response actions and associated remedial technologies. The physical limitations imposed by the Site setting were considered when evaluating the ability of a response action or technology to achieve the remedial goals for the Site.

1.5.1.2 Evaluation of Remedial Alternatives

The preferred technologies/approaches were assembled into a set of five remedial alternatives for the Site. The alternatives were evaluated using a set of prescribed criteria that included: overall protection of human health and the environment, compliance with SCGs, long-term effectiveness and permanence, reduction in toxicity, mobility, and volume, short-term effectiveness, implementability, cost effectiveness, land use, and community acceptance.

1.5.2 Record of Decision

National Grid developed a recommended remedy for the Site in the FS that was accepted by NYSDEC in the Record of Decision (ROD) for the project (NYSDEC, 2014). The remedy specifies the following activities:

- Solidification of 1,300 CY of on-site soil and disposal of 350 CY of spoils.
- Recovery of NAPL from three wells in the off-site commercial property.
- Natural Attenuation of dissolved-phase impacts on both the on-site and off-site commercial properties.
- Implementation of Site Management Plans (SMPs) on the on-site and off-site commercial properties.

2. Design Investigations

2.1 Pre-Design Investigation

National Grid conducted a Pre-Design Investigation (PDI) to provide the following information in support of the design for the selected Site remedy:

- Analytical results to confirm that vadose zone soils are appropriate for re-use as backfill;
- Geotechnical data to develop an assessment of the stability of the adjacent elevated railroad track;
- Treatability testing results to determine the appropriate grout mixture for solidification.

Activities for the PDI included: geotechnical testing, pre-characterization sampling and treatability testing. All field work was conducted in accordance with the NYSDEC approved Pre-Design Investigation Work Plan (AECOM, March 2018).

2.1.1 Evaluation of Vadose Zone Soil

Three test pits (TP-1 through TP-3) were excavated in the area of the proposed *in situ* solidification (ISS) treatment area and three borings (SB-1 through SB-3) were installed along the on-site property boundary with the railroad property. A figure illustrating the sampling locations is provided as Figure 2-1. A composite sample was collected from 0-8 ft. bgs in each of the test pit and soil boring sampling locations and analyzed to support the re-use of vadose zone soils as clean backfill.

The results from the analyses are summarized in Appendix C. The results from the analyses indicate that samples collected from several locations in the proposed treatment area shown in Figure 3-1 contain constituent concentrations that exceed the Restricted Residential Use Soil Cleanup Objectives (RRUSCO). Therefore, there will be no re-use of soils.

2.1.2 Geotechnical Evaluation

A separate composite sample was collected from 8-35 ft bgs in SB-1 and SB-2, and 8-25 ft. bgs in SB-3 and submitted for geotechnical testing to support an assessment of the stability of the elevated railroad. Laboratory testing of the samples included of geotechnical index tests, including grain-size, organic content, Atterberg Limits, bulk density, and moisture content.

The bulk samples from the individual soil borings were sent to Kemron Labs in Atlanta, Georgia for geotechnical testing. The results of the testing of representative aliquots of the samples are summarized in Table 2-1. The soil was determined to consist of poorly graded sand with silt and gravel, with a moisture content of approximately 10%. The samples had a bulk density of approximately 125 pounds per cubic foot.

2.1.3 Treatability Testing

Samples of the MGP-related source material were collected from soil boring locations/intervals that exhibited NAPL. Observations from the boring logs indicate that these impacts are present in the saturated zone at the following locations:

- SB-2 – NAPL blebs and coating from 10-13 ft. bgs.
- SB-3 – NAPL blebs and coating from 12.5 to 23 ft. bgs, with sheen associated with the observations of NAPL.

The boring log from SB-1 indicated that impacts were limited to odor and staining from 10-12 ft. bgs.

The samples were composited into three 5-gallon containers for use in bench-scale treatability testing at Kemron Labs. The initial phase of testing involved the production of the following test mixtures using the composite material:

Reagent	Addition Rate (by weight)
Type I Portland Cement	5%
Type I Portland Cement	8%
Type I Portland Cement	11%
Type I PC/GGBFS* (60:40 blend)	5%
Type I PC/GGBFS (60:40 blend)	8%
Type I PC/GGBFS (60:40 blend)	11%

*Portland Cement/Ground Granulated Blast Furnace Slag

The results from the initial phase of testing are summarized in Table 2-2. As illustrated, all samples met the accepted unconfined compressive strength (UCS) performance standard of 50 pounds per square inch (psi) after 7 days of curing. The results indicate that UCS values increased with greater rates of reagent addition from 5% to 11%. The benefits of the addition of ground granulated blast furnace slag (GGBFS) are not apparent. The following mixes were selected for further evaluation over a 28-day period:

Reagent	Addition Rate (by weight)
Type I Portland Cement	5%
Type I PC/GGBFS* (60:40 blend)	5%
Type I PC/GGBFS (60:40 blend)	8%
Type I PC/GGBFS (60:40 blend)	11%

The results from the optimization phase of testing are summarized in Table 2-3. Similar results were obtained for these samples. Increased UCS values were observed with an increased rate of reagent addition. UCS values for the 5% addition rate samples ranged from 132 to 155 psi, while values of 383 and 409 psi were observed for the 8% and 11% addition rate samples, respectively.

Table 2-4 provides a summary of the hydraulic conductivity results for the four test materials.

All samples met the accepted performance standard of 1 x 10^{-6} cm/sec. The results for the 5% addition rate samples were similar with results from 2.1 to 3.6 x 10^{-7} cm/sec. Hydraulic conductivity decreased by approximately two orders of magnitude with the addition of 8% Portland cement (PC) and slag (5.5 x 10^{-9} cm/sec). The addition of reagents at 11% did not appear to provide significant additional benefit.

The treatability testing demonstrated that the physical characteristics of site media (predominantly sand and gravel) can be readily treated to improve its strength and make it relatively impermeable to groundwater flow to isolate source material and improve downgradient water quality. The results suggest that reagent addition rates from 5 to 8%, by wet soil weight would be appropriate to achieve the solidification performance standards for strength (> 50 psi) and permeability (< 1x10^{-6} cm/s). The treatability report is provided in Appendix D.

3. Design Scope – On-Site Property

The remedy for the on-site property will consist of the solidification of MGP impacted media in the treatment area, natural attenuation of dissolved-phase impacts, and the implementation of a SMP to address the remaining exposure pathways that are potentially complete. The following discussion will provide details associated with solidification and the SMP. A discussion of the proposed activities associated with groundwater are presented in Section 7 of this document.

3.1 Solidification of Impacted Soil

Solidification will involve the introduction of a Portland cement slurry (grout) into impacted media to decrease its permeability and increase its strength to meet the following performance standards:

- Unconfined Compressive Strength (UCS)
  - 28-day UCS of at least 50 pounds per square inch (psi) as determined by ASTM D1633 Standard Test Method for Compressive Strength of Molded Soil-Cement Cylinders.
- Permeability
  - 28-day hydraulic conductivity of less than $1X10^{-6}$ centimeters per second (cm/sec) as determined by ASTM D5084 Standard Test Methods for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter.

The grout mixture will be developed using the information from the treatability test (Table 2-4). Treatment will be conducted by installing overlapping columns using a 6-8 ft. diameter auger. Treatment will create a solidified mass that will eliminate the potential for NAPL to migrate and “isolate” the on-site area of impacts from groundwater flow. As a result, solidification will control the ability of on-site source material to adversely affect groundwater quality. The treatment area, 1,900 square feet (sq. ft.) is illustrated in Figure 3-1. Note that the dimensions of the area differ slightly from the illustrations provided in the FS and the PDI Report (Figure 2-1). The treatment area has been re-sized based on the information provided by PDI location SB-1, i.e. no observed NAPL and MGP impacts that are limited to odor and staining. The change has been made to increase the distance between the treatment area and the building (the sole vehicle entrance) to facilitate safe equipment access to the Site.

The solidification of on-site material will occur in four phases: site preparation; the stabilization of the railroad embankment adjacent to the treatment area; removal of vadose zone soil and solidification of the remaining impacted soil. All work will be conducted in accordance with a Health and Safety Plan (HASP) developed by the Contractor.

3.1.1 Site Preparation

Prior to the start of the excavation work, Dig Safely New York will be contacted and companies with subsurface utilities present will be requested to mark-out their utilities in the remediation area. Following review of the utilities in the site area, AECOM will contract a private company to locate all underground electric and gas utilities in the vicinity of each proposed boring and test pit locations using geophysical methods, e.g. ground penetrating radar. Site preparation activities will include the relocation of utilities, installation of erosion controls and odor controls, delineation of soil stockpile/loading areas, and construction of decontamination pads/facilities. Sediment controls, e.g. hay bales, silt fence, etc. will be used in accordance with the applicable New York State guidance. Stormwater run-off will be controlled to prevent contact with impacted soils. Stormwater that does contact impacted soils will be collected and disposed off-site.

The final phase of site preparation will be the removal of the pavement/concrete from the treatment area. The debris will be managed at a permitted off-site facility.

3.1.2 Stabilization of the Railroad Embankment

The embankment will be stabilized by installing two rows of overlapping ISS support columns along 110 feet of the Site perimeter to a depth of 35 ft. bgs (Figure 3-2). The treatment will involve approximately 1,300 CY of soil. The support columns will be required to meet the following performance criteria:

- Unconfined Compressive Strength (UCS) - 7-day UCS of at least 50 psi as determined by ASTM D1633 Standard Test Method for Compressive Strength of Molded Soil-Cement Cylinders.
- Permeability - 28-day hydraulic conductivity of less than $1X10^{-6}$ cm/sec as determined by ASTM D5084 Standard Test Methods for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter.

The support columns will be mixed using a grout mixture that is designed to maximize the strength of the solidified mass. Excess ISS material (spoils) are expected to be generated at a rate of 15 to 25% of the volume of treated soil (260 CY). The spoils will be contained at the ground surface and collected/characterized for subsequent off-site disposal. An evaluation of the potential stability of the railroad embankment during the remediation effort is provided in Section 5.1. A summary of the evaluation, as well as the details of the proposed monitoring program (Section 3.1.2.1) will be provided to LIRR for review/comment as part of the remedial design process.

3.1.2.1 Slope Stability Monitoring

Settlement monitoring will be conducted along the top of the railroad embankment to ensure that construction activities do not affect the stability of the slope and track. Survey points (survey pins, nails, or marks) will be located at three points along the embankment (approximate 50-foot intervals).

Surveys of each point will be conducted prior to the initiation of field work to establish a baseline condition, and daily during construction. The horizontal and vertical location of each point will be surveyed with an accuracy of 0.01 feet. Monitoring shall be performed for both (x, y) horizontal directions using a GPS system with a ground station. The settlement shall be measured using a conventional or digital level. Reflective settlement prisms and a data collection system may be used as an alternative to measure the lateral, horizontal, and vertical movements of the structures. The following settlement threshold levels will be used in the evaluation:

- **Warning Action Limit (0.05 feet)** - The value of the geotechnical or structural instrumentation reading that will require field staff to assess the necessity of any or all of the following:
  - Evaluate the activity responsible for the exceedance
  - Altering the method of excavation or construction
  - Altering the rate of excavation or construction
  - Altering the sequence of excavation or construction
  - Change excavation or construction machinery
  - Increase frequency of monitoring of affected instrument
- **Stop Work Action Limit (0.1 feet)** - The value of the geotechnical or structural instrumentation reading that will require field staff to assess the necessity of any of the following:
  - Make site and affected properties secure
  - Take necessary predetermined measures to mitigate movements and assure the safety of the public and the work
  - Restart excavation or construction operations

3.1.3 Removal of Vadose Zone Soil

After the embankment support columns are installed and cured to meet the required strength standard, vadose zone soils in the treatment area will be removed to a depth of 6 ft. bgs, i.e. two feet above the

typical water table, to provide a working platform for the solidification of deeper soil (Figure 3-3). The excavated soil (400 CY) will be pre-characterized for disposal and direct-loaded onto trucks for off-site disposal. Additional soil will be removed to provide a sloped (4:1) access ramp into the treatment area.

3.1.4 Solidification of Impacted Soil

The remaining soil in the treatment area (approximately 900 sq. ft.) will then be mixed to the depths of the observed impacts (25 ft. bgs) using an ad-mix developed by the treatability studies (Figure 3-4). Approximately 1,300 CY of soil will be mixed, with the generation of approximately 350 CY spoils. The spoils will be consolidated within the treatment area and loaded directly for off-site disposal using the waste profile developed during the railroad bank stabilization activity (Section 3.1.2).

3.1.4.1 Remedial Action Monitoring

The location of the soil columns will be laid out by survey prior to the start of work. During treatment, the contractor will continuously monitor the following parameters:

Process Monitoring

- Verticality and position of the mixing auger;
- Top of column and bottom of column elevations;
- The quantity/rate of ad-mix for each column;
- Rotation rate of the auger;
- Number of treatment passes; and
- Auger penetration and withdrawal rates.

Performance Standards

Wet column samples will be collected at a frequency of 1 sample/ 500 cubic yards of treated material. Three samples will be collected from the embankment stabilization columns and three samples will be collected from the soil treatment area. They will be visually inspected to verify that a homogeneous mixture has been created based on the following criteria:

- No visible NAPL or sheen;
- Grout and soil are thoroughly mixed;
- Consistent color for samples collected from different depth intervals and locations; and
- There are no unmixed soil clumps greater than three inches.

The samples will be recovered into standard soil mold cylinders and allowed to cure for subsequent analysis for unconfined compressive strength, permeability and free liquids. The following performance standards will be used for the project.

- Unconfined Compressive Strength (UCS)
  28-day UCS of at least 50 pounds per square inch (psi) as determined by ASTM D1633 Standard Test Method for Compressive Strength of Molded Soil-Cement Cylinders. 7-day test results will be used to provide an early indicator that the 28-day results will meet the performance standard.
- Permeability
  28-day hydraulic conductivity of less than $1X10^{-6}$ centimeters per second (cm/sec) as determined by ASTM D5084 Standard Test Methods for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter. Note that the samples will be processed using an ASTM accelerated cure process, with preliminary results obtained at 7 and 14 days to provide an early indicator that the 28-day results will meet the performance standard.
- Free Liquids
  The solidified soil shall have no free liquid present observed along the break point of the UCS testing detailed above.

National Grid will notify the NYSDEC project manager of instances when the performance standards are not met to determine whether corrective actions are necessary

3.1.4.2 Quality Assurance Quality Control (QA/QC)

Coring of the solidified mass will be conducted to ensure the complete mixing of the ISS ad-mix and soil.

Coring Implementation

The advancement of four (4) core boreholes (2 associated with the embankment support columns, 2 associated with the treatment columns are anticipated for the project based on ISS field conditions. Each borehole will be advanced to at least one foot below the base of the ISS monolith design. Split spoons, advanced using direct push tools or augers, will be used to collect core samples of the solidified material. Individual sample cores will be less than five (5) feet in length. The core samples will be collected in accordance with the following guidelines:

- Cores will be advanced within 7-10 days of treatment of an area, with the first coring location completed when the ISS area is no more than 25 percent complete.
- Core locations will be biased towards the following: areas with the greatest soil contamination; areas where excessive grout was lost during ISS implementation and/or locations where other difficulties in the ISS process were encountered. To the extent practicable, cores will be collected in locations where individual treatment columns overlap.
- In instances when less than 60% of the core material is recovered from any of the coring runs, an adjacent core will be installed. The location will be abandoned if the recovery from the adjacent core hole continues to be less than 60%.

National Grid will provide NYSDEC with a minimum of 72 hours' (or two business days') notice of the sampling to allow for the on-site inspection of the collected cores. Following completion of each coring location, the borings will be filled with grout using tremie methods. The sample cores will be archived on-site and will be discarded upon approval by the NYSDEC project manager.

Visual Inspection and Reporting

Core samples and related equipment will be visually inspected for the following criteria:

- Visible NAPL within the core, on drilling tools or in drill wash tub, if water-based drilling methods are employed
- Non-mechanical induced cracking within the core
- Percent of core sample recovered

National Grid will notify NYSDEC if any of the following conditions are observed to discuss whether any corrective actions will be necessary:

- A continuous layer or seam of NAPL is noted within the core.
- NAPL coating is visible on drilling tools
- Visible NAPL is noted in the drill wash tub, if water-based drilling methods are employed
- Large sections (> 1 cubic foot) of unmixed material are observed.

It is anticipated that concurrence between National Grid and NYSDEC on the findings from the coring can be achieved on the day of sampling. Field documentation of the QA/QC activities will include the following information: a figure depicting boring/trenching locations, photographs of each core boring referenced, type of drilling method and field coring/trench logs. Following on-site inspection of the QA/QC cores, email correspondence summarizing the observations of the coring results will be sent to the NYSDEC project manager.

3.1.5 Perimeter Air Monitoring

Air monitoring will be conducted during all ground intrusive activities in accordance with the New York State Department of Health (NYSDOH) requirements. It will include real-time monitoring for VOCs, and respirable particulates as described in the Generic Community Air Monitoring Plan (CAMP) included as Appendix E. The proposed monitoring locations are illustrated in Figure 3-5.

VOC monitoring will be performed using a field photoionization detector (PID), RAE Systems MiniRAE™, or equivalent. If the concentration of total VOCs exceeds 5 parts per million (ppm) above background at a downwind location, then work activities will be temporarily halted. If the total VOC level then decreases below 5 ppm over background, work activities will resume. If the total VOC levels persist at levels greater than 5 ppm, work activities will be halted, the source of the vapors identified, and corrective actions taken to abate the emissions until the concentrations drop below the action levels.

Particulate monitoring will be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 microns in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. Each particulate monitor will be calibrated daily with a filtered air sample. Each air monitoring instrument will be continuously downloaded and saved electronically to a dedicated computer located on-site.

CAMP reports will be submitted to NYSDEC and NYSDOH representatives on a weekly basis. Notification of exceedances of the Action/Alert Levels will be provided to NYSDEC and NYSDOH within 2 hours of the occurrence, with written notification provided to the agencies within 24 hours.

3.1.5.1 Odor and Dust Control

Odor, vapor, and dust control will be required for this project due to the immediate proximity of residential buildings. Field technicians will evaluate conditions at the perimeter of the site to identify times when there may be a potential for MGP odors to reach off-site properties. To mitigate the potential for MGP olfactory fatigue, staff will “sample” a material having a significant and different odor, e.g. coffee beans, prior to conducting inspections. An odor and vapor suppressing foam (Rusmar AC-654 foam or similar) and plastic sheeting (or other approved methods, including BioSolve™ and similar products) will be available at all times during the remedial activity to contain air emission sources. Additional controls will be employed in instances when the CAMP action levels are exceeded, or when odors are detected at the perimeter of the Site during routine monitoring activities.

If the real-time perimeter levels are exceeded or significant nuisance odors are noted, National Grid, the Engineer, and the Contractor will consult to determine what type of emission control action is appropriate. Actions that may be taken to reduce emissions include the following:

- Spraying water on exposed soil surfaces and/or roadways to suppress windblown dust.
- Covering working areas of exposed impacted soils, trucks loaded with impacts soils, or stockpiles of impacted soils with tarpaulins, with vapor suppressing foam or other vapor control agent.
- Temporarily relocating work to an area with potentially lower emission levels.
- Reduce the production rate or change the sequence of work activities.
- Change the work methods or equipment to alternatives that minimize air emissions.

National Grid will develop a Fact Sheet for the remediation program that will be distributed to stakeholders. The Fact Sheet will provide the contact information for NYSDEC and NYSDOH as well as a Hot Line phone number that stakeholders can call to ask questions or register complaints about Site conditions.

3.1.6 Waste Management

The implementation of the remedy will generate the following wastes for off-site management: soil, asphalt pavement, concrete and ISS spoils. The wastes will be characterized with laboratory analyses in accordance with the requirements of the disposal facilities. They may include: Toxicity Characteristic Leaching Procedure (TCLP), corrosivity, ignitability, reactivity, total petroleum hydrocarbons (TPH) and

polychlorinated biphenyls (PCBs). Waste transportation and disposal of all contaminated wastes at an off-site permitted facility will be managed by an approved-National Grid contractor. All shipments of waste from the Site will be documented using waste tracking forms, bills of lading, and receipts. A list of National Grid-approved disposal facilities is provided as Appendix F.

3.1.6.1 Soil

The soil within the excavation will be pre-characterized as per off-site thermal treatment facility requirements. To the extent possible, excavated soil will be loaded directly into trucks for off-site transportation.

3.1.6.2 Construction Debris

Construction and Demolition (C&D) materials, e.g. concrete and pavement, removed during the excavation will be segregated, visually inspected, and decontaminated using scrapers, shovels, and a steam cleaner, as necessary, and loaded into roll-offs for off-site transportation and disposal.

3.1.6.3 ISS Spoils

Excess grout will be consolidated on-Site, characterized and managed off-site at a permitted disposal facility.

3.1.7 Off-site Transportation

The transportation of impacted materials from the Site will be performed in accordance with all regulatory requirements. All haul trucks will have impermeable bed liners and impermeable covers (minimum 10 mil thickness) that fully line the bed of the truck and can be overlapped to cover the top of the load to manage odors during transportation and, if there is the potential for liquids or tarry material leaking from the waste, they will have gasketed tailgates. The trucks may be sprayed, as necessary, with odor suppressive foam prior to covering to reduce vapor and odor emissions.

3.1.8 Decontamination

During and upon completion of the excavation/solidification phases of the project, decontamination of equipment will be performed in order to prevent contaminated material from being spread off-site during waste hauling activities and to prevent the spreading of impacted material to un-impacted areas of the site. Trucks used for transport of excavated material will be decontaminated using dry decontamination methods (i.e., removal of loose material with a broom or brush) to the extent practicable to limit the volume of decontamination water. These methods, along with parking of trucks on plastic sheeting during loading, will effectively prevent the spread of contaminated materials onto roadways during transport to disposal facilities. Decontamination of the earth-moving equipment will occur at the completion of the excavation phase and prior to the handling of clean backfill or mobilization offsite. The method of equipment decontamination will consist of pressure washing to remove any impacted soil. Decontamination water generated during cleaning of tools and equipment will be temporarily stored on-site for later off-site disposal at an approved facility. Water generated from decontaminating personnel will be minimal due to the availability of disposable personal protective equipment (PPE) such as Tyvek® coveralls, booties, and nitrile gloves.

3.1.9 Site Restoration

Upon completion of excavation activities, the excavated areas will be backfilled using material from an off-site source that meets the requirements of NYSDEC 6 NYCRR 375 Subpart 6.7 (d) and the NYSDEC per- and polyfluoroalkyl substances (PFAS) guidelines. The backfill will be placed in 12-inch lifts and properly compacted. The surface of the site will be restored, and pavement replaced. Backfill material will be sampled at least once for each borrow source and submitted to NYSDEC for approval. All remnants of the remedial activities will be removed from the Site after completion of the work.

3.2 Site Management Plan

A Draft Interim Site Management Plan (ISMP) has been developed for the on-site property to address the potential human health risk posed by remaining impacts within the saturated zone. The ISMP will be

revised as a final SMP after completion of the remedial activities described in the previous sections. It will detail processes to manage remaining impacts at the site in support of the Environmental Easement granted to NYSDEC by the Owner as a requirement of site closure and to address the means for implementing the institutional controls that will be mandated by the Easement. The institutional controls will place restrictions on site use to prevent future exposure to remaining impacts, e.g., controlling disturbances of impacted soil and prohibit the of groundwater without treatment to render it safe for intended use. The following documents will be included in the SMP:

- **Engineering and Institutional Control Plan** – will include a description of the controls and define the criteria for their termination. The plan will provide specific details regarding the mechanisms that will be used to implement, maintain, monitor and enforce the controls.
- **Excavation Work Plan** – will be developed to support future activities that will disturb remaining contaminated material. The plan will define notification requirements, soil screening methods, stockpiling methods, material excavation and load out requirements, methods for transport, disposal/cover system restoration, and include a contingency plan in the event that unanticipated sources of impact are encountered. Supporting information will include example site-specific health and safety and community air monitoring plans**.**
- **Monitoring Plan** - will define the inspection, maintenance and monitoring requirements for Site systems, including requirements for documenting site use; procedures for inspection of the soil cover and reporting for monitoring activities.
- **Operation and Maintenance Plan** – will define the requirements to documenting product recovery and the performance of associated monitoring activities. It will address routine and non-routine operation.

4. Design – Off-Site Property

The remedy for the off-site property will involve the installation of NAPL recovery and groundwater monitoring wells and the implementation of a SMP to address potential exposure pathways. A discussion of these activities is provided below. Associated monitoring activities are discussed in Section 7. All work will be conducted in accordance with the HASP submitted with the Pre-Design Investigation Work Plan (AECOM, March 2018).

4.1 Installation of Wells

The remedy calls for the installation of three NAPL recovery wells (RW-1, RW-2, and RW-3) and four groundwater monitoring wells (MW-101 S/D and MW-102 S/D) on the off-site commercial property (Figure 4-1). Specific details of the wells and their installation are provided below.

4.1.1 Mobilization and Site Preparation

Mobilization will include the staging of the necessary equipment and personnel to manage investigation derived waste, implement the HASP and setup an on-site decontamination facility.

Site preparation activities will include utility clearance and installation of site controls. Prior to the start of the drilling activities, Dig Safely New York will be contacted, and companies with subsurface utilities present in the work area will be requested to mark-out their utilities in areas immediately adjacent to the Site. Following review of the utilities in the site area, AECOM will contract a private company to locate all underground electric and gas utilities in the vicinity of each proposed boring and test pit locations using geophysical methods, e.g. ground penetrating radar. Proposed well locations will be surveyed by geophysical methods to identify possible locations of subsurface structures not indicated on available drawings. All well locations will be pre-cleared to a depth of 5 ft. bgs.

4.1.2 Recovery Well Design

Based on borehole stratigraphy at RI borings SB-08, SB-09, and SB-10, the proposed recovery well design includes the use of 4-inch diameter 0.020-inch slot wire wrap stainless steel screen and 4-inch flush-threaded PVC risers. The recovery wells will screen all soil intervals with visual indications of MGP impacts, including NAPL stringers, coating, or blebs. Centralizers will be installed at the top and bottom of each screen. The screen size has been selected based on the grain-size information presented in the boring logs. Each well will be equipped with a 10-foot long, 4-inch diameter, stainless steel sump to collect any dense non-aqueous phase liquid (DNAPL) that enters the well. A cement basket (or similar cone-shaped device) shall be attached to the casing at the screen-sump connection.

The anticipated recovery well construction depths are provided in Table 4-1. The table also provides the anticipated screen interval for locations where data is currently available. Note that field observations will also be used to verify the appropriate construction depths/screening intervals, with modifications made as required. The recovery wells will be installed as follows:

- Soil borings will be advanced at each recovery well location to a target depth of 50 feet bgs based on the worst-case visual impacts noted at boring SB-08.
- Soil samples will be collected continuously to the target depth for observation and evidence of visual impacts.
- The bottom of the well screen will be set at the bottom of the lowest observed NAPL saturated interval (if present) at each recovery well. If no visual impacts are noted, screens will be set from 10 to 25 feet bgs.
- Well screens will be designed to intersect zones of identified visual NAPL impacts.

- Information from the RI indicates that the recovery well screens will not pass through a low permeability interval where NAPL could discharge from the well back into another permeable interval.

The annulus of the bore hole for all recovery wells will be at least four inches greater than the riser and screen diameter. A quantity of cement/bentonite grout that has been calculated to fill the annulus between the sump and the bore hole to the screen-sump connection will be placed in the bottom of the boring to seal the sump. The well casing assembly, consisting of the sump, cement basket, screen, and casing will be lowered into the borehole so that the cement/bentonite grout forms a seal with the bottom of the cement basket. An appropriately sized high efficiency glass bead filter pack will then be placed around the well screen and the riser from the base of the well screen to two feet above the top of the well screen.

The annular space above the filter pack will be filled with a bentonite seal (2 feet thick). The annular space above the bentonite seal will be filled with a grout mixture utilizing a tremie pipe to fill the annulus from the bentonite seal to one foot below the top of casing (TOC). If settling of the grout mixture occurs, the annulus will be filled again with the grout mixture to 1 foot below TOC. Each recovery well will be completed at the ground surface in a limited-access flush mounted well vault.

4.1.3 Groundwater Monitoring Well Design

Two shallow and deep monitoring well pairs will be installed downgradient of the proposed recovery wells. At these well locations, shallow wells will be screened from 10 to 20 feet bgs and deeper wells will be screened from 20 to 30 feet bgs. These intervals cover intervals of the highest dissolved phase detections of MGP constituents identified in the RIR. Each well will be constructed of 2-inch 20-slot PVC well screens and 2-inch flush-threaded PVC riser. Appropriated sized gravel filter packs will be placed around the well screen and the riser from the base of the well screen to two feet above the top of the well screen. The annular space above the filter pack will be filled with a bentonite seal (2 feet thick). The annular space above the bentonite seal will be filled with a grout mixture utilizing a tremie pipe to fill the annulus from the bentonite seal to one foot below the TOC. If settling of the grout mixture occurs, the annulus will be filled again with the grout mixture to 1 foot below TOC. Each monitoring well will be completed at the ground surface in a limited-access flush mounted well vault. Monitoring well locations are shown on Figure 4-1.

4.1.4 Well Development and Surveying

All installed wells will be surveyed for elevation and location using a licensed New York surveyor. A minimum of 24-hours post-installation, each well will be developed using surge and pump procedures to remove drilling fluids and fine-grained material from the sump, well screen, and filter pack.

4.1.5 Waste Management

Investigation waste generated during the well installation will be collected in properly labeled United States Department of Transportation approved storage containers (e.g. 55-gallon drums) or a small bulk roll-off container and grouped by environmental matrix (soil, water, personal protective equipment (PPE)/plastic, construction debris). All investigation derived waste (soil cuttings, well development water, decontamination water, and poly/plastic sheeting) will be containerized and secured pending off-site disposal at a permitted facility.

The investigation derived wastes will be characterized with laboratory analyses as required by the disposal facility. They may include: TCLP, corrosivity, ignitability, reactivity, TPH and PCBs. Waste transportation and disposal of all contaminated wastes at an off-site permitted facility will be managed by an approved-National Grid contractor.

4.1.6 Site Restoration

Disturbed grass and paved areas will be restored. All remnants of the well installation activities will be removed, leaving site conditions appropriate for the subsequent use of the property by the owner.

4.1.7 CAMP Monitoring

Air monitoring will be conducted during all ground intrusive activities. It will include real-time monitoring for volatile organic compounds (VOCs), and particulates (i.e., dust) at a minimum of two (2) locations along the perimeter of the site, e.g. upwind and downwind of the work area, as described in the *Generic Community Air Monitoring Plan* (CAMP) included in Appendix E.

VOC monitoring will be performed using a field PID (RAE Systems MiniRAE™ or equivalent) located within the work zone. If the concentration of total VOCs exceeds 5 parts per million (ppm) above background, then work activities will be temporarily halted. If the total VOC level then decreases below 5 ppm over background, work activities will resume. If the total VOC levels persist at levels in excess of 5 ppm, work activities will be halted, the source of the vapors identified, and corrective actions taken to abate the emissions until the concentrations drop below the action levels.

Particulate monitoring will be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 microns in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. Each particulate monitor will be calibrated daily with a filtered air sample. Each air monitoring instrument will be continuously downloaded and saved electronically to a dedicated computer located on-site.

4.1.8 Decontamination

All drilling equipment including the drilling rig; augers; bits; rods; tools; split-spoon samplers; and tremie pipes will be cleaned with a high-pressure, hot water pressure washing unit between investigation locations. The tools, drill rods, and augers will be placed on polyethylene plastic sheets following pressure washing. Direct contact with the ground will be avoided. The back of the drill rig and all tools, augers, and rods will be decontaminated at the completion of the work and prior to leaving the site.

4.2 Site Access Agreement

An access agreement will be developed for the off-site commercial property to ensure access to the recovery and monitoring wells and address the potential human health risk posed by remaining impacts within the saturated zone. Specifically, the agreement will detail processes to manage remaining impacts at the site as a requirement of site closure and address the means for implementing the site controls. The controls will place restrictions on site use to prevent future exposure to remaining impacts, e.g., controlling disturbances of impacted soil and prohibit the use of groundwater. The use of groundwater will be governed by the Long Island General Well Construction Prohibition, Environmental Conservation Law (ECL), Article 15, Title 15, Section15-1527. The following documents will be included in the agreement:

- **Engineering and Site Control Plan** – will include a description of the controls and define the criteria for their termination. The plan will provide specific details regarding the mechanisms that will be used to implement, maintain, monitor and enforce the controls.
- **Excavation Work Plan** – will be developed to support future activities that will disturb remaining contaminated material. The plan will define notification requirements; soil screening methods; stockpiling methods; material excavation and load out requirements, methods for transport, disposal/cover system restoration, and include a contingency plan in the event that unanticipated sources of impact are encountered. Supporting information will include example site-specific health and safety and community air monitoring plans**.**
- **Monitoring Plan** - will define the inspection and monitoring requirements for site systems, including requirements for documenting site use; procedures for inspection of the soil cover and reporting for product recovery and groundwater monitoring activities.
- **Operation and Maintenance Plan** – will define the requirements to documenting product recovery and the performance of associated monitoring activities. It will address routine and non-routine operation.

National Grid has obtained a written agreement with the property owner to perform the activities related to the remedy.

5. Permits and Authorizations

New York State or Federal permits or approvals are not believed to be required for the work since remedial activities will be conducted under an Order on Consent with NYSDEC.

Work in the on-site area immediately adjacent to the railroad right of way will require an Entry Permit (EP) from the LIRR. An EP is required in instances where third-party activities have the potential to "Foul the Track", i.e. work within 15 feet of or along the track, and/or operation of equipment which could fall onto or within 6 feet of the track.

The ISS contractor will submit a Request for Entry Permit that will include the following information:

- A description and schedule for the work;
- Drawings and calculations that have been stamped by a New York State Professional Engineer;
- Specific crane and loading information;
- Evidence of insurance, including Railroad Protective Liability Insurance; and
- Documentation that project staff have attended Roadway Worker Protective Training.

All work under the permit will be conducted under the direction of LIRR flagmen.

5.1 Embankment Stability Evaluation

The stability of the elevated railroad embankment located adjacent to the Site is a principal concern for the design of the solidification remedy. A topographic illustration of the track embankment and Site treatment area was presented previously in Figure 3-1.

The results obtained from the PDI indicate that the soil observed at the site is predominately sand with varying amounts of silt and gravel. Based on the N-values (blows/ft) and the laboratory results, a unit weight of 122 pounds per cubic feet (pcf) and a friction angle of 32 degrees was determined to be appropriate for this soil. The groundwater was determined to be at 8 ft bgs.

Based on the results of the treatability test (Section 2.1.3), it was determined that a unit weight of 132 pcf is an appropriate value to be used in the slope stability analysis. For the wet cement, a cohesion of 250 pounds per square feet (psf) was entered into the model, and for the cured soil cement, a cohesion of 3600 psf was entered. In each case, a friction angle of 0 was chosen to represent the undrained condition.

The soil parameters used in the modelling analysis are provided in the following table.

Slope stability model input parameters

	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (deg)
Sand, Gravel, and Silt	122	0	32
Wet Soil Cement	132	250	0
Cured Soil Cement	132	3600	0

The static stability analysis was performed using the computer program Slope/W by Geo-Slope International. Each case was analyzed using the Entry and Exit method to determine the associated factor of safety. The most conservative, i.e. lowest, result is presented in a text box on each figure presented in Appendix G. The model identifies a potential failure surface and establishes a number of computation points along it (green shaded area). The model calculates the "driving force (DF)" and "resisting force (RF)" along the multiple slip surfaces and determines the Factor of Safety (RF/DF) for

each surface. A train passing on the track is a temporary condition; therefore, each scenario was evaluated first without an applied surcharge load and then with an applied surcharge load, representative of the Cooper E 80 load on the train track. The slope stability analysis was first conducted for the existing conditions. Figure G-1 represents the existing condition without a surcharge load, and Figure G-2 represents the existing condition with a surcharge load. The calculated critical failure surface does not pass through the location of the proposed ISS columns indicating that these columns will not impact the stability of the embankment. The analysis at the existing embankments was completing a second time, forcing the critical failure surface to pass through the ISS columns in order to further evaluate the impact of the ISS columns and excavation on the embankment. These analyses (Case 2) are the basis of comparison for the subsequent cases 3 through 5 in which the critical failure surface passing through the proposed ISS support column was evaluated. The following five cases were evaluated, the results are summarized in the following table and included in Appendix G:

1. Existing embankment (Figures G-1 and G-2);
2. Existing embankment with critical surface through location of ISS support columns (Figures G-1 and G-2);
3. Installation of 10 ft diameter ISS support columns with wet concrete, i.e. while curing (Figures G-3 and G-4);
4. Installed 10 ft diameter ISS support columns with cured concrete (Figures G-5 and G-6); and
5. Installed 10 ft diameter ISS support columns with cured concrete and 6 ft excavation (Figures G-7 and G-8)

Slope/W Results - Factor of Safety

Case	Entry and Exit Factor of Safety	
	No Surcharge Load	Surcharge Load
1 – Existing embankment with critical surface through location of ISS support columns	2.03	1.19
2 – Installation of 10 ft diameter ISS support columns with wet concrete, i.e. while curing	2.60	1.23
3 – Installed 10 ft diameter ISS support columns with cured concrete	6.63	2.33
4 – Installed 10 ft diameter ISS support columns with cured concrete and 6 ft excavation	4.11	1.93

Note: A factor of safety > 1.5 for normal conditions or > 1.25 for temporary loading conditions indicates a stable slope

In each case, the calculated Factor of Safety without a surcharge load applied is above 1.5 indicating a stable slope. The inclusion of a surcharge load (temporary load) results in an FS lower than 1.25 for the existing case. In each scenario of cases 2 through 4, the calculated Factor of Safety is greater than the calculated value for the existing condition from case 1. This indicates that the installation of the ISS support columns will provide additional support and not weaken the railroad embankment. Although the analysis was not conducted for the ISS treatment and the backfilled excavation (restored site), this work will provide additional support for the embankment.

6. Schedule

Preliminary schedules for the design and implementation of the on-site and off-site remedies remedy are presented below. The schedule will be reviewed and revised as necessary throughout the design/procurement process. Updates will be provided in the bi-monthly reports that National Grid submits to NYSDEC.

6.1 On-Site Remedy

The proposed general schedule for the implementation of the ISS remedy and finalization of the SMP for the 29 Evergreen Street property is provided below:

- Submittal of RAWP – May 15, 2020.
- Submittal of 95% Design to NYSDEC for Review – June15, 2020.
- Issue For Bid Design to National Grid Purchasing – July 15, 2020.
- Procurement and Contractor Selection/Negotiation – October 15, duration 12-weeks.
- Secure LIRR Entry Permit for Contractor and Mobilize to the Site – November 15, 2020.
- Implementation of the Remedy – November 15 to January 15, 2021, duration 8-weeks.
- Submittal of draft SMP to NYSDEC for Review – February 15, 2021.

6.2 Off-Site Remedy

The proposed schedule for the installation or recovery /monitoring wells and development of the SMP for the off-site property is provided below:

- Submittal of RAWP – May 15, 2020.
- Installation of Recovery/Monitoring Wells – First Quarter, 2021.

7. Post Construction Plans

National Grid will continue the management of MGP residual material on the on-site and off-site properties through the implementation of procedures detailed in the SMPs.

7.1 Reporting

The remedial activities at the on-site and off-site properties will be documented in a Final Engineering Report (FER). The document will include the following content for the remedies for the On-Site and Off-Site Properties:

- A description of the constructed remedy, including a description of the changes to the design documents.
- Quantities of contaminants treated or removed.
- The boundaries of the properties subject to environmental easement or deed restriction/institutional control.
- As built drawings, where appropriate. report of constructed.
- Identification/documentation of the applicable environmental easement or institutional control.

The document will describe the institutional controls and provide the FER certification for the remedial program. The SMPs for the properties will be included as attachments to the document.

A draft FER will be submitted to NYSDEC within 60 days of the completion of the On-Site Remedy.

7.2 Monitoring and NAPL Recovery

The evaluation of product levels will be conducted on the three recovery wells on the off-site property on a quarterly basis. The schedule for subsequent monitoring will be reviewed with NYSDEC after the first four events. The approaches for monitoring site conditions, as well as recovering and managing the collected product are discussed below.

7.2.1 Monitoring

Initial gauging activities will be conducted approximately 30 days after well development to ensure the starting product thickness, product head, and potentiometric surface head are all representative of formation conditions.

Immediately before NAPL recovery, the depth to water, total well depth, and depth to NAPL will be measured and recorded. NAPL and water depths will be measured to the nearest 0.01 ft below TOC using an interface probe; the thickness of NAPL will be measured with a graduated, stainless steel weighted tape. All readings will be evaluated for reasonableness/accuracy and re-measured, if necessary. For example, NAPL coatings that only occur on one side of the tape, or are intermittent, may be an indication an inaccurate reading and will be re-measured. The volume of NAPL within each well will be calculated prior to removal using the design dimensions of the well and measured thickness of the product. On a periodic basis the total depth of the well will be measured and compared against installed depth. In the event that the initial depth is lost due to debris or silt, a plan will be developed to restore the well.

7.2.2 NAPL Recovery

Accumulated NAPL will be recovered using an air lift system that consists of an air compressor and sample line (1 inch outside diameter black iron pipe) that runs from the bottom of the well sump to a closed 55-gallon drum and is operated in the following manner:

- A small stream of compressed air is introduced into the bottom of the sample line through a “T’ connection.
- The upward movement of the air “bubble” creates a vacuum that draws NAPL upward from the sump and into the drum.
- The consistency of the stream is observed until the fluid being removed appears to be clear (i.e., NAPL is no longer being removed). At that point, the air flow is discontinued and the volume of collected NAPL is measured and recorded.

The collected NAPL will be containerized and stored in a secure drum enclosure pending off-site collection by a certified waste hauler for disposal.

7.3 Groundwater Monitoring

Groundwater monitoring will be conducted on the three monitoring wells on the on-site property and four newly installed wells on the off-site property on a quarterly basis. Note that on-site well MW-03 will be removed as part of the ISS remedy and will be re-installed as MW-03R along the fence line of the Site adjacent to the solidified mass. The schedule for subsequent monitoring will be reviewed with NYSDEC after the first four events. The approaches for monitoring site conditions are discussed below.

Static water level, total depth, and NAPL thickness measurements will be collected from the monitoring wells using an oil-water interface probe with 0.01-foot measurement accuracy. The measurements will be used to determine the groundwater elevations throughout the monitoring well network and the presence or absence of NAPL in the wells. Each monitoring well will be purged using a peristaltic pump and new low-density polyethylene tubing. Groundwater elevations and water quality parameters including pH, conductivity, oxidation-reduction potential, temperature, dissolved oxygen, and turbidity will be measured and recorded during the purging process.

Representative samples will be collected in accordance with the procedures detailed in United States Environmental Protection Agency (USEPA) document titled *Low -Stress (low flow) Purging and Sampling Procedures for the Collection of Groundwater Samples from Monitoring Wells,* dated July 30, 1996 and revised January 19, 2010. The samples will be collected into pre-cleaned sample containers provided by the laboratory performing analysis with any necessary preservations added to the sample containers at the laboratory prior to sample collection. Coolers with ice will be used to store samples at 4 degrees Celsius until delivered to and analyzed by the laboratory.

The samples will be analyzed for BTEX and PAHs, as well as additional parameters to evaluate the presence/progress of natural attenuation processes, including alkalinity, nitrate, nitrite, sulfate, sulfide, dissolved oxygen, total organic carbon, ammonia, and nitrogen. The laboratory will be certified under the NYSDEC Environmental Laboratory Approval Program (ELAP) and the NYSDOH ELAP Contract Laboratory Program for analyses of solid and hazardous waste. Data will be provided in electronic format, including the following specific requirements:

- All data generated will be submitted in an electronic data deliverable that complies with the NYSDEC Electronic Data Warehouse standards or as otherwise directed by NYSDEC.
- Preliminary or final reports will be submitted to NYSDEC in an electronic format that complies with NYSDEC Electronic Document Standards or as otherwise directed.

Data deliverables and DUSRs will be completed in accordance with the *Guidance for Data Deliverables and the Development of Data Usability Summary Reports* included in Appendix 2B to DER-IO.

7.3.1 Periodic Review/ Inspections

The on-site and off-site properties will be inspected on an annual basis and the findings reported in a Period Review Report. The inspections will document, through certification by a Qualified Environmental Professional (QEP) that the institutional controls are in place and remain effective. The report will include a summary of monitoring results, including sampling locations and groundwater elevation contours and flow direction.

8. References

AECOM Technical Services (AECOM), 2014, Feasibility Study Former Babylon Manufactured Gas Plant Site, West Babylon, New York, Administrative Order on Consent Index A2-0552-0606.

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New York State Department of Environmental Conservation (NYSDEC), 2010, DER-10 Technical Guidance for Site Investigation and Remediation, New York State Department of Environmental Conservation, Division of Environmental Remediation, June 2010.

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Tetra Tech, 2012, Remedial Investigation Report for the Babylon Former MGP Site, West Babylon, Suffolk County, New York, December 2012.

USDA, 1987, USDA Soil Conservation Service, Soil Survey of Nassau County New York, 1987.

VHB, 2003, Preliminary Site Assessment Report, Order on Consent D1-0001-95, NYSDEC Site No. 1-52-181, Babylon Former MGP Site, West Babylon, Suffolk County, New York, 2003.

Figures

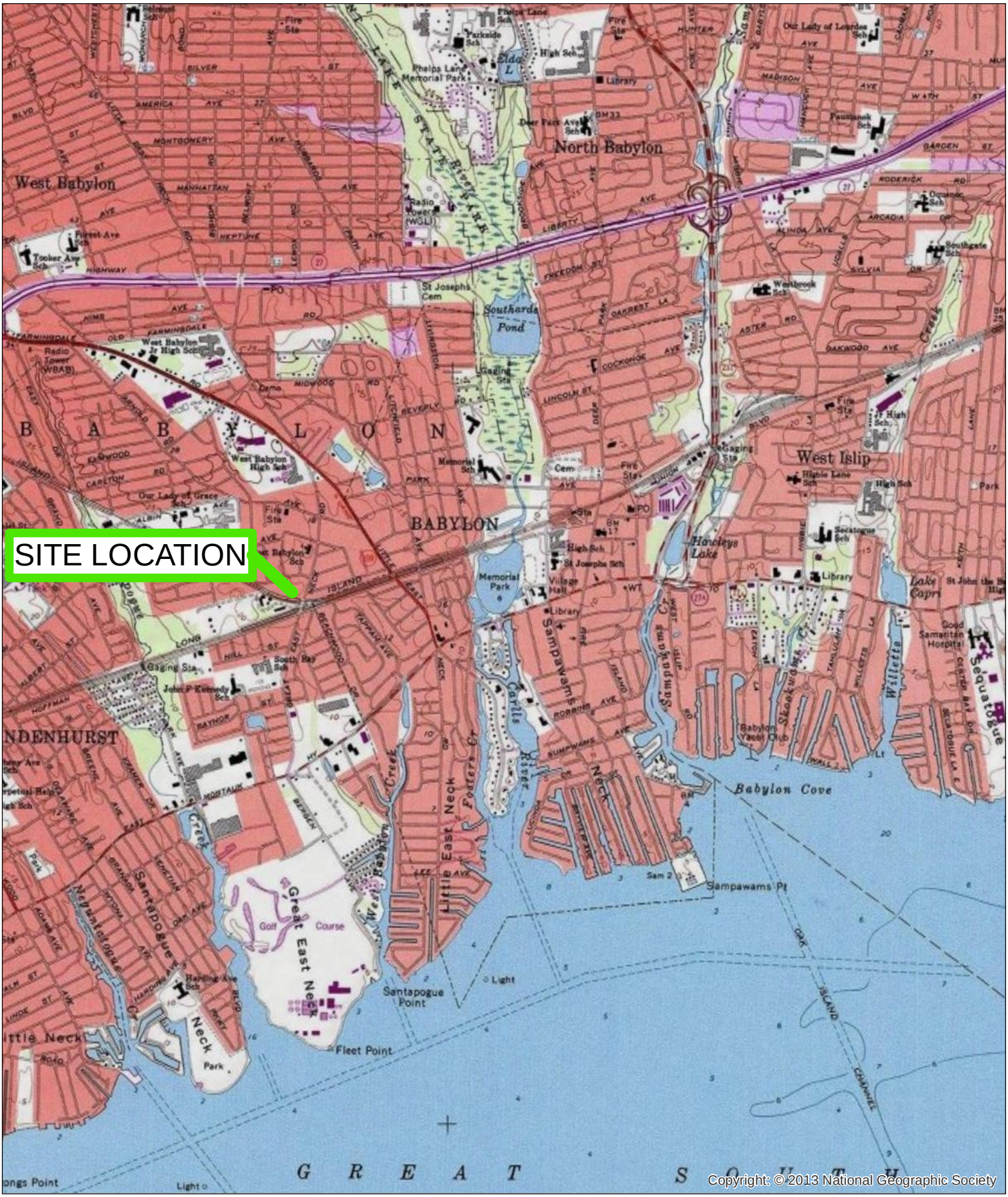

Figure:	Site Locus Babykon Former MGP Site West Babylon, New York		
1-1	Scale:	Date:	Project Number:
	As Shown	01/2014	6028769.2000

AECOM ENVIRONMENT
2 TECHNOLOGY PARK DRIVE
WESTFORD, MA 01886
PHONE: (978) 589-3000
WEB: WWW.AECOM.COM

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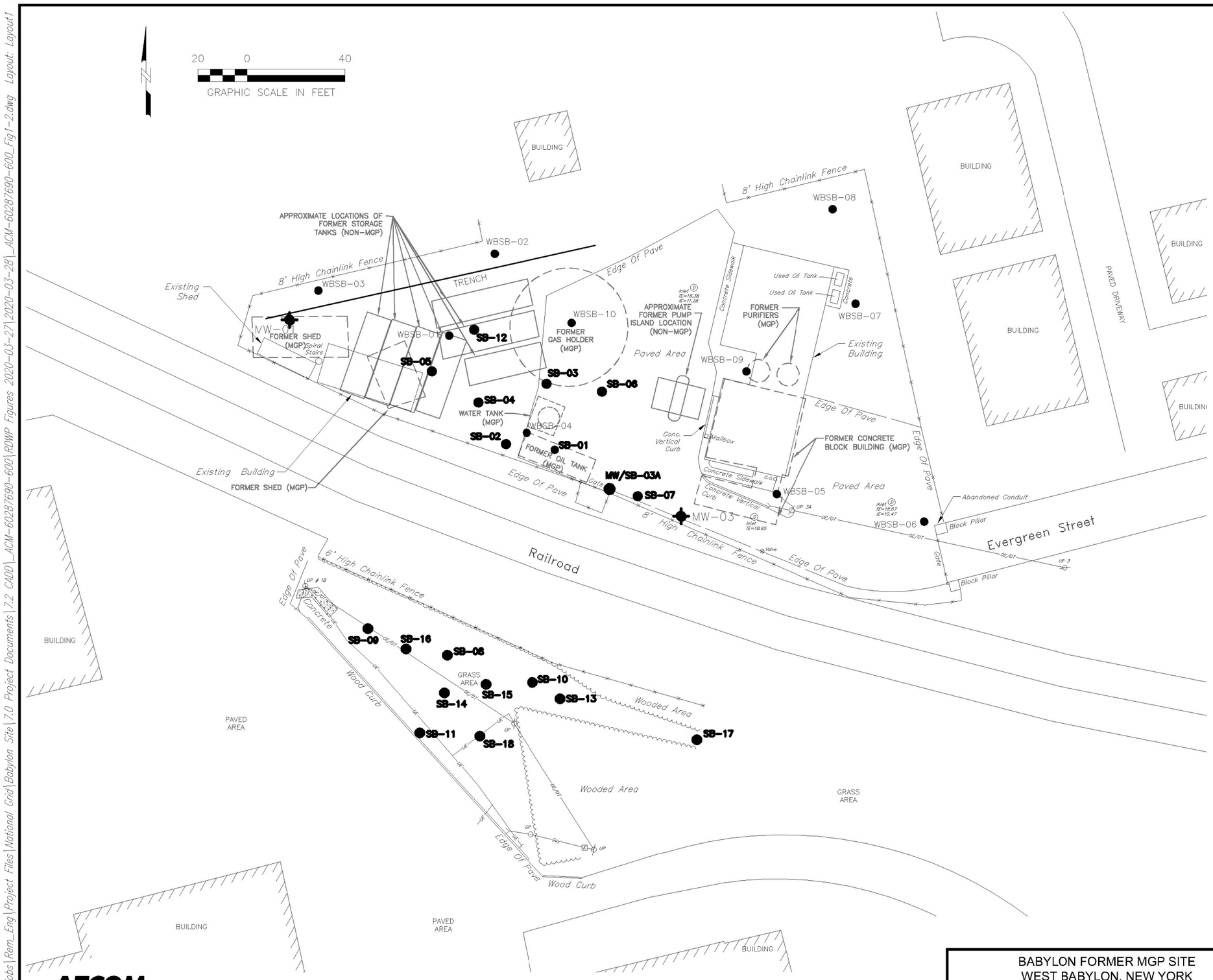
1 inch = 2,500 feet

0 2,500 5,000 10,000
Feet

Path: J:\Rem_Eng\Project Files\National Grid\Babylon Site\7.0 Project Documents\GIS\2013-Site Loc.mxd



AECOM

BABYLON FORMER MGP SITE WEST BABYLON, NEW YORK 60287690.600			**INVESTIGATION LOCATIONS**
DATE: 03/29/2020	DRWN: RCW		**FIGURE 1-2**

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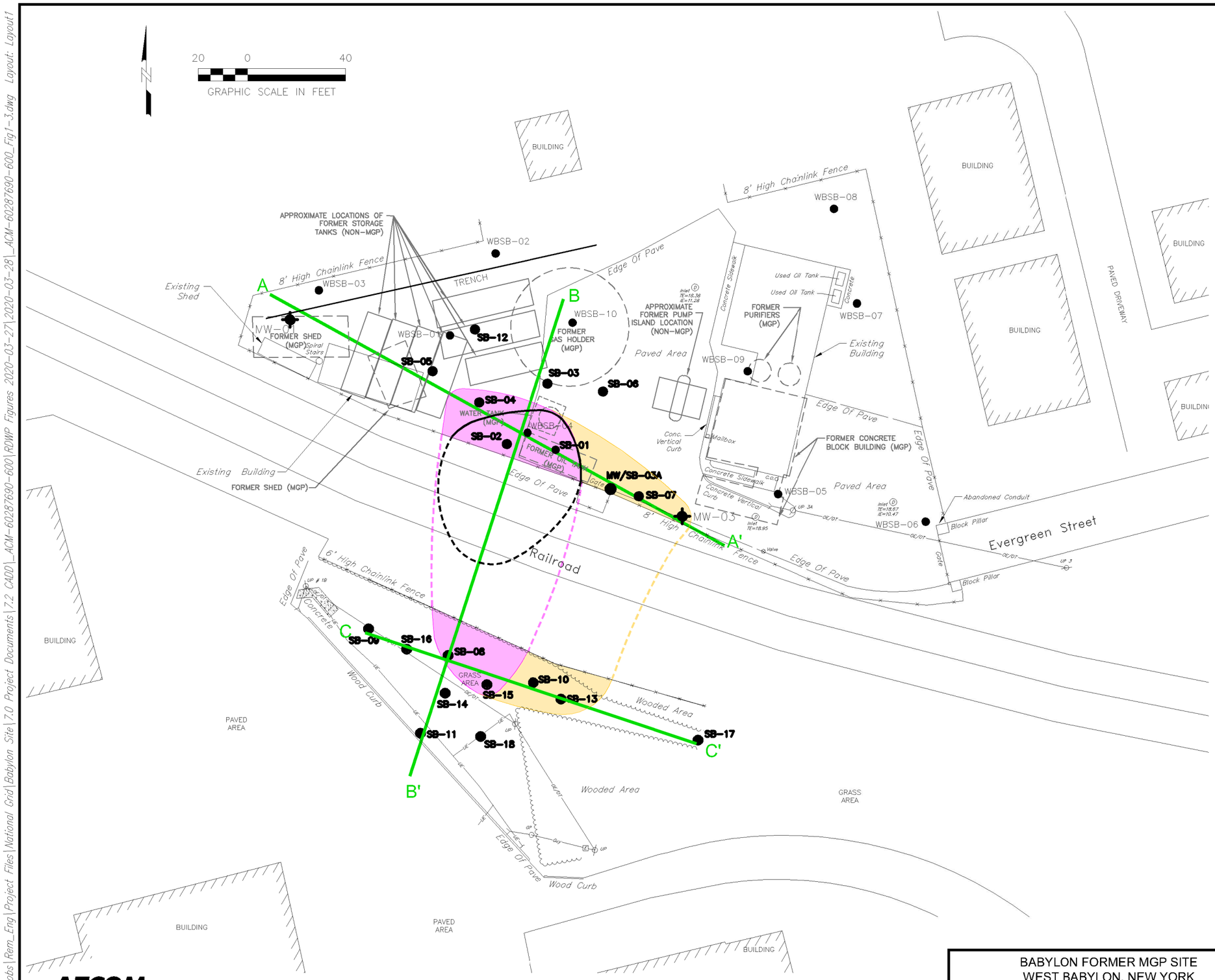

LEGEND

- PSA SOIL SAMPLE LOCATION
- RI SOIL SAMPLE LOCATION
- RI SOIL/GROUNDWATER SAMPLE LOCATION
- MONITORING WELL LOCATION
- FORMER MGP STRUCTURE
- FORMER FUEL TANK STRUCTURE
- CROSS-SECTION LOCATION LINE
- UTILITY POLE
- DRAIN
- CLEAN OUT
- MAILBOX
- VALVE
- GUY WIRE
- UNDERGROUND ELECTRIC
- OVERHEAD ELECTRIC/TELEPHONE
- TREE LINE
- ELECTRIC BOX
- POST
- MGP CONSTITUENT CONCENTRATIONS GREATER THAN NYSDEC COMMERCIAL CRITERIA
- VISIBLE EVIDENCE OF IMPACTS - LENSES
- VISIBLE EVIDENCE OF IMPACTS - STRINGERS/BLEBS

*DASHED BOUNDARIES WHERE INFERRED

CONCENTRATIONS ABOVE COMMERCIAL CLEANUP CRITERIA

LOCATION	INTERVAL FT/BGS	TOTAL PAHs	TOTAL BTEX
SB-01	18-20	3,400	
SB-02	8-10	2,200	190
	20-25	4,800	
SB-07	6.8-8.5	640	
WBSB-4	8-12	523	

AECOM

BABYLON FORMER MGP SITE
WEST BABYLON, NEW YORK
60287690.600

DATE: 03/29/2020 | DRWN: RCW

MGP RESIDUAL IMPACTS IN SOIL AND CROSS SECTION LOCATIONS

FIGURE 1-3

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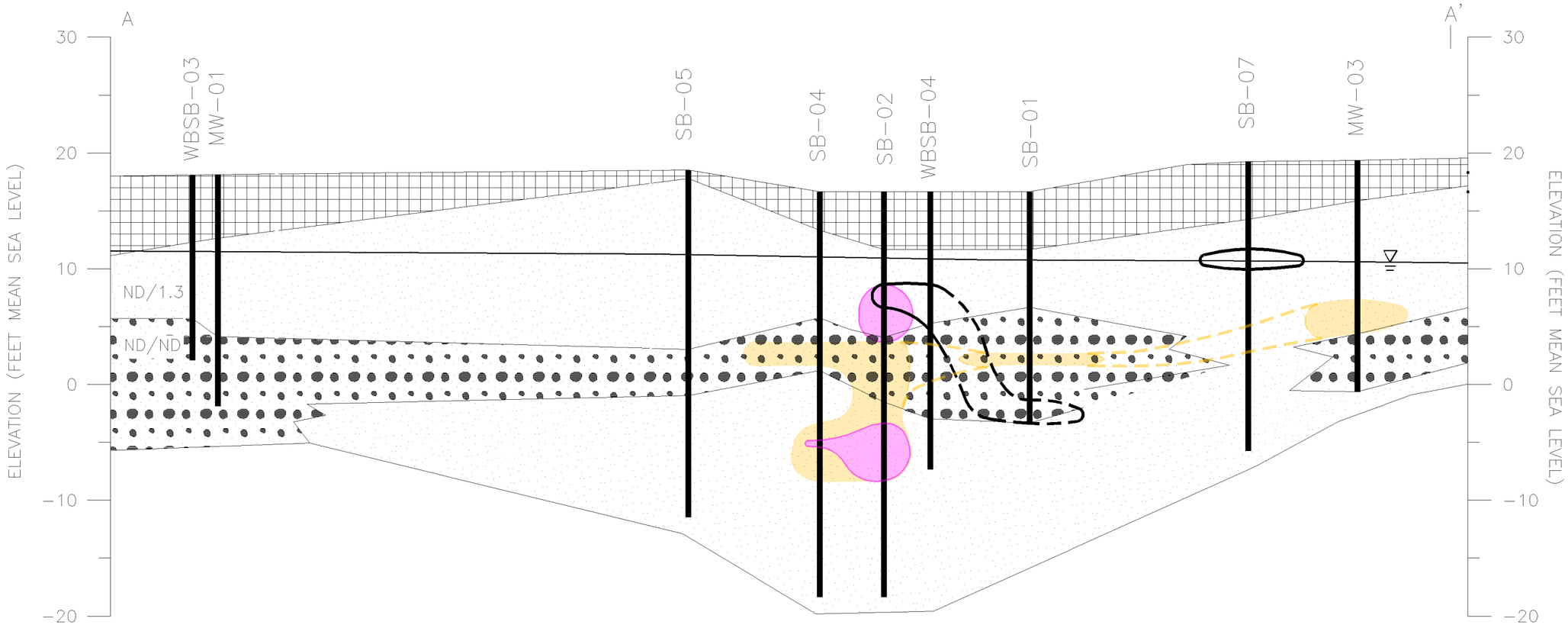

LEGEND

- FINE SAND/SILT MIX WITH VARYING AMOUNTS OF GRAVEL. OBSERVED FILL MATERIALS INCLUDE BRICK, ASPHALT, CONCRETE, AND COAL FRAGMENTS
- FINE TO COARSE SAND WITH VARYING AMOUNTS OF FINE TO COARSE GRAVEL
- FINE TO COARSE GRAVEL, SOME MEDIUM TO COARSE SAND
- SOIL BORING
- SB-01 — SB: SOIL BORING; 01: BORING ID
- GROUNDWATER TABLE (APPROXIMATE)
- MGP CONSTITUENT CONCENTRATIONS GREATER THAN NYSDEC COMMERCIAL CRITERIA
- VISIBLE EVIDENCE OF IMPACTS - LENSES
- VISIBLE EVIDENCE OF IMPACTS - STRINGERS/BLEBS
- * DASHED BOUNDARIES WHERE INFERRED

NOTES:

1. VERTICAL SCALE: 2X
2. GEOLOGIC CONTACTS DASHED WHERE INFERRED.

CONCENTRATIONS ABOVE COMMERCIAL CLEANUP CRITERIA

LOCATION	INTERVAL FT/BGS	TOTAL PAHs	TOTAL BTEX
SB-01	18-20	3,400	
SB-02	8-10	2,200	190
	20-25	4,800	
SB-07	6.8-8.5	640	
WBSB-4	8-12	523	

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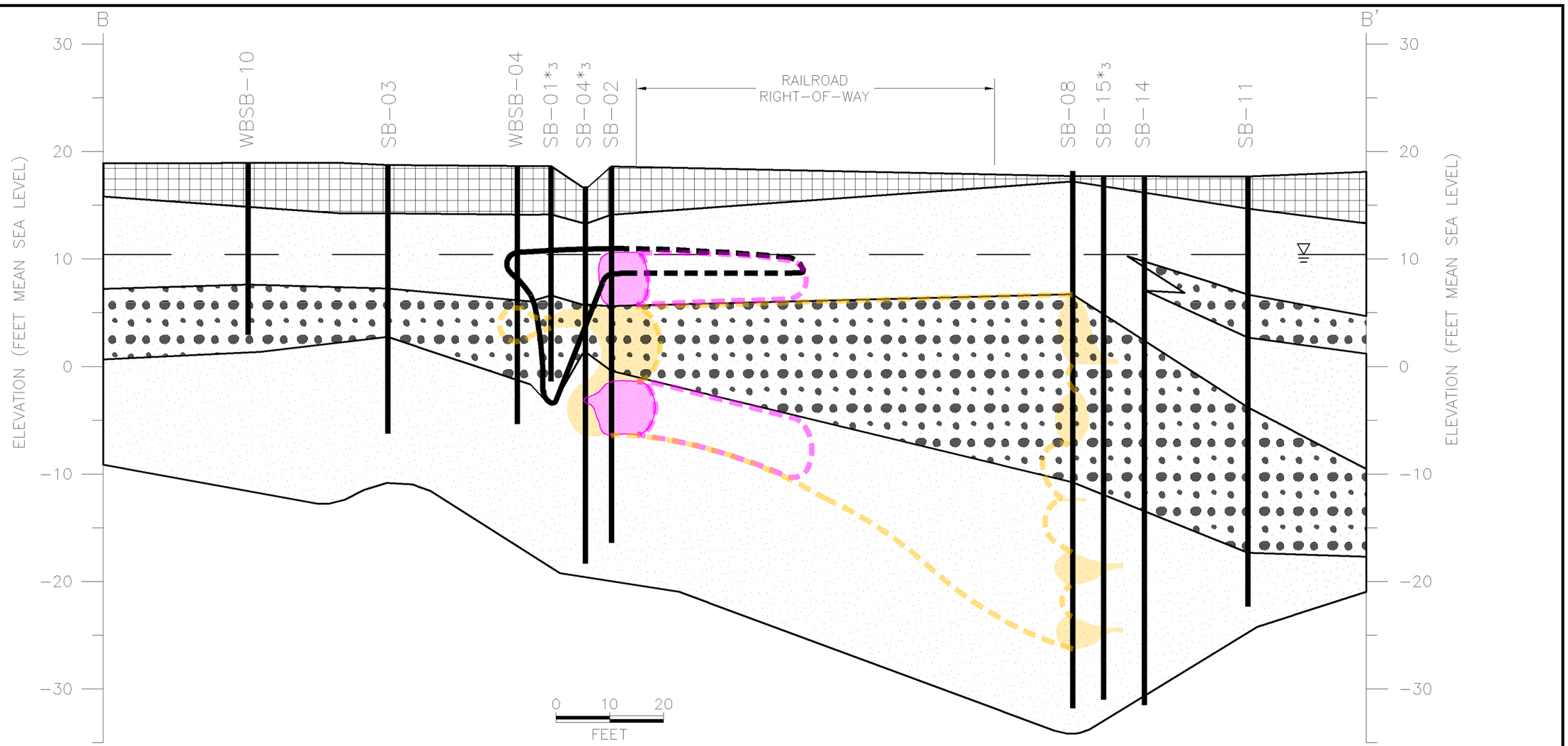
BABYLON FORMER MGP SITE
WEST BABYLON, NEW YORK
60287690.600

DATE: 03/29/2020 | DRWN: RCW

MGP RESIDUAL IMPACTS IN SOIL CROSS SECTION A-A'

FIGURE 1-3a



LEGEND

- FINE SAND/SILT MIX WITH VARYING AMOUNTS OF GRAVEL. OBSERVED FILL MATERIALS INCLUDE BRICK, ASPHALT, CONCRETE, AND COAL FRAGMENTS
- FINE TO COARSE SAND WITH VARYING AMOUNTS OF FINE TO COARSE GRAVEL
- FINE TO COARSE GRAVEL, SOME MEDIUM TO COARSE SAND
- SOIL BORING
- SB-02 — SB: SOIL BORING; 02: BORING ID
- GROUNDWATER TABLE (APPROXIMATE)
- MGP CONSTITUENT CONCENTRATIONS GREATER THAN NYSDEC COMMERCIAL CRITERIA
- VISIBLE EVIDENCE OF IMPACTS - LENSES
- VISIBLE EVIDENCE OF IMPACTS - STRINGERS/BLEBS
- * DASHED BOUNDARIES WHERE INFERRED

NOTES:

1. VERTICAL SCALE: 2X
2. GEOLOGIC CONTACTS DASHED WHERE INFERRED.
3. SB-1 & SB-15 PROJECTED >15' TO CROSS SECTION

CONCENTRATIONS ABOVE COMMERCIAL CLEANUP CRITERIA

LOCATION	INTERVAL FT/BGS	TOTAL PAHs	TOTAL BTEX
SB-01	18-20	3,400	
SB-02	8-10	2,200	190
	20-25	4,800	
SB-07	6.8-8.5	640	
WBSB-4	8-12	523	

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BABYLON FORMER MGP SITE
WEST BABYLON, NEW YORK
60287690.600

DATE: 03/29/2020 | DRWN: RCW

MGP RESIDUAL IMPACTS IN SOIL CROSS SECTION B-B'

FIGURE 1-3b

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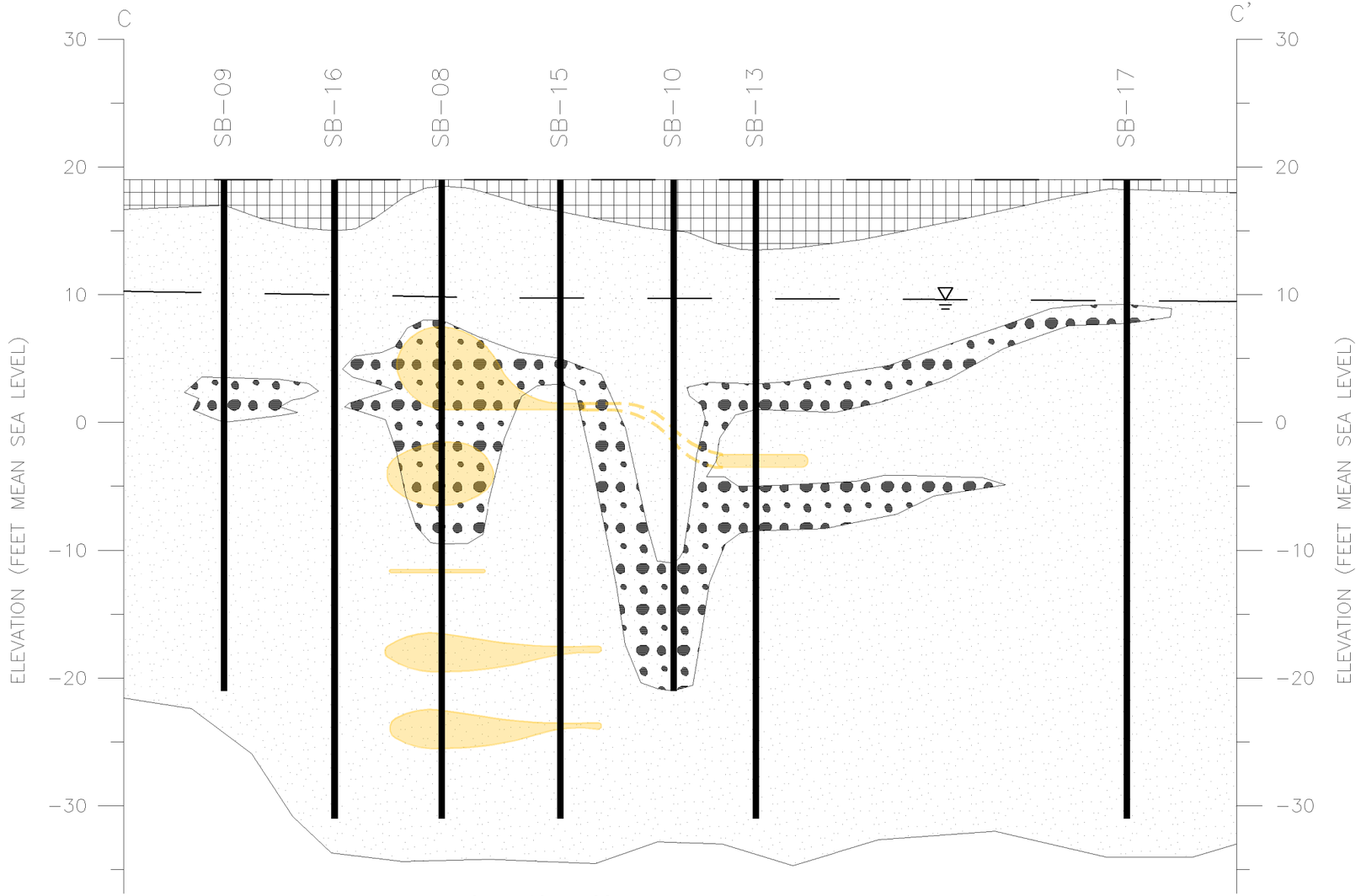

NOTES:

1. VERTICAL SCALE: 2X
2. GEOLOGIC CONTACTS DASHED WHERE INFERRED.

LEGEND

- FINE SAND/SILT MIX WITH VARYING AMOUNTS OF GRAVEL. OBSERVED FILL MATERIALS INCLUDE BRICK, ASPHALT, CONCRETE, AND COAL FRAGMENTS
- FINE TO COARSE SAND WITH VARYING AMOUNTS OF FINE TO COARSE GRAVEL
- FINE TO COARSE GRAVEL, SOME MEDIUM TO COARSE SAND
- SOIL BORING
- SB-01 — SB: SOIL BORING; 01: BORING ID
- GROUNDWATER TABLE (APPROXIMATE)
- VISIBLE EVIDENCE OF IMPACTS - STRINGERS/BLEBS
- * DASHED BOUNDARIES WHERE INFERRED

CONCENTRATIONS ABOVE COMMERCIAL CLEANUP CRITERIA

LOCATION	INTERVAL FT/BGS	TOTAL PAHs	TOTAL BTEX
SB-01	18-20	3,400	
SB-02	8-10	2,200	190
	20-25	4,800	
SB-07	6.8-8.5	640	
WBSB-4	8-12	523	

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BABYLON FORMER MGP SITE
WEST BABYLON, NEW YORK
60287690.600

DATE: 03/29/2020 | DRWN: RCW

MGP RESIDUAL IMPACTS IN SOIL CROSS SECTION C-C'

FIGURE 1-3c

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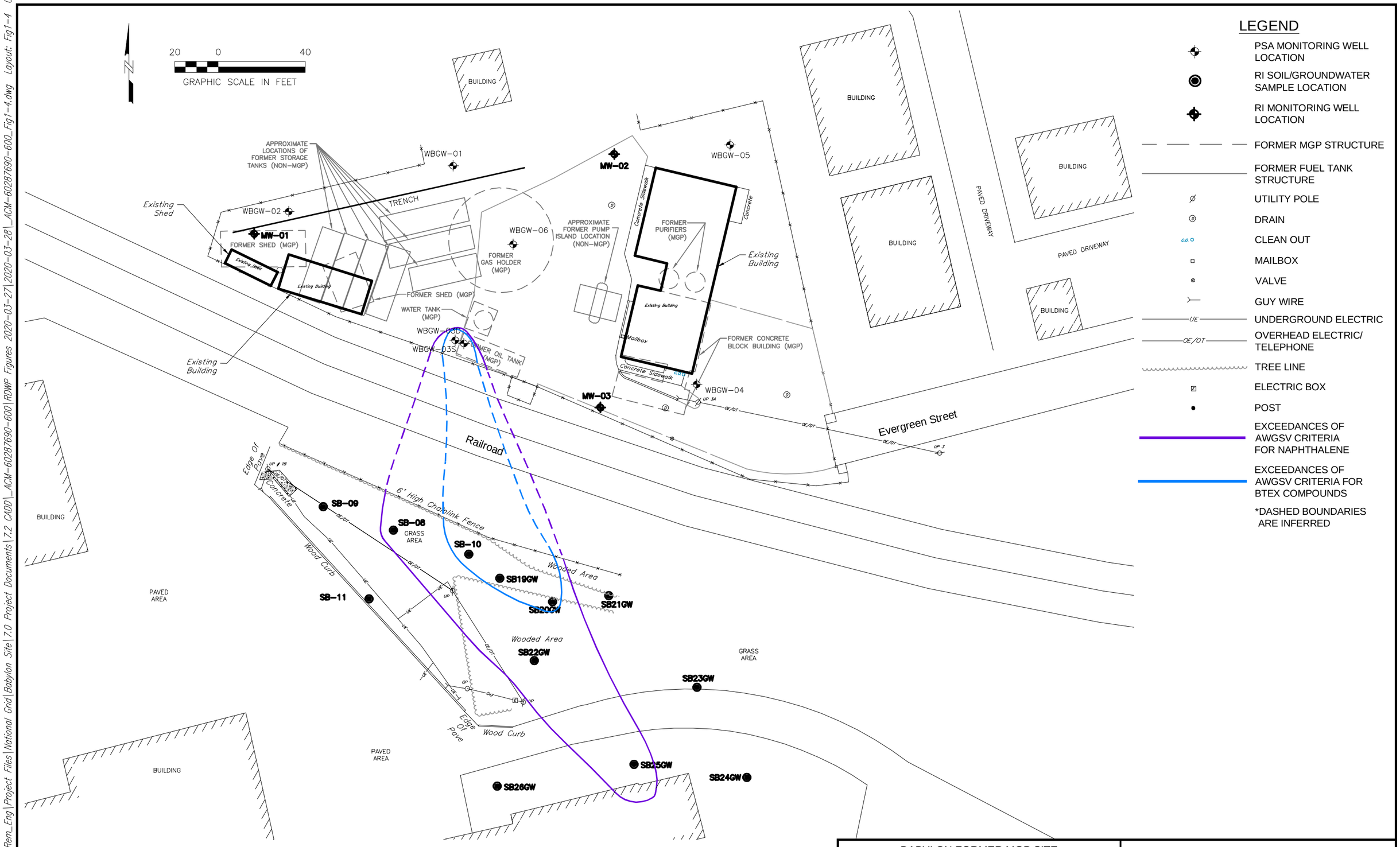

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BABYLON FORMER MGP SITE WEST BABYLON, NEW YORK 60287690.600				**DISSOLVED PHASE IMPACTS**
DATE: 03/29/2020	DRWN: RCW			**FIGURE 1-4**

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N

20 0 40

GRAPHIC SCALE IN FEET

BUILDING

8' High Chainlink Fence

APPROXIMATE LOCATIONS OF FORMER STORAGE TANKS (NON-MGP)

FORMER SHEDS (MGP)

TRENCH

Edge Of Pave

Inlet TE=18.38 IE=11.28

Concrete Sidewalk

APPROXIMATE FORMER PUMP ISLAND LOCATION (NON-MGP)

FORMER PURIFIERS (MGP)

Concrete

FORMER GAS HOLDER (MGP)

Paved Area

Existing Building

TP-3

TP-4

TP-2

TP-1

SB-3

SB-2

SB-1

Existing Buildings

WATER TANK AREA

FORMER GAS HOLDER AREA

Edge Of Pave

Paved Area

Edge Of Pave

c.o.

Concrete Vertical Curb

UP 3A

Inlet TE=18.67 IE=10.47

Inlet TE=18.95

oe/ot

FORMER CONCRETE BLOCK BUILDING (MGP)

Evergreen Street

Gate

UP 3

8' High Chainlink Fence

Edge Of Pave

Railroad

BUILDING

BUILDING

BUILDING

BUILDING

PAVED DRIVEWAY

BUILDING

GRASS AREA

PAVED AREA

GRASS AREA

BUILDING

PAVED AREA

BUILDING

LEGEND

- TP-1 — PDIWP TEST PIT LOCATION
- SB-1 — PDIWP SOIL BORING LOCATION
- FORMER MGP STRUCTURE
- FORMER FUEL TANK STRUCTURE
- UTILITY POLE
- DRAIN
- CLEAN OUT
- FENCE
- VALVE
- GUY WIRE
- UNDERGROUND ELECTRIC
- OE/OT — OVERHEAD ELECTRIC/TELEPHONE
- TREE LINE
- ELECTRIC BOX
- POST
- AREA FOR SOLIDIFICATION
- VISIBLE EVIDENCE OF IMPACTS - LENSES
- VISIBLE EVIDENCE OF IMPACTS - STRINGERS/BLEBS based on findings from RIR as presented in the FS and ROD

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BABYLON FORMER MGP SITE
WEST BABYLON, NEW YORK
60287690-420

DATE: 01/31/20 | DRWN: RCW

SAMPLING LOCATIONS
PRE-DESIGN INVESTIGATION

FIGURE 2-1

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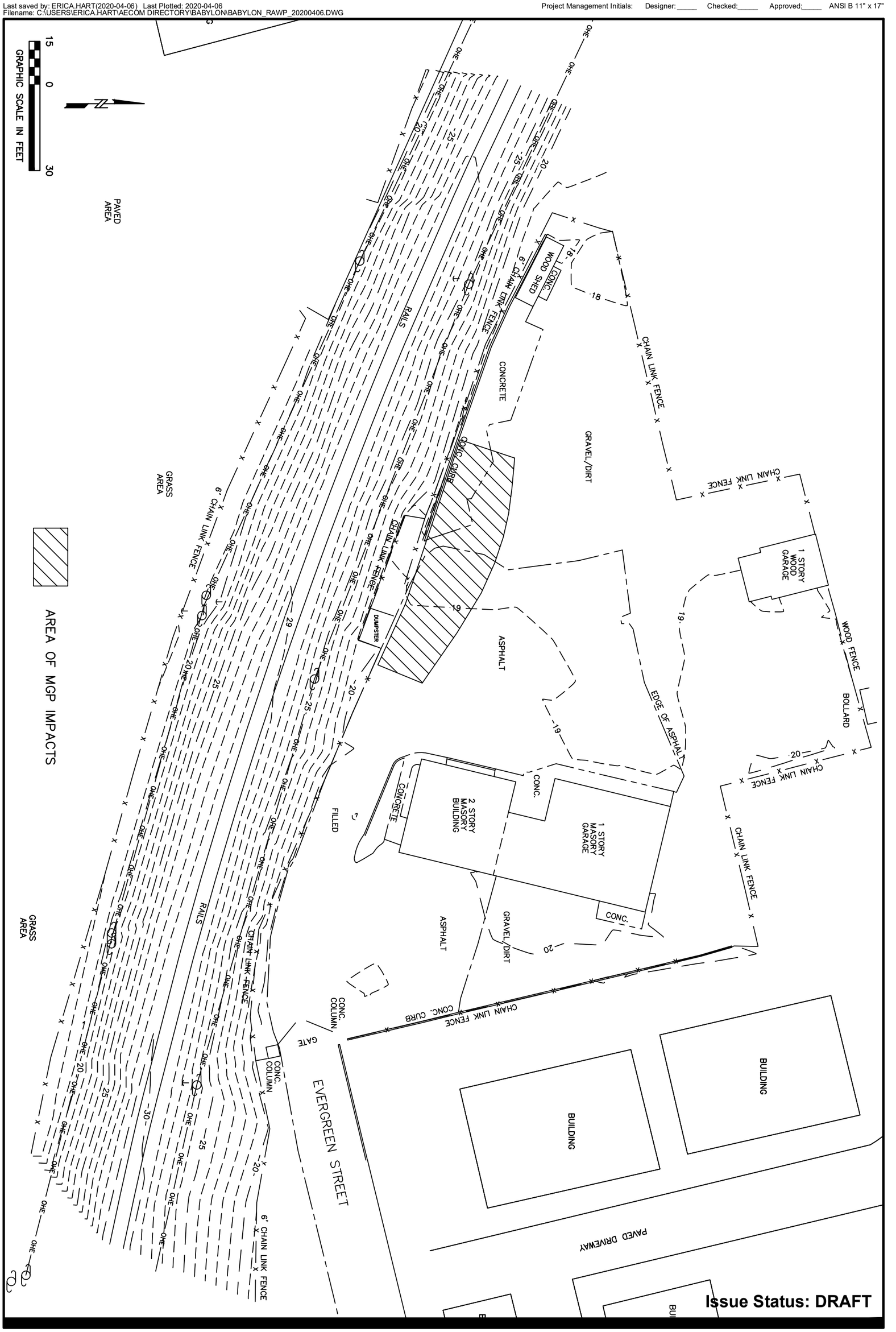

REMEDIAL ACTION WORK PLAN
NATIONAL GRID
WEST BABYLON FORMER MGP SITE
Project No.: 60287690 Date: 2020-04-06

AREA OF MGP IMPACTS

AECOM

Figure: 3-1

Project Management Initials: Designer: Checked: Approved: ANSI B 11" x 17"

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Issue Status: DRAFT

AECOM

Figure: 3-2

EMBANKMENT STABILIZATION COLUMNS

REMEDIAL ACTION WORK PLAN
NATIONAL GRID
WEST BABYLON FORMER MGP SITE
Project No.: 60287690 Date: 2020-04-06

Issue Status: DRAFT

AECOM

Figure: 3-3

REMOVAL OF VADOSE ZONE SOILS

REMEDIAL ACTION WORK PLAN
NATIONAL GRID
WEST BABYLON FORMER MGP SITE
Project No.: 60287690 Date: 2020-04-06

Project Management Initials: Designer: Checked: Approved: ANSI B 11" x 17"

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Issue Status: DRAFT

AECOM

Figure: 3-4

SOLIDIFICATION OF IMPACTED SOIL

REMEDIAL ACTION WORK PLAN
NATIONAL GRID
WEST BABYLON FORMER MGP SITE
Project No.: 60287690 Date: 2020-04-06

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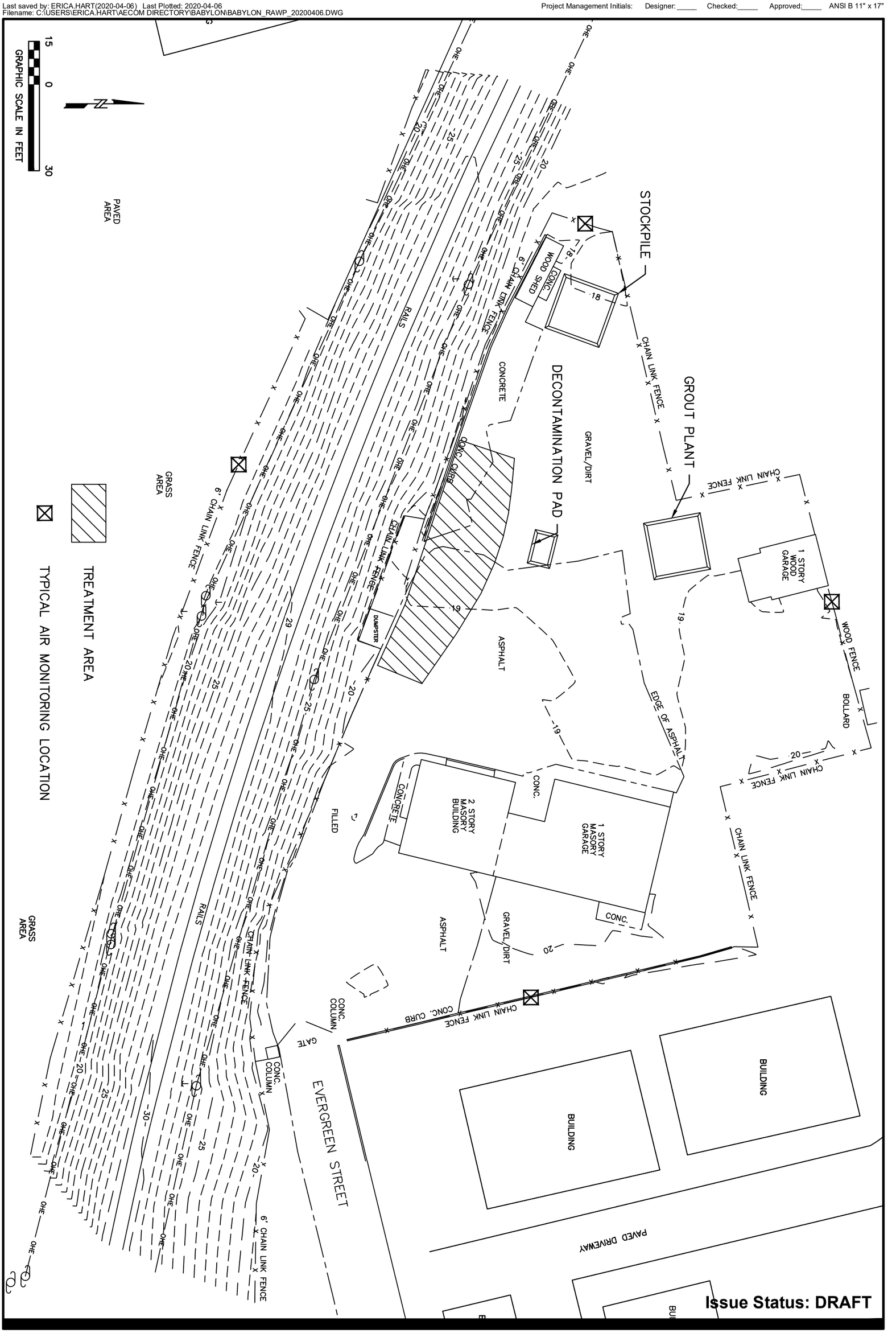


Issue Status: DRAFT

REMEDIAL ACTION WORK PLAN
NATIONAL GRID
WEST BABYLON FORMER MGP SITE
Project No.: 60287690 Date: 2020-04-06

TYPICAL AIR MONITORING LOCATIONS

AECOM

Figure: 3-5

25 0 50

GRAPHIC SCALE IN FEET

N

BUILDING

8' High Chainlink Fence

WBSB-08

WBSB-02

WBSB-03

WBSB-10

FORMER GAS HOLDER (MGP)

WBSB-01

SB-12

SB-05

SB-03

SB-06

Edge Of Pave

Concrete Sidewalk

FORMER PURIFIERS (MGP)

Concrete

WBSB-07

Existing Building

Paved Area

WBSB-09

Existing Buildings

SB-04

WATER TANK (MGP)

SB-02

SB-01

FORMER OIL TANK (MGP)

MW/SB-02A

SB-07

AREA FOR SOLIDIFICATION (8FT BGS UP TO 25FT BGS)

Conc. Vertical Curb

Concrete Vertical Curb

WBSB-05

Paved Area

WBSB-06

FORMER CONCRETE BLOCK BUILDING (MGP)

Gate

Evergreen Street

PAVED DRIVEWAY

BUILDING

6' High Chainlink Fence

RW1

RW2

RW3

SB-09

SB-16

SB-08

SB-10

SB-15

SB-13

SB-14

GRASS AREA

Wood Curb

SB-17

SB-11

SB-18

PAVED AREA

WODDED AREA

Railroad

BUILDING

PAVED AREA

BUILDING

PAVED DRIVEWAY

MW101S

MW101D

GRASS AREA

MW102S

MW102D

LEGEND

- PSA SOIL SAMPLE LOCATION
- RI SOIL SAMPLE LOCATION
- RI SOIL/GROUNDWATER SAMPLE LOCATION
- RECOVERY WELL LOCATION
- MONITORING WELL LOCATION
- FORMER MGP STRUCTURE
- FORMER FUEL TANK STRUCTURE
- UTILITY POLE
- DRAIN
- CLEAN OUT
- FENCE
- VALVE
- GUY WIRE
- UNDERGROUND ELECTRIC
- OVERHEAD ELECTRIC/TELEPHONE
- TREE LINE
- ELECTRIC BOX
- POST
- AREA FOR SOLIDIFICATION
- MGP CONSTITUENT CONCENTRATIONS GREATER THAN NYSDEC COMMERCIAL CRITERIA
- VISIBLE EVIDENCE OF IMPACTS - LENSES
- VISIBLE EVIDENCE OF IMPACTS - STRINGERS/BLEBS
- * DASHED BOUNDARIES WHERE INFERRED

AECOM

BABYLON FORMER MGP SITE
WEST BABYLON, NEW YORK
60287690.600

OFF-SITE WELL LOCATIONS

DATE: 12/17/2020 | DRWN: RCW | **FIGURE 4-1**

Tables

Table 2-1
Summary of Results
Geotechnical Testing of Soil
Babylon Former MGP Site

Testing Parameter	Test Method	Unit	Perimeter Soil Samples					
			SB-1 (8-35)	SB-1 (8-35)-DUP	SB-2 (8-35)	SB-2 (8-35)-DUP	SB-3 (8-25)	SB-3 (8-25)-DUP
Particle Size Distribution	ASTM D422							
Gravel (<1/2")		%	5.5	11.3	22.5	17.6	18.6	15.6
Sand		%	85.8	80.3	67.8	74.6	76.6	79.5
Silt		%	5.9	5.7	6.2	5.6	3.8	3.9
Clay		%	2.8	2.7	3.5	2.2	1.0	1.0
Description and Classification								
Sample Description	ASTM D2487		Yellowish brown poorly graded sand with silt	Yellowish brown poorly graded sand with silt	Yellowish brown well-graded sand with silt and gravel	Yellowish brown poorly graded sand with silt and gravel	Yellowish brown poorly graded sand with gravel	Yellowish brown poorly graded sand with gravel
Sample Classification	ASTM D2487		SP-SM	SP-SM	SW-SM	SP-SM	SP	SP
Atterburg Limits	ASTM D4317							
LL			NV	NV	NV	NV	NV	NV
PL			NP	NP	NP	NP	NP	NP
PI			NP	NP	NP	NP	NP	NP
Moisture Content	ASTM D2216							
Average ASTM Moisture Content		%	9.86	10.56	8.79	10.07	6.28	6.00
Average Percent Solids		%	91.02	90.45	91.93	90.86	94.09	94.34
Loss on Ignition	ASTM D2974							
ASTM Moisture Content		%	10.59	8.85	10.16	9.77	5.73	6.02
Average Loss on Ignition @ 440°C		%	0.69	0.51	0.38	0.45	0.39	0.39
Unit Weight and Specific Gravity								
Average Bulk Unit Weigh	ASTM D7263	pcf	117.1	119.0	132.7	131.9	123.8	123.9
Solid Specific Gravity	ASTM D854		2.70	2.69	2.67	2.69	2.69	2.67

Notes:
(1)Sample color determined by the Munsell Soil Color Charts.
(2) Sample classification based on the Unified Classification System.
%= Percent
pcf = pounds per cubic foot
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index

TABLE 2-2
Solidification Evaluation - Initial testing
Babylon Former MGP Site

Reagent Type	Reagent Addition % by Wet Soil wt.	Water Addition % by Reagent wt.	Pocket Penotrometer (TSF)			Cure Day	Unconfined Compressive Strength ASTM D2166			
			3 Day	5 Day	7 Day		Moisture Content (%)	Bulk Density (lb/ft^3)	Dry Density (lb/ft^3)	UCS (lb/in^2)
Type I Portland Cement	5.0	100.0	>4.5	>4.5	>4.5	7	10.48	136.4	123.5	98.4
Type I Portland Cement	8.0	100.0	>4.5	>4.5	>4.5	7	15.45	130.3	112.9	157.6
Type I Portland Cement	11.0	100.0	>4.5	>4.5	>4.5	7	17.72	132.6	112.6	281.9
Type I PC/GGBFS 60:40	5.0	100.0	>4.5	>4.5	>4.5	7	11.22	133.0	119.5	61.1
Type I PC/GGBFS 60:40	8.0	100.0	>4.5	>4.5	>4.5	7	14.23	130.4	114.1	167.5
Type I PC/GGBFS 60:40	11.0	100.0	>4.5	>4.5	>4.5	7	16.19	130.8	112.5	221.2

Notes:
% = Percent
Wt= Weight
lb/ft^3 = pounds per cubic foot
lb/in^2 = pounds per square inch

Table 2-3
Optimization Evaluation - Unconfined Compressive Strength
Babylon Former MGP Site

Reagent Type	Reagent Addition % by Wet Soil Wt.	Water Addition % by Reagent Wt.	Cure Day	Unconfined Compressive Strength ASTM D2166			
				Moisture Content (%)	Bulk Density (lb/ft^3)	Dry Density (lb/ft^3)	UCS (lb/in^2)
Type I Portland Cement #842	5.0	100.0	7	14.71	130.8	114.0	75.4
			28	11.87	133.4	119.2	132.1
60:40 Type I Portland Cement/ GGBFS #1094	5.0	100.0	7	15.61	132.0	114.2	57.1
			28	15.71	130.9	113.1	155.5
60:40 Type I Portland Cement/ GGBFS #1094	8.0	100.0	7	16.94	131.7	112.6	159.5
			28	14.44	131.5	114.9	382.9
60:40 Type I Portland Cement/ GGBFS #1094	11.0	100.0	7	13.40	130.4	115.0	187.1
			28	17.72	131.4	111.6	490.4

Notes:
% = Percent
Wt= Weight
lb/ft^3 = pounds per cubic foot
lb/in^2 = pounds per square inch
cm/sec = centimeter per second

Table 2-4
Treatability Test Results
Babylon Former MGP Site

Reagent Type	Reagent Addition % by Wet Soil Wt.	Water Addition % by Reagent Wt.	Cure Day	Unconfined Compressive Strength ASTM D2166				Hydraulic Conductivity ASTM D5084			
				Moisture Content (%)	Bulk Density (lb/ft^3)	Dry Density (lb/ft^3)	UCS (lb/in^2)	Moisture Content (%)	Bulk Density (lb/ft^3)	Dry Density (lb/ft^3)	K (cm/sec)
Type I Portland Cement #842	5.0	100.0	28	11.87	133.4	119.2	132.1	15.3	131	113.7	2.1×10^{-7}
60:40 Type I Portland Cement/ GGBFS #1094	5.0	100.0	28	15.71	130.9	113.1	155.5	15.4	129	111.4	3.6×10^{-7}
60:40 Type I Portland Cement/ GGBFS #1094	8.0	100.0	28	14.44	131.5	114.9	382.9	14.7	131	114.2	5.5×10^{-9}
60:40 Type I Portland Cement/ GGBFS #1094	11.0	100.0	28	17.72	131.4	111.6	490.4	15.7	131	113.4	4.2×10^{-9}

Notes:
% = Percent
Wt= Weight
lb/ft^3 = pounds per cubic foot
lb/in^2 = pounds per square inch
cm/sec = centimeter per second

Table 4-1
Summary of Proposed Recovery Wells and Groundwater Monitoring Wells
Babylon Former MGP Site

Well ID	Screened Interval bgs (ft)	Sump Interval bgs (ft)	Total Well Depth (ft)	Observations
RW-1	10-25	25-35	35	No visual impacts noted at nearby boring SB-09. Assuming no visual impacts noted during borehole advancement, will set screened interval from 10-25 feet bgs to be consistent with RW-3.
RW-2	10-45	45-55	55	Proposed screened interval covers shallowest visual NAPL impacts noted at SB-08 starting at 11 feet bgs and extending until the deepest visual impacts noted at 44 feet bgs.
RW-3	10-25	25-35	35	Proposed screened interval covers shallowest visual NAPL impacts noted at SB-10 starting at 16 feet bgs and extending until the deepest visual impacts noted at 25 feet bgs.
MW-101S	10-20	None	20	Screen intersects zone of elevated BTEX and PAHs detected at SB-22GW from 15-19 feet bgs.
MW-101D	20-30	None	30	Screen intersects zone of elevated BTEX and PAHs detected at SB-22GW from 25-29 feet bgs.
MW-102S	10-20	None	20	Screen intersects zone of elevated BTEX and PAHs detected at SB-25GW at 15 feet bgs.
MW-102D	20-30	None	30	Screen intersects zone of elevated BTEX and PAHs detected at SB-25GW at 25 feet bgs.

Notes:
bgs
BTEX
PAHs

Appendix A Summary of MGP Impacts in Soil

Appendix A Summary of MGP Impacts in Soil

Summary of Subsurface Soil Impacts
Babylon Former MGP Site

Locations	Depth (ft. bgs)	NYSDEC Part 375 Soil Cleanup Objectives									CP-51 Commercial total PAHs	Visible Impacts			
		Residentital			Restricted Residential			Commercial							
		BTEX	PAH	CN	BTEX	PAH	CN	BTEX	PAH	CN		Stringers	Coated	Blebs	Lenses
On-Site															
MW-3	12-15											X			
	17													X	
SBMW-3A	2-4														
	10-15														
SB-1	3-8														
	8-14														
	9-11		X			X			X						
	14-15													X	
	18-20		X			X			X		X				
SB- 2	4.5-8														
	8-10	X	X		X	X			X		X				X
	10-13														X
	13-15													X	
	15-19											X			
	20-25										X	X			X
	29.5														
	33-35														
SB- 3	11-13		X			X			X						
SB- 4	5-10														
	13-15													X	
	16-18		X			X			X						
	23-25		X			X			X					20-25	21.5-22
SB- 5	5-15														
	15.5-19.5														
SB- 7	6.8-8		X			X			X		X				
	8-10														
	11-11.5														
	12-15														
	23-25														
WBSB- 9	8.5-10		X			X			X						
	16-20		X			X			X						
WBSB- 4	8-12		X		X	X			X		X				
	12-16		X			X			X						
WBSB- 5	12-16		X			X			X						
Forensic Analysis															
SB-01	11-14														
SB-02	10-15										X				
	18-20														
	23-25										X				
Off-Site															
SB-8	7.5-10														
	9-13		X			X			X					11-15	
	15-17.5													X	
	22-24											X			
	25-28														
	30-44											35		30-30.25	
SB-10	8.5-10													36-44	
	10-11														
	16-17													X	
	17-20														
	21-25													X	
SB-13	5-10														
	10-11.5					X									
	11-16														
	16-18					X								X	
	18-20														
	20-25														
	25-28.5														
SB-15	15-16		X			X			X				15-15.25		
	34.2 - 34.3														X
	40.1-40.5														X

Notes:

denotes interval within the saturated zone (depth to groundwater ranges from 6.5 to 8 ft bgs)

X indictates constituent concentrations greater than criteria, or presence of visible impact

Appendix B – 2020 Groundwater Monitoring of On-site Wells

Appendix B
Groundwater Sampling Data Summary Report

Former Babylon Manufactured Gas Plant
West Babylon, New York

Administrative Consent Order Index A2-0552-0606

National Grid

May 15, 2020

1. Project Background

AECOM has prepared this Data Summary Report for National Grid in accordance with the Administrative Order on Consent Index No. A2-0552-0606. The report describes monitoring well sampling activities in February 2020 for the Former Babylon Manufactured Gas Plant (MGP). Work was performed in conjunction with the Pre-Design Investigation (AECOM 2018).

This data summary report provides information on sampling of the three on-site monitoring wells MW-01, MW-02 and MW-03. MW-01 is located along the upgradient (northern) boundary of the property, while MW-02 and MW-03 are located along the downgradient (southern) property line. The well locations are illustrated in Figure 1-2 of the main body of the RAWP report. Documentation of the sampling activities is included in the appendices of this report.

2. Sampling

Monitoring wells MW-01 through MW-03 were purged by low flow methodology using a peristaltic pump in accordance with the low flow sampling protocol. The pump tubing intake was placed at the approximate midpoint of the screened interval (summarized on Table 1), and the following field water quality parameters were continuously measured during purging: water temperature, pH, conductivity, oxidation-reduction potential, dissolved oxygen and turbidity. Groundwater analytical samples were collected when field water quality parameters stabilized. Stabilized field parameters are summarized on Table 2, and groundwater sampling logs are provided in Appendix A. Quality assurance (QA) and quality control (QC) samples, including a field duplicate, were collected as well. All purge water was managed as investigation derived waste (IDW).

Samples were preserved and placed on ice in a cooler and delivered to Pace Analytical Services (Pace) under proper chain-of custody procedures. Pace analyzed the samples for benzene toluene ethylbenzene xylene (BTEX) via United States Environmental Protection Agency (EPA) Method 8260C, polyaromatic hydrocarbons (PAHs) via EPA Method 8270D and total cyanide via EPA Method 9014. A copy of the analytical report is provided in Appendix B.

AECOM utilized dedicated and disposable sampling equipment when possible to avoid the potential for cross-impacting of samples. The sampling equipment included dedicated disposable polyethylene tubing, disposable gloves, and laboratory supplied sample bottles. Handheld equipment was decontaminated using an alconox and water wash, a potable water rinse followed by a distilled water rinse. Water was collected in 5-gallon pails or 55-gallon drums.

3. Summary of Results

The analytical data is summarized in Table 3. As illustrated, the concentrations of the MGP constituents of interest were determined to be less than their associated analytical reporting limits and in compliance with the NYSDEC Division of Water Technical and Operational Guidance Series 1.1.1 Ambient Water Quality Standards and Guidance Values (AWQSGVs). The analytical data was reviewed by AECOM, and no quality issues were identified as summarized in the Data Usability Summary Report presented in Appendix C.

Tables

TABLE 1
MONITORING WELL CONSTRUCTION SUMMARY
BABYLON, NEW YORK

Well	Total Depth (ft bgs)	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	Mid-screen (ft bgs)	Sump Length (ft)
MW-01	18	8	18	13	NONE
MW-02	18	8	18	13	NONE
MW-03	18	8	18	13	NONE

ft bgs - feet below ground surface

TABLE 2
STABILIZED FIELD PARAMETERS
BABYLON, NEW YORK

Well	Date	Temperature (°C)	Specific Conductance (µS/cm)	DO (mg/L)	pH	ORP (mV)	Turbidity (NTU)	Purge Flow rate (ml/min)	Depth to water (ft bgs)
MW-01	2/20/2020	11.5	146.8	2.74	5.56	138.1	1.65	300	7.08
MW-02	2/20/2020	11.7	312.6	0.79	6.01	160.6	1.90	300	7.60
MW-03	2/20/2020	11.5	564.8	0.66	6.05	92.0	1.80	300	8.43

°C - degrees Celsius
µS/cm - Microsiemens per Centimeter
mg/L - milligrams per liter
mV - Millivolts
NTU - Nephelometric Turbidity Unit
ft bgs - feet below ground surface
ml/min - mililiters per minute

TABLE 3
GROUNDWATER ANALYTICAL RESULTS
BABYLON, NEW YORK

Location ID Sample Date Sample ID SDG	CAS #	NYSDEC Ambient Water Quality Standards and Guidance Values [1]	MW-01 2/20/2020 MW-01_20200220 70122514	MW-02 2/20/2020 DUPE 2-20-2020_20200220 70122514	MW-02 2/20/2020 MW-02_20200220 70122514	MW-03 2/20/2020 MW-03_20200220 70122514
BTEX (ug/L)						
Benzene	71-43-2	1	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	100-41-4	5	< 1.0	< 1.0	< 1.0	< 1.0
m+p-Xylene	1330-20-7-M,P	NL	< 2.0	< 2.0	< 2.0	< 2.0
o-Xylene	95-47-6	NL	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	108-88-3	5	< 1.0	< 1.0	< 1.0	< 1.0
Xylenes (total)	1330-20-7	5	< 3.0	< 3.0	< 3.0	< 3.0
PAHs (ug/L)						
2-Methylnaphthalene	91-57-6	NL	< 5.0	< 5.0	< 5.0	< 5.0
Acenaphthene	83-32-9	20	< 5.0	< 5.0	< 5.0	< 5.0
Acenaphthylene	208-96-8	NL	< 5.0	< 5.0	< 5.0	< 5.0
Anthracene	120-12-7	50	< 5.0	< 5.0	< 5.0	< 5.0
Benzo(a)anthracene	56-55-3	0.002	< 5.0	< 5.0	< 5.0	< 5.0
Benzo(a)pyrene	50-32-8	0	< 5.0	< 5.0	< 5.0	< 5.0
Benzo(b)fluoranthene	205-99-2	0.002	< 5.0	< 5.0	< 5.0	< 5.0
Benzo(ghi)perylene	191-24-2	NL	< 5.0	< 5.0	< 5.0	< 5.0
Benzo(k)fluoranthene	207-08-9	0.002	< 5.0	< 5.0	< 5.0	< 5.0
Chrysene	218-01-9	0.002	< 5.0	< 5.0	< 5.0	< 5.0
Dibenz(a,h)anthracene	53-70-3	NL	< 5.0	< 5.0	< 5.0	< 5.0
Fluoranthene	206-44-0	50	< 5.0	< 5.0	< 5.0	< 5.0
Fluorene	86-73-7	50	< 5.0	< 5.0	< 5.0	< 5.0
Indeno(1,2,3-cd)pyrene	193-39-5	0.002	< 5.0	< 5.0	< 5.0	< 5.0
Naphthalene	91-20-3	10	< 5.0	< 5.0	< 5.0	< 5.0
Phenanthrene	85-01-8	50	< 5.0	< 5.0	< 5.0	< 5.0
Pyrene	129-00-0	50	< 5.0	< 5.0	< 5.0	< 5.0
Total Cyanide (ug/L)						
Total Cyanide	57-12-5	200	< 10.0	< 10.0	< 10.0	< 10.0

Notes:
1 New York State Department of Environmental Conservation Division of Water Technical and Operation Guidance series (6 NYCRR 700-706, Part 703.5 summarized in TOGS 1.1.1)
Ambient water quality standards and groundwater effluent limitations, class GA
ug/L = micrograms per liter
NL = Not listed
< = Nondetected result
SDG = Sample designation group
BTEX = Benzene, Toluene, Ethylbenzene, Xylenes
PAH = Polycyclic Aromatic Hydrocarbons

Appendices

Appendix A – Groundwater Sampling Forms

AECOM

Well ID: MW-01

Low Flow Ground Water Sample Collection Record

Client: NAT. GRID Date: 2-20-2020 Time: Start 0930 am/pm
Project No: Finish am/pm
Site Location: BABYLON MGP
Weather Conds: 30S, SUN Collector(s): S. WRIGHT

1. WATER LEVEL DATA: (measured from Top of Casing)

a. Total Well Length 18.05 c. Length of Water Column 10.99 (a-b) Casing Diameter/Material 2" PVC

b. Water Table Depth 7.06 d. Calculated System Volume (see back) 1.8 GAL

2. WELL PURGE DATA

a. Purge Method: PERI PUMP

b. Acceptance Criteria defined (see workplan)

- Temperature	3%	-D.O.	10%
- pH	± 1.0 unit	- ORP	± 10mV
- Sp. Cond.	3%	- Drawdown	< 0.3'

c. Field Testing Equipment used:

	Make	Model	Serial Number
	GEOPUMP	PERI PUMP	40800
	YSI		
	LAMOTTE	2020WE	2213

Time (24hr)	Volume Removed (Liters)	Temp. (°C)	pH	Spec. Cond. (µS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (ml/min)	Drawdown (feet)	Color/Odor
0935	—	11.5	6.05	149.2	3.08	139.2	1.65	300	7.08	CLEAR / NONE
0940	1.5	11.4	5.63	147.8	2.79	147.9	1.60	300	7.08	CLEAR / NONE
0945	3	11.6	5.60	147.0	2.89	142.3	1.60	300	7.08	CLEAR / NONE
0950	4.5	11.8	5.58	146.1	2.99	138.3	1.65	300	7.08	CLEAR / NONE
0955	6	11.6	5.56	146.7	2.85	138.2	1.60	300	7.08	CLEAR / NONE
1000	7.5	11.5	5.56	147.1	2.77	138.2	1.65	300	7.08	CLEAR / NONE
1005	9	11.5	5.56	146.8	2.74	138.1	1.65	300	7.08	CLEAR / NONE

d. Acceptance criteria pass/fail

	Yes	No	N/A
Has required volume been removed	☑	☐	☐
Has required turbidity been reached	☑	☐	☐
Have parameters stabilized	☑	☐	☐

If no or N/A - Explain below.

(continued on back)

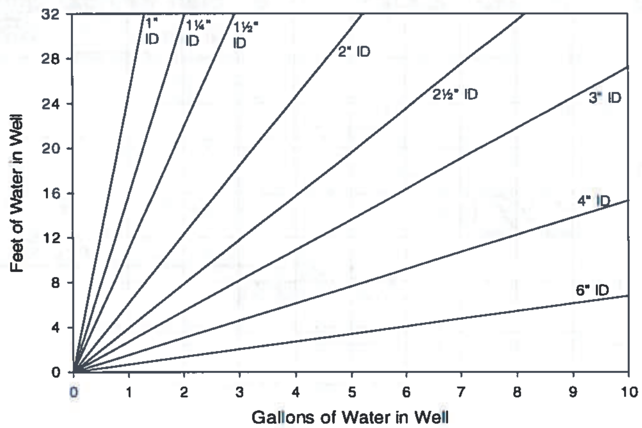
3. SAMPLE COLLECTION: Method: GEOPUMP

Sample ID	Container Type	No. of Containers	Preservation	Analysis Req.	Time
MW-01	VOA	2	HCl	VOCs	1015
MW-01	1 AMBER	2	NONE	PAHs	1015
MW-01	250 ML PLASTIC	1	H_2SO_4	CYANIDE	1015

Comments

Signature Date 2-20-2020

Purge Volume Calculation



Volume / Linear Ft. of Pipe		
ID (in)	Gallon	Liter
0.25	0.0025	0.0097
0.375	0.0057	0.0217
0.5	0.0102	0.0386
0.75	0.0229	0.0869
1	0.0408	0.1544
1.25	0.0637	0.2413
1.5	0.0918	0.3475
2	0.1632	0.6178
2.5	0.2550	0.9653
3	0.3672	1.3900
4	0.6528	2.4711
6	1.4688	5.5600

(continued from front)

Time (24 hr)	Volume Removed (Liters)	Temp (°C)	pH	Spec. Cond. (µS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (ml/min)	Drawdown (ft)	Color/Odor
1010	10.5									
1015	12									

AECOM

Well ID: MW-02

Low Flow Ground Water Sample Collection Record

Client: NAT. GRID Date: 2-20-20 Time: Start 1030 am/pm
Project No: Finish am/pm
Site Location: BABYLON MGP
Weather Conds: 30s, SUN Collector(s): S. WRIGHT

1. WATER LEVEL DATA: (measured from Top of Casing)

a. Total Well Length 18.5 c. Length of Water Column 10.91 (a-b)

Casing Diameter/Material 2" PVC

b. Water Table Depth 7.59 d. Calculated System Volume (see back) 1.8

2. WELL PURGE DATA

a. Purge Method: PERI PUMP

b. Acceptance Criteria defined (see workplan)

- Temperature	3%	-D.O.	10%
- pH	± 1.0 unit	- ORP	± 10mV
- Sp. Cond.	3%	- Drawdown	< 0.3'

c. Field Testing Equipment used:

	Make	Model	Serial Number
	GEOPUMP	PERI PUMP	40800
	YSI	PRO PLUS	43880
	LAMOTTE	2020WE	2213

Time (24hr)	Volume Removed (Liters)	Temp. (°C)	pH	Spec. Cond. (µS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (ml/min)	Drawdown (feet)	Color/Odor
1035	-	10.0	5.49	672.8	4.13	174.4	2.20	300	7.60	CLEAR/NONE
1040	1.5	11.6	6.33	515.0	0.66	162.4	1.95	300	7.60	CLEAR/NONE
1045	3	11.8	6.24	381.1	0.72	161.8	1.90	300	7.60	CLEAR/NONE
1050	4.5	11.9	6.19	361.2	0.73	161.7	1.90	300	7.60	CLEAR/NONE
1055	6	11.9	6.15	349.4	0.74	161.6	1.95	300	7.60	CLEAR/NONE
1100	7.5	11.8	6.10	339.8	0.75	161.0	1.90	300	7.60	CLEAR/NONE
1105	9	11.7	6.05	319.2	0.78	161.0	1.90	300	7.60	CLEAR/NONE

d. Acceptance criteria pass/fail

	Yes	No	N/A
Has required volume been removed	☑	☐	☐
Has required turbidity been reached	☑	☐	☐
Have parameters stabilized	☑	☐	☐

If no or N/A - Explain below.

(continued on back)

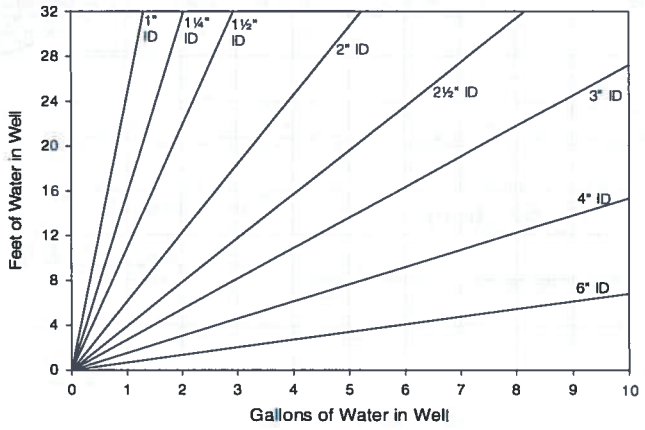
3. SAMPLE COLLECTION: Method: GEOPUMP

Sample ID	Container Type	No. of Containers	Preservation	Analysis Req.	Time
MW-02	VOA		HCl	VOCs	1130
MW-02	1L AMBER		NONE	PAHs	1130
MW-02	250mL PLASTIC		H_2SO_4	CYANIDE	1130

Comments COLLECTED MS/MSD SAMPLE

Signature Date 2-20-2020

Purge Volume Calculation



Volume / Linear Ft. of Pipe		
ID (in)	Gallon	Liter
0.25	0.0025	0.0097
0.375	0.0057	0.0217
0.5	0.0102	0.0386
0.75	0.0229	0.0869
1	0.0408	0.1544
1.25	0.0637	0.2413
1.5	0.0918	0.3475
2	0.1632	0.6178
2.5	0.2550	0.9653
3	0.3672	1.3900
4	0.6528	2.4711
6	1.4688	5.5600

(continued from front)

Time (24 hr)	Volume Removed (Liters)	Temp (°C)	pH	Spec. Cond. (µS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (ml/min)	Drawdown (ft)	Color/Odor	
1110	10.5	11.7	6.03	3151	0.78	160.8	1.95	300	7.60	CLEAR	NONE
1115	12	11.7	6.01	3126	0.79	160.6	1.90	300	7.60	CLEAR	NONE

AECOM

Well ID: MW-03

Low Flow Ground Water Sample Collection Record

Client: NAT. GRID Date: 2-20-2020 Time: Start 0800 am/pm
Project No: Finish 0900 am/pm
Site Location: BABYLON MGP
Weather Conds: 30s, SUN Collector(s): S. WRIGHT

1. WATER LEVEL DATA: (measured from Top of Casing)

a. Total Well Length 18.5 c. Length of Water Column 10.09 (a-b) Casing Diameter/Material 2" PVC

b. Water Table Depth 8.41 d. Calculated System Volume (see back) 1.6 GAL

2. WELL PURGE DATA

a. Purge Method: PERI PUMP

b. Acceptance Criteria defined (see workplan)

- Temperature	3%	-D.O.	10%
- pH	± 1.0 unit	- ORP	± 10mV
- Sp. Cond.	3%	- Drawdown	< 0.3'

c. Field Testing Equipment used: Make GEOPUMP / YSI / LAMOTTE; Model PERI PUMP / 2020WE; Serial Number 40800 / 2213

Time (24hr)	Volume Removed (Liters)	Temp. (°C)	pH	Spec. Cond. (µS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (ml/min)	Drawdown (feet)	Color/Odor
0810	—	9.9	8.68	686.1	3.11	70.2	2.25	300	8.42	CLEAR / NONE
0815	1.5	10.6	6.60	603.3	1.12	73.9	1.85	300	8.42	CLEAR / NONE
0820	3	11.2	6.12	575.3	0.81	86.6	1.90	300	8.42	CLEAR / NONE
0825	4.5	11.4	6.09	571.4	0.75	87.5	1.90	300	8.42	CLEAR / NONE
0830	6	11.4	6.06	568.7	0.71	89.8	1.85	300	8.42	CLEAR / NONE
0835	7.5	11.5	6.06	566.2	0.69	90.4	1.80	300	8.42	CLEAR / NONE
0840	9	11.5	6.05	565.5	0.68	91.2	1.80	300	8.42	CLEAR / NONE

(continued on back)

d. Acceptance criteria pass/fail

	Yes	No	N/A
Has required volume been removed	☑	☐	☐
Has required turbidity been reached	☑	☐	☐
Have parameters stabilized	☑	☐	☐

If no or N/A - Explain below.

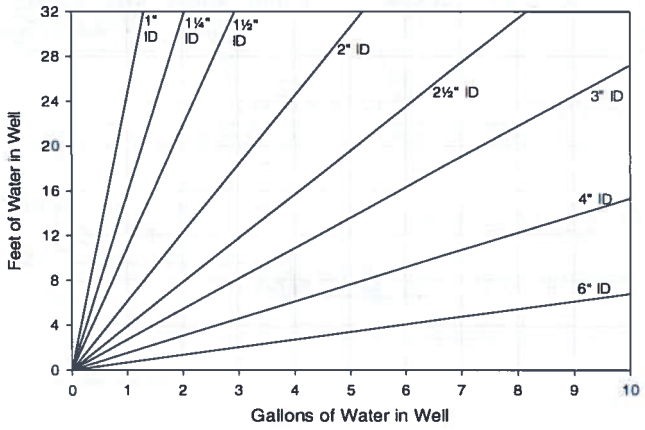
3. SAMPLE COLLECTION: Method: PERI PUMP

Sample ID	Container Type	No. of Containers	Preservation	Analysis Req.	Time
MW-03	VOA	2	HCl	VOCs	0900
MW-03	1L AMBER	2	NONE	PAHs	0900
MW-03	250mL PLASTIC	1	H_2SO_4	CYANIDE	0900

Comments COLLECTED DUPLICATE SAMPLE → LABELED "DUPE 2-20-2020"

Signature Date 2-20-2020

Purge Volume Calculation



Volume / Linear Ft. of Pipe		
ID (in)	Gallon	Liter
0.25	0.0025	0.0097
0.375	0.0057	0.0217
0.5	0.0102	0.0386
0.75	0.0229	0.0869
1	0.0408	0.1544
1.25	0.0637	0.2413
1.5	0.0918	0.3475
2	0.1632	0.6178
2.5	0.2550	0.9653
3	0.3672	1.3900
4	0.6528	2.4711
6	1.4688	5.5600

(continued from front)

Time (24 hr)	Volume Removed (Liters)	Temp (°C)	pH	Spec. Cond. (µS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)	Flow Rate (ml/min)	Drawdown (ft)	Color/Odor
0845	10,5	11,5	6.05	565.0	0,67	91.6	1.80	300	8.42	CLEAR/NONE
0850	12	11.5	6.05	564.8	0,66	92.0	1.80	300	8.43	CLEAR/NONE

Appendix B – Analytical Lab Sheets

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

February 28, 2020

Eleanor Vivaudou
AECOM
100 Red Schoolhouse Rd
Suite B-1
Chestnut Ridge, NY 10977

RE: Project: BABLYON FORMER MGP SITE 2/20
Pace Project No.: 70122514

Dear Eleanor Vivaudou:
Enclosed are the analytical results for sample(s) received by the laboratory on February 20, 2020. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Jennifer Aracri
jennifer.aracri@pacelabs.com
(631)694-3040
Project Manager

Enclosures

cc: Claire Hunt, AECOM
Shreyas Mantri, AECOM

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

CERTIFICATIONS

Project: BABLYON FORMER MGP SITE 2/20
Pace Project No.: 70122514

Pace Analytical Services Long Island
575 Broad Hollow Rd, Melville, NY 11747
New York Certification #: 10478 Primary Accrediting Body
New Jersey Certification #: NY158
Pennsylvania Certification #: 68-00350
Connecticut Certification #: PH-0435
Maryland Certification #: 208
Rhode Island Certification #: LAO00340
Massachusetts Certification #: M-NY026
New Hampshire Certification #: 2987

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

PROJECT NARRATIVE

Project: BABLYON FORMER MGP SITE 2/20
Pace Project No.: 70122514

Method: **EPA 8270D**
Description: 8270 MSSV
Client: AECOM-Chestnut Ridge
Date: February 28, 2020

General Information:
4 samples were analyzed for EPA 8270D. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 3510C with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Internal Standards:
All internal standards were within QC limits with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

PROJECT NARRATIVE

Project: BABLYON FORMER MGP SITE 2/20
Pace Project No.: 70122514

Method: **EPA 8260C/5030C**
Description: 8260C Volatile Organics
Client: AECOM-Chestnut Ridge
Date: February 28, 2020

General Information:
5 samples were analyzed for EPA 8260C/5030C. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Internal Standards:
All internal standards were within QC limits with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

PROJECT NARRATIVE

Project: BABLYON FORMER MGP SITE 2/20
Pace Project No.: 70122514

Method: **EPA 9014 Total Cyanide**
Description: 9014 Cyanide, Total
Client: AECOM-Chestnut Ridge
Date: February 28, 2020

General Information:
4 samples were analyzed for EPA 9014 Total Cyanide. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 9010C with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

ANALYTICAL RESULTS

Project: BABLYON FORMER MGP SITE 2/20
Pace Project No.: 70122514

Sample: MW-01 **Lab ID: 70122514001** Collected: 02/20/20 10:15 Received: 02/20/20 12:50 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8270 MSSV	Analytical Method: EPA 8270D Preparation Method: EPA 3510C							
Acenaphthene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/21/20 22:13	83-32-9	
Acenaphthylene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/21/20 22:13	208-96-8	
Anthracene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/21/20 22:13	120-12-7	
Benzo(a)anthracene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/21/20 22:13	56-55-3	
Benzo(a)pyrene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/21/20 22:13	50-32-8	
Benzo(b)fluoranthene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/21/20 22:13	205-99-2	
Benzo(g,h,i)perylene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/21/20 22:13	191-24-2	
Benzo(k)fluoranthene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/21/20 22:13	207-08-9	
Chrysene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/21/20 22:13	218-01-9	
Dibenz(a,h)anthracene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/21/20 22:13	53-70-3	
Fluoranthene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/21/20 22:13	206-44-0	
Fluorene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/21/20 22:13	86-73-7	
Indeno(1,2,3-cd)pyrene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/21/20 22:13	193-39-5	
2-Methylnaphthalene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/21/20 22:13	91-57-6	
Naphthalene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/21/20 22:13	91-20-3	
Phenanthrene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/21/20 22:13	85-01-8	
Pyrene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/21/20 22:13	129-00-0	
Surrogates								
Nitrobenzene-d5 (S)	70	%	35-114	1	02/21/20 09:20	02/21/20 22:13	4165-60-0	
2-Fluorobiphenyl (S)	61	%	43-116	1	02/21/20 09:20	02/21/20 22:13	321-60-8	
p-Terphenyl-d14 (S)	83	%	33-141	1	02/21/20 09:20	02/21/20 22:13	1718-51-0	
Phenol-d5 (S)	23	%	10-110	1	02/21/20 09:20	02/21/20 22:13	4165-62-2	
2-Fluorophenol (S)	31	%	21-110	1	02/21/20 09:20	02/21/20 22:13	367-12-4	
2,4,6-Tribromophenol (S)	80	%	10-123	1	02/21/20 09:20	02/21/20 22:13	118-79-6	
2-Chlorophenol-d4 (S)	52	%	33-110	1	02/21/20 09:20	02/21/20 22:13	93951-73-6	
1,2-Dichlorobenzene-d4 (S)	45	%	16-110	1	02/21/20 09:20	02/21/20 22:13	2199-69-1	
8260C Volatile Organics	Analytical Method: EPA 8260C/5030C							
Benzene	**<1.0**	ug/L	1.0	1		02/27/20 21:31	71-43-2	
Ethylbenzene	**<1.0**	ug/L	1.0	1		02/27/20 21:31	100-41-4	
Toluene	**<1.0**	ug/L	1.0	1		02/27/20 21:31	108-88-3	
Xylene (Total)	**<3.0**	ug/L	3.0	1		02/27/20 21:31	1330-20-7	
m&p-Xylene	**<2.0**	ug/L	2.0	1		02/27/20 21:31	179601-23-1	
o-Xylene	**<1.0**	ug/L	1.0	1		02/27/20 21:31	95-47-6	
Surrogates								
1,2-Dichloroethane-d4 (S)	86	%	68-153	1		02/27/20 21:31	17060-07-0	
4-Bromofluorobenzene (S)	93	%	79-124	1		02/27/20 21:31	460-00-4	
Toluene-d8 (S)	94	%	69-124	1		02/27/20 21:31	2037-26-5	
9014 Cyanide, Total	Analytical Method: EPA 9014 Total Cyanide Preparation Method: EPA 9010C							
Cyanide	**<10.0**	ug/L	10.0	1	02/24/20 08:10	02/24/20 14:25	57-12-5	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

ANALYTICAL RESULTS

Project: BABLYON FORMER MGP SITE 2/20
Pace Project No.: 70122514

Sample: MW-02 **Lab ID: 70122514002** Collected: 02/20/20 11:30 Received: 02/20/20 12:50 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8270 MSSV	Analytical Method: EPA 8270D Preparation Method: EPA 3510C							
Acenaphthene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/21/20 22:44	83-32-9	
Acenaphthylene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/21/20 22:44	208-96-8	
Anthracene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/21/20 22:44	120-12-7	
Benzo(a)anthracene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/21/20 22:44	56-55-3	
Benzo(a)pyrene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/21/20 22:44	50-32-8	
Benzo(b)fluoranthene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/21/20 22:44	205-99-2	
Benzo(g,h,i)perylene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/21/20 22:44	191-24-2	
Benzo(k)fluoranthene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/21/20 22:44	207-08-9	
Chrysene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/21/20 22:44	218-01-9	
Dibenz(a,h)anthracene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/21/20 22:44	53-70-3	
Fluoranthene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/21/20 22:44	206-44-0	
Fluorene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/21/20 22:44	86-73-7	
Indeno(1,2,3-cd)pyrene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/21/20 22:44	193-39-5	
2-Methylnaphthalene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/21/20 22:44	91-57-6	
Naphthalene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/21/20 22:44	91-20-3	
Phenanthrene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/21/20 22:44	85-01-8	
Pyrene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/21/20 22:44	129-00-0	
Surrogates								
Nitrobenzene-d5 (S)	83	%	35-114	1	02/21/20 09:20	02/21/20 22:44	4165-60-0	
2-Fluorobiphenyl (S)	73	%	43-116	1	02/21/20 09:20	02/21/20 22:44	321-60-8	
p-Terphenyl-d14 (S)	83	%	33-141	1	02/21/20 09:20	02/21/20 22:44	1718-51-0	
Phenol-d5 (S)	13	%	10-110	1	02/21/20 09:20	02/21/20 22:44	4165-62-2	
2-Fluorophenol (S)	29	%	21-110	1	02/21/20 09:20	02/21/20 22:44	367-12-4	
2,4,6-Tribromophenol (S)	80	%	10-123	1	02/21/20 09:20	02/21/20 22:44	118-79-6	
2-Chlorophenol-d4 (S)	56	%	33-110	1	02/21/20 09:20	02/21/20 22:44	93951-73-6	
1,2-Dichlorobenzene-d4 (S)	55	%	16-110	1	02/21/20 09:20	02/21/20 22:44	2199-69-1	
8260C Volatile Organics	Analytical Method: EPA 8260C/5030C							
Benzene	**<1.0**	ug/L	1.0	1		02/27/20 21:54	71-43-2	
Ethylbenzene	**<1.0**	ug/L	1.0	1		02/27/20 21:54	100-41-4	
Toluene	**<1.0**	ug/L	1.0	1		02/27/20 21:54	108-88-3	
Xylene (Total)	**<3.0**	ug/L	3.0	1		02/27/20 21:54	1330-20-7	
m&p-Xylene	**<2.0**	ug/L	2.0	1		02/27/20 21:54	179601-23-1	
o-Xylene	**<1.0**	ug/L	1.0	1		02/27/20 21:54	95-47-6	
Surrogates								
1,2-Dichloroethane-d4 (S)	85	%	68-153	1		02/27/20 21:54	17060-07-0	
4-Bromofluorobenzene (S)	91	%	79-124	1		02/27/20 21:54	460-00-4	
Toluene-d8 (S)	94	%	69-124	1		02/27/20 21:54	2037-26-5	
9014 Cyanide, Total	Analytical Method: EPA 9014 Total Cyanide Preparation Method: EPA 9010C							
Cyanide	**<10.0**	ug/L	10.0	1	02/24/20 08:10	02/24/20 14:16	57-12-5	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

ANALYTICAL RESULTS

Project: BABLYON FORMER MGP SITE 2/20
Pace Project No.: 70122514

Sample: MW-03 **Lab ID: 70122514003** Collected: 02/20/20 09:00 Received: 02/20/20 12:50 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8270 MSSV	Analytical Method: EPA 8270D Preparation Method: EPA 3510C							
Acenaphthene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/22/20 00:19	83-32-9	
Acenaphthylene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/22/20 00:19	208-96-8	
Anthracene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/22/20 00:19	120-12-7	
Benzo(a)anthracene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/22/20 00:19	56-55-3	
Benzo(a)pyrene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/22/20 00:19	50-32-8	
Benzo(b)fluoranthene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/22/20 00:19	205-99-2	
Benzo(g,h,i)perylene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/22/20 00:19	191-24-2	
Benzo(k)fluoranthene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/22/20 00:19	207-08-9	
Chrysene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/22/20 00:19	218-01-9	
Dibenz(a,h)anthracene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/22/20 00:19	53-70-3	
Fluoranthene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/22/20 00:19	206-44-0	
Fluorene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/22/20 00:19	86-73-7	
Indeno(1,2,3-cd)pyrene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/22/20 00:19	193-39-5	
2-Methylnaphthalene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/22/20 00:19	91-57-6	
Naphthalene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/22/20 00:19	91-20-3	
Phenanthrene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/22/20 00:19	85-01-8	
Pyrene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/22/20 00:19	129-00-0	
Surrogates								
Nitrobenzene-d5 (S)	80	%	35-114	1	02/21/20 09:20	02/22/20 00:19	4165-60-0	
2-Fluorobiphenyl (S)	71	%	43-116	1	02/21/20 09:20	02/22/20 00:19	321-60-8	
p-Terphenyl-d14 (S)	64	%	33-141	1	02/21/20 09:20	02/22/20 00:19	1718-51-0	
Phenol-d5 (S)	24	%	10-110	1	02/21/20 09:20	02/22/20 00:19	4165-62-2	
2-Fluorophenol (S)	34	%	21-110	1	02/21/20 09:20	02/22/20 00:19	367-12-4	
2,4,6-Tribromophenol (S)	88	%	10-123	1	02/21/20 09:20	02/22/20 00:19	118-79-6	
2-Chlorophenol-d4 (S)	58	%	33-110	1	02/21/20 09:20	02/22/20 00:19	93951-73-6	
1,2-Dichlorobenzene-d4 (S)	52	%	16-110	1	02/21/20 09:20	02/22/20 00:19	2199-69-1	
8260C Volatile Organics	Analytical Method: EPA 8260C/5030C							
Benzene	**<1.0**	ug/L	1.0	1		02/27/20 20:23	71-43-2	
Ethylbenzene	**<1.0**	ug/L	1.0	1		02/27/20 20:23	100-41-4	
Toluene	**<1.0**	ug/L	1.0	1		02/27/20 20:23	108-88-3	
Xylene (Total)	**<3.0**	ug/L	3.0	1		02/27/20 20:23	1330-20-7	
m&p-Xylene	**<2.0**	ug/L	2.0	1		02/27/20 20:23	179601-23-1	
o-Xylene	**<1.0**	ug/L	1.0	1		02/27/20 20:23	95-47-6	
Surrogates								
1,2-Dichloroethane-d4 (S)	85	%	68-153	1		02/27/20 20:23	17060-07-0	
4-Bromofluorobenzene (S)	92	%	79-124	1		02/27/20 20:23	460-00-4	
Toluene-d8 (S)	94	%	69-124	1		02/27/20 20:23	2037-26-5	
9014 Cyanide, Total	Analytical Method: EPA 9014 Total Cyanide Preparation Method: EPA 9010C							
Cyanide	**<10.0**	ug/L	10.0	1	02/24/20 08:10	02/24/20 14:19	57-12-5	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

ANALYTICAL RESULTS

Project: BABLYON FORMER MGP SITE 2/20
Pace Project No.: 70122514

Sample: DUPE 2-20-2020 **Lab ID: 70122514004** Collected: 02/20/20 00:00 Received: 02/20/20 12:50 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8270 MSSV	Analytical Method: EPA 8270D Preparation Method: EPA 3510C							
Acenaphthene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/22/20 00:51	83-32-9	
Acenaphthylene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/22/20 00:51	208-96-8	
Anthracene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/22/20 00:51	120-12-7	
Benzo(a)anthracene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/22/20 00:51	56-55-3	
Benzo(a)pyrene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/22/20 00:51	50-32-8	
Benzo(b)fluoranthene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/22/20 00:51	205-99-2	
Benzo(g,h,i)perylene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/22/20 00:51	191-24-2	
Benzo(k)fluoranthene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/22/20 00:51	207-08-9	
Chrysene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/22/20 00:51	218-01-9	
Dibenz(a,h)anthracene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/22/20 00:51	53-70-3	
Fluoranthene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/22/20 00:51	206-44-0	
Fluorene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/22/20 00:51	86-73-7	
Indeno(1,2,3-cd)pyrene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/22/20 00:51	193-39-5	
2-Methylnaphthalene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/22/20 00:51	91-57-6	
Naphthalene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/22/20 00:51	91-20-3	
Phenanthrene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/22/20 00:51	85-01-8	
Pyrene	**<5.0**	ug/L	5.0	1	02/21/20 09:20	02/22/20 00:51	129-00-0	
Surrogates								
Nitrobenzene-d5 (S)	74	%	35-114	1	02/21/20 09:20	02/22/20 00:51	4165-60-0	
2-Fluorobiphenyl (S)	68	%	43-116	1	02/21/20 09:20	02/22/20 00:51	321-60-8	
p-Terphenyl-d14 (S)	75	%	33-141	1	02/21/20 09:20	02/22/20 00:51	1718-51-0	
Phenol-d5 (S)	22	%	10-110	1	02/21/20 09:20	02/22/20 00:51	4165-62-2	
2-Fluorophenol (S)	27	%	21-110	1	02/21/20 09:20	02/22/20 00:51	367-12-4	
2,4,6-Tribromophenol (S)	78	%	10-123	1	02/21/20 09:20	02/22/20 00:51	118-79-6	
2-Chlorophenol-d4 (S)	52	%	33-110	1	02/21/20 09:20	02/22/20 00:51	93951-73-6	
1,2-Dichlorobenzene-d4 (S)	49	%	16-110	1	02/21/20 09:20	02/22/20 00:51	2199-69-1	
8260C Volatile Organics	Analytical Method: EPA 8260C/5030C							
Benzene	**<1.0**	ug/L	1.0	1		02/27/20 22:17	71-43-2	
Ethylbenzene	**<1.0**	ug/L	1.0	1		02/27/20 22:17	100-41-4	
Toluene	**<1.0**	ug/L	1.0	1		02/27/20 22:17	108-88-3	
Xylene (Total)	**<3.0**	ug/L	3.0	1		02/27/20 22:17	1330-20-7	
m&p-Xylene	**<2.0**	ug/L	2.0	1		02/27/20 22:17	179601-23-1	
o-Xylene	**<1.0**	ug/L	1.0	1		02/27/20 22:17	95-47-6	
Surrogates								
1,2-Dichloroethane-d4 (S)	85	%	68-153	1		02/27/20 22:17	17060-07-0	
4-Bromofluorobenzene (S)	94	%	79-124	1		02/27/20 22:17	460-00-4	
Toluene-d8 (S)	94	%	69-124	1		02/27/20 22:17	2037-26-5	
9014 Cyanide, Total	Analytical Method: EPA 9014 Total Cyanide Preparation Method: EPA 9010C							
Cyanide	**<10.0**	ug/L	10.0	1	02/24/20 08:10	02/24/20 14:24	57-12-5	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

ANALYTICAL RESULTS

Project: BABLYON FORMER MGP SITE 2/20
Pace Project No.: 70122514

Sample: TRIP BLANK **Lab ID: 70122514005** Collected: 02/17/20 00:00 Received: 02/20/20 12:50 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260C Volatile Organics	Analytical Method: EPA 8260C/5030C							
Benzene	**<1.0**	ug/L	1.0	1		02/27/20 20:46	71-43-2	
Ethylbenzene	**<1.0**	ug/L	1.0	1		02/27/20 20:46	100-41-4	
Toluene	**<1.0**	ug/L	1.0	1		02/27/20 20:46	108-88-3	
Xylene (Total)	**<3.0**	ug/L	3.0	1		02/27/20 20:46	1330-20-7	
m&p-Xylene	**<2.0**	ug/L	2.0	1		02/27/20 20:46	179601-23-1	
o-Xylene	**<1.0**	ug/L	1.0	1		02/27/20 20:46	95-47-6	
Surrogates								
1,2-Dichloroethane-d4 (S)	84	%	68-153	1		02/27/20 20:46	17060-07-0	
4-Bromofluorobenzene (S)	93	%	79-124	1		02/27/20 20:46	460-00-4	
Toluene-d8 (S)	94	%	69-124	1		02/27/20 20:46	2037-26-5	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

QUALITY CONTROL DATA

Project: BABLYON FORMER MGP SITE 2/20
Pace Project No.: 70122514

QC Batch: 151297 Analysis Method: EPA 8260C/5030C
QC Batch Method: EPA 8260C/5030C Analysis Description: 8260 MSV
Associated Lab Samples: 70122514001, 70122514002, 70122514003, 70122514004, 70122514005

METHOD BLANK: 726298 Matrix: Water
Associated Lab Samples: 70122514001, 70122514002, 70122514003, 70122514004, 70122514005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Benzene	ug/L	<1.0	1.0	02/27/20 14:34	
Ethylbenzene	ug/L	<1.0	1.0	02/27/20 14:34	
m&p-Xylene	ug/L	<2.0	2.0	02/27/20 14:34	
o-Xylene	ug/L	<1.0	1.0	02/27/20 14:34	
Toluene	ug/L	<1.0	1.0	02/27/20 14:34	
Xylene (Total)	ug/L	<3.0	3.0	02/27/20 14:34	
1,2-Dichloroethane-d4 (S)	%	87	68-153	02/27/20 14:34	
4-Bromofluorobenzene (S)	%	92	79-124	02/27/20 14:34	
Toluene-d8 (S)	%	94	69-124	02/27/20 14:34	

LABORATORY CONTROL SAMPLE: 726299

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Benzene	ug/L	50	49.9	100	73-119	
Ethylbenzene	ug/L	50	48.6	97	70-113	
m&p-Xylene	ug/L	100	96.9	97	72-115	
o-Xylene	ug/L	50	48.2	96	73-117	
Toluene	ug/L	50	49.9	100	72-119	
Xylene (Total)	ug/L	150	145	97	71-109	
1,2-Dichloroethane-d4 (S)	%			84	68-153	
4-Bromofluorobenzene (S)	%			93	79-124	
Toluene-d8 (S)	%			96	69-124	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 726673 726674

Parameter	Units	70122514002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Qual
Benzene	ug/L	<1.0	50	50	48.2	43.3	96	87	73-119	11	
Ethylbenzene	ug/L	<1.0	50	50	47.9	44.2	96	88	70-113	8	
m&p-Xylene	ug/L	<2.0	100	100	94.5	86.2	95	86	72-115	9	
o-Xylene	ug/L	<1.0	50	50	46.9	43.5	94	87	73-117	7	
Toluene	ug/L	<1.0	50	50	47.9	44.9	96	90	72-119	7	
Xylene (Total)	ug/L	<3.0	150	150	141	130	94	87	71-109	9	
1,2-Dichloroethane-d4 (S)	%						82	79	68-153		
4-Bromofluorobenzene (S)	%						94	93	79-124		
Toluene-d8 (S)	%						96	96	69-124		

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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

QUALITY CONTROL DATA

Project: BABLYON FORMER MGP SITE 2/20
Pace Project No.: 70122514

QC Batch: 150495 Analysis Method: EPA 8270D
QC Batch Method: EPA 3510C Analysis Description: 8270 Water MSSV
Associated Lab Samples: 70122514001, 70122514002, 70122514003, 70122514004

METHOD BLANK: 722039 Matrix: Water
Associated Lab Samples: 70122514001, 70122514002, 70122514003, 70122514004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
2-Methylnaphthalene	ug/L	<5.0	5.0	02/21/20 20:04	
Acenaphthene	ug/L	<5.0	5.0	02/21/20 20:04	
Acenaphthylene	ug/L	<5.0	5.0	02/21/20 20:04	
Anthracene	ug/L	<5.0	5.0	02/21/20 20:04	
Benzo(a)anthracene	ug/L	<5.0	5.0	02/21/20 20:04	
Benzo(a)pyrene	ug/L	<5.0	5.0	02/21/20 20:04	
Benzo(b)fluoranthene	ug/L	<5.0	5.0	02/21/20 20:04	
Benzo(g,h,i)perylene	ug/L	<5.0	5.0	02/21/20 20:04	
Benzo(k)fluoranthene	ug/L	<5.0	5.0	02/21/20 20:04	
Chrysene	ug/L	<5.0	5.0	02/21/20 20:04	
Dibenz(a,h)anthracene	ug/L	<5.0	5.0	02/21/20 20:04	
Fluoranthene	ug/L	<5.0	5.0	02/21/20 20:04	
Fluorene	ug/L	<5.0	5.0	02/21/20 20:04	
Indeno(1,2,3-cd)pyrene	ug/L	<5.0	5.0	02/21/20 20:04	
Naphthalene	ug/L	<5.0	5.0	02/21/20 20:04	
Phenanthrene	ug/L	<5.0	5.0	02/21/20 20:04	
Pyrene	ug/L	<5.0	5.0	02/21/20 20:04	
1,2-Dichlorobenzene-d4 (S)	%	55	16-110	02/21/20 20:04	
2,4,6-Tribromophenol (S)	%	88	10-123	02/21/20 20:04	
2-Chlorophenol-d4 (S)	%	68	33-110	02/21/20 20:04	
2-Fluorobiphenyl (S)	%	75	43-116	02/21/20 20:04	
2-Fluorophenol (S)	%	44	21-110	02/21/20 20:04	
Nitrobenzene-d5 (S)	%	86	35-114	02/21/20 20:04	
p-Terphenyl-d14 (S)	%	86	33-141	02/21/20 20:04	
Phenol-d5 (S)	%	31	10-110	02/21/20 20:04	

LABORATORY CONTROL SAMPLE: 722040

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
2-Methylnaphthalene	ug/L	25	19.3	77	31-123	
Acenaphthene	ug/L	25	23.6	94	50-116	
Acenaphthylene	ug/L	25	22.8	91	50-109	
Anthracene	ug/L	25	24.1	97	54-117	
Benzo(a)anthracene	ug/L	25	26.1	104	31-128	
Benzo(a)pyrene	ug/L	25	27.9	112	30-146	
Benzo(b)fluoranthene	ug/L	25	28.6	114	43-147	
Benzo(g,h,i)perylene	ug/L	25	30.5	122	25-153	
Benzo(k)fluoranthene	ug/L	25	26.8	107	28-148	
Chrysene	ug/L	25	26.8	107	42-140	
Dibenz(a,h)anthracene	ug/L	25	28.9	115	22-147	

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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

QUALITY CONTROL DATA

Project: BABLYON FORMER MGP SITE 2/20
Pace Project No.: 70122514

LABORATORY CONTROL SAMPLE: 722040

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Fluoranthene	ug/L	25	25.3	101	50-123	
Fluorene	ug/L	25	24.9	100	51-118	
Indeno(1,2,3-cd)pyrene	ug/L	25	30.7	123	26-156	
Naphthalene	ug/L	25	19.3	77	39-107	
Phenanthrene	ug/L	25	24.5	98	52-126	
Pyrene	ug/L	25	27.6	110	41-137	
1,2-Dichlorobenzene-d4 (S)	%			58	16-110	
2,4,6-Tribromophenol (S)	%			104	10-123	
2-Chlorophenol-d4 (S)	%			72	33-110	
2-Fluorobiphenyl (S)	%			84	43-116	
2-Fluorophenol (S)	%			45	21-110	
Nitrobenzene-d5 (S)	%			90	35-114	
p-Terphenyl-d14 (S)	%			95	33-141	
Phenol-d5 (S)	%			33	10-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 722433 722434

Parameter	Units	70122514002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Qual
2-Methylnaphthalene	ug/L	<5.0	25	25	18.7	20.3	75	81	31-123	8	
Acenaphthene	ug/L	<5.0	25	25	19.5	22.0	78	88	50-116	12	
Acenaphthylene	ug/L	<5.0	25	25	18.8	21.2	75	85	50-109	12	
Anthracene	ug/L	<5.0	25	25	17.9	20.3	71	81	54-117	13	
Benzo(a)anthracene	ug/L	<5.0	25	25	19.3	21.8	77	87	31-128	12	
Benzo(a)pyrene	ug/L	<5.0	25	25	21.1	23.7	85	95	30-146	11	
Benzo(b)fluoranthene	ug/L	<5.0	25	25	20.6	22.9	83	92	43-147	10	
Benzo(g,h,i)perylene	ug/L	<5.0	25	25	25.2	27.9	101	111	25-153	10	
Benzo(k)fluoranthene	ug/L	<5.0	25	25	20.6	22.9	82	92	28-148	11	
Chrysene	ug/L	<5.0	25	25	20.0	22.3	80	89	42-140	11	
Dibenz(a,h)anthracene	ug/L	<5.0	25	25	22.8	26.1	91	104	22-147	14	
Fluoranthene	ug/L	<5.0	25	25	19.0	21.5	76	86	50-123	13	
Fluorene	ug/L	<5.0	25	25	19.6	22.2	78	89	51-118	13	
Indeno(1,2,3-cd)pyrene	ug/L	<5.0	25	25	24.4	27.2	98	109	26-156	11	
Naphthalene	ug/L	<5.0	25	25	19.4	20.1	77	80	39-107	4	
Phenanthrene	ug/L	<5.0	25	25	18.4	21.1	74	84	52-126	13	
Pyrene	ug/L	<5.0	25	25	20.4	23.1	81	92	41-137	12	
1,2-Dichlorobenzene-d4 (S)	%						56	69	16-110		
2,4,6-Tribromophenol (S)	%						86	87	10-123		
2-Chlorophenol-d4 (S)	%						60	59	33-110		
2-Fluorobiphenyl (S)	%						78	82	43-116		
2-Fluorophenol (S)	%						34	31	21-110		
Nitrobenzene-d5 (S)	%						85	85	35-114		
p-Terphenyl-d14 (S)	%						78	73	33-141		
Phenol-d5 (S)	%						16	21	10-110		

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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

QUALITY CONTROL DATA

Project: BABLYON FORMER MGP SITE 2/20
Pace Project No.: 70122514

QC Batch: 150683 Analysis Method: EPA 9014 Total Cyanide
QC Batch Method: EPA 9010C Analysis Description: 9014 Cyanide, Total
Associated Lab Samples: 70122514001, 70122514002, 70122514003, 70122514004

METHOD BLANK: 723195 Matrix: Water
Associated Lab Samples: 70122514001, 70122514002, 70122514003, 70122514004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Cyanide	ug/L	<10.0	10.0	02/24/20 14:15	

LABORATORY CONTROL SAMPLE: 723196

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cyanide	ug/L	75	68.5	91	85-115	

MATRIX SPIKE SAMPLE: 723197

Parameter	Units	70122514002 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Cyanide	ug/L	<10.0	100	121	120	75-125	

SAMPLE DUPLICATE: 723198

Parameter	Units	70122514002 Result	Dup Result	RPD	Qualifiers
Cyanide	ug/L	<10.0	<10.0		

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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

QUALIFIERS

Project: BABLYON FORMER MGP SITE 2/20
Pace Project No.: 70122514

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

Pace Analytical Services, LLC
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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: BABLYON FORMER MGP SITE 2/20
Pace Project No.: 70122514

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
70122514001	**MW-01**	EPA 3510C	150495	EPA 8270D	150606
70122514002	**MW-02**	EPA 3510C	150495	EPA 8270D	150606
70122514003	**MW-03**	EPA 3510C	150495	EPA 8270D	150606
70122514004	**DUPE 2-20-2020**	EPA 3510C	150495	EPA 8270D	150606
70122514001	**MW-01**	EPA 8260C/5030C	151297		
70122514002	**MW-02**	EPA 8260C/5030C	151297		
70122514003	**MW-03**	EPA 8260C/5030C	151297		
70122514004	**DUPE 2-20-2020**	EPA 8260C/5030C	151297		
70122514005	**TRIP BLANK**	EPA 8260C/5030C	151297		
70122514001	**MW-01**	EPA 9010C	150683	EPA 9014 Total Cyanide	150741
70122514002	**MW-02**	EPA 9010C	150683	EPA 9014 Total Cyanide	150741
70122514003	**MW-03**	EPA 9010C	150683	EPA 9014 Total Cyanide	150741
70122514004	**DUPE 2-20-2020**	EPA 9010C	150683	EPA 9014 Total Cyanide	150741

Pace Analytical
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CHAIN-OF-CUSTODY / Analytical Request D

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields mu

WO#:70122514

Section A Required Client Information:		Section B Required Project Information:		Section C Invoice Information:	
Company:	AECOM-Chestnut Ridge	Report To:	Eleanor Vivaudou	Attention:	
Address:	100 Red Schoolhouse Rd	Copy To:		Company Name:	
Chestnut Ridge, NY 10977				Address:	
Email:	eleanor.vivaudou@aecom.com	Purchase Order #:		Pace Quote:	
Phone:	(845) 425-4980 Fax:	Project Name:	Babylon Former MGP Site	Pace Project Manager:	jennifer.aracri@pacelabs.com,
Requested Due Date:	STANDARD	Project #:		Pace Profile #:	8339

Regulatory Agency
NYSDEC
State / Location
New York

ITEM #	SAMPLE ID (One Character per box. (A-Z, 0-9 / , -) Sample Ids must be unique)	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED START DATE	COLLECTED START TIME	COLLECTED END DATE	COLLECTED END TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Methanol	Other	Requested Analysis Filtered (Y/N) Y/N	Analyses Test: BTEX by 8260	PAH by 8270	Cyanide	Residual Chlorine (Y/N)	
1	MW-01	WT	G	2-20-20		2-20-20	1015		5	2	1		2						X	X	X		
2	MW-02	WT	G				1130		15	6	3		6						X	X	X		MS/MSD
3	MW-03	WT	G				0900		5	2	1		2						X	X	X		
4	DUPE 2-20-2020	WT	G				—		5	2	1		2						X	X	X		
5	TRIP BLANK	WT	G			2-20-20	—		2				2						X				
6																							
7																							
8																							
9																							
10																							
11																							
12																							

MATRIX CODE: Drinking Water DW; Water WT; Waste Water WW; Product P; Soil/Solid SL; Oil OL; Wipe WP; Air AR; Other OT; Tissue TS

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
	/AECOM	2-20-20	1300	Pace LI	2/20/20	12:50	1.5	W	N	Y

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: STEVE WRIGHT

SIGNATURE of SAMPLER: DATE Signed: 2-20-2020

TEMP in C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

Pace Analytical

Sample Condition Upon Receipt

WO#:70122514
PM: JSA Due Date: 03/05/20
CLIENT: AECOM-C

Client Name: AECOM-C Pro

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☑ Client ☐ Commercial ☐ Pace ☐ Other

Tracking #:

Custody Seal on Cooler/Box Present: ☐ Yes ☑ No Seals intact: ☐ Yes ☑ No

Temperature Blank Present: ☐ Yes ☑ No

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☐ Ziploc ☑ None ☐ Other

Type of Ice: (Wet) Blue None

Thermometer Used: TH081 Correction Factor: +0.2

☐ Samples on ice, cooling process has begun

Cooler Temperature (°C): 1.5 Cooler Temperature Corrected (°C): 1.7

Date/Time 5035A kits placed in freezer

Temp should be above freezing to 6.0°C

USDA Regulated Soil (☑ N/A, water sample)

Date and Initials of person examining contents: 2/20/20 JP

Did samples originate in a quarantine zone within the United States: AL, AR, CA, FL, GA, ID, LA, MS, NC, NM, NY, OK, OR, SC, TN, TX, or VA (check map)? ☐ YES ☐ NO

Did samples orignate from a foreign source (internationally, including Hawaii and Puerto Rico)? ☐ Yes ☒ No

If Yes to either question, fill out a Regulated Soil Checklist (F-LI-C-010) and include with SCUR/COC paperwork.

				COMMENTS:
Chain of Custody Present:	☑Yes	☐No		1.
Chain of Custody Filled Out:	☑Yes	☐No		2.
Chain of Custody Relinquished:	☑Yes	☐No		3.
Sampler Name & Signature on COC:	☑Yes	☐No	☐N/A	4.
Samples Arrived within Hold Time:	☑Yes	☐No		5.
Short Hold Time Analysis (<72hr):	☐Yes	☑No		6.
Rush Turn Around Time Requested:	☐Yes	☑No		7.
Sufficient Volume: (Triple volume provided for MS/MSD	☑Yes	☐No		8.
Correct Containers Used:	☑Yes	☐No		9.
-Pace Containers Used:	☑Yes	☐No		
Containers Intact:	☑Yes	☐No		10.
Filtered volume received for Dissolved tests	☐Yes	☐No	☑N/A	11. Note if sediment is visible in the dissolved container.
Sample Labels match COC:	☑Yes	☐No		12.
-Includes date/time/ID/Analysis Matrix SL (WT) OIL				
All containers needing preservation have been checked	☑Yes	☐No	☐N/A	13. ☐ HNO_3 ☐ H_2SO_4 ☐ NaOH ☐ HCl
pH paper Lot # HC998032				
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO_3, H_2SO_4, HCl, NaOH>9 Sulfide, NAOH>12 Cyanide)	☑Yes	☐No	☐N/A	Sample #
Exceptions: (VOA), Coliform, TOC/DOC, Oil and Grease, DRO/8015 (water). Per Method, VOA pH is checked after analysis				Initial when completed: / Lot # of added preservative: / Date/Time preservative added
Samples checked for dechlorination:	☐Yes	☐No	☑N/A	14.
KI starch test strips Lot #				
Residual chlorine strips Lot #				Positive for Res. Chlorine? Y N
Headspace in VOA Vials (>6mm):	☐Yes	☑No	☐N/A	15.
Trip Blank Present:	☑Yes	☐No	☐N/A	16.
Trip Blank Custody Seals Present	☑Yes	☐No	☐N/A	
Pace Trip Blank Lot # (if applicable):				

Client Notification/ Resolution: Field Data Required? Y / N

Person Contacted: Date/Time:

Comments/ Resolution:

* PM (Project Manager) review is documented electronically in LIMS.

Appendix C – Data Validation

AECOM

Prepared for:
National Grid
Brooklyn, NY

Prepared by:
AECOM
Pittsburgh, PA
60287690-430
April 2020

April 13, 2020

Organic and Inorganic Data Usability Summary Report

National Grid/Babylon Former MGP Site Groundwater Samples Pace Analytical Services Data February 2020 Final

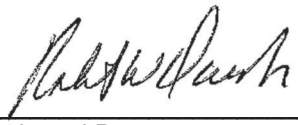
Prepared for:
National Grid
Brooklyn, NY

Prepared by:
AECOM
Pittsburgh, PA
60287690-430
April 2020

Organic and Inorganic Data Usability Summary Report

National Grid/Babylon Former MGP Site Groundwater Samples Pace Analytical Services Data February 2020 Final

Prepared By
Gregory Malzone, Project Chemist
AECOM
Gulf Tower
707 Grant Street, 5th floor
Pittsburgh, PA 15219



Reviewed By
Robert Davis
Data Validator/Database Technician
AECOM
1360 Peachtree Street NE, Suite 500
Atlanta, GA 30309

Contents

List of Appendices

Executive Summary

Overview

Data validation was performed by Gregory A. Malzone of AECOM Pittsburgh on one data package from Pace Analytical Services, 575 Broad Hollow Road, Melville, NY 11747 (Pace) for the analysis of groundwater samples collected on February 20, 2020 at the Babylon former manufactured gas plant (MGP) site in West Babylon NY.

The following analytical methods were requested on the chain-of-custody (CoC) records.

- USEPA Method SW 8260C – Benzene, Toluene, Ethylbenzene and Xylenes (BTEX) by Gas Chromatography/Mass Spectrometry (GC/MS)
- USEPA Method SW 8270D – Polycyclic Aromatic Hydrocarbons (PAHs) by GC/MS
- USEPA Method SW 9014 - Total Cyanide

The data were evaluated for conformance to method specifications and qualifiers were applied using the validation criteria set forth in USEPA Region II SOPs and *USEPA Contract Laboratory Program (CLP) National Functional Guidelines for Organic Superfund Methods Data Review*, EPA-540-R-2017-002, January 2017 and *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Methods Data Review*, EPA-540-R-2017-001, January 2017, as they apply to the analytical methods employed.

Field duplicate relative percent difference (RPD) review and applicable control limits were taken from the *USEPA Region I Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses*, December 1996 and *USEPA Region I Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses*, June 1988.

Table 1 below provides a sample submittal list with the field IDs cross-referenced with the laboratory IDs.

Table 1 – Groundwater Sample Submittals NG/Babylon Former MGP Site

Field ID	Pace ID	Sample Date/Time	Matrix
MW-01	70122514001	02/20/20 10:15	Groundwater
MW-02	70122514002	02/20/20 11:30	Groundwater
MW-03	7012251403	02/20/20 09:00	Groundwater
DUPE-2-02202020	70122514004	02/20/20 00:00	Groundwater (QC)
Trip Blank	70122514005	02/20/20 00:00	Aqueous (QC)

Sample MW-2 was designated in the field to be processed as the quality control sample, that is, as the matrix spike/matrix spike duplicate sample.

Summary

Data quality for the organic analyses was evaluated by reviewing the following parameters: holding times, GC/MS tuning and performance standards, internal standards, initial and continuing calibrations, matrix spike/matrix spike duplicates (MS/MSD), surrogate recoveries, laboratory control standards (LCSs), laboratory blanks, laboratory and field duplicates, compound identification, and compound quantitation.

Inorganic data quality was evaluated by reviewing the following parameters: holding times, matrix spikes, initial calibrations, continuing calibration verification standard recoveries, laboratory control samples, field and laboratory duplicates, laboratory blanks, and analyte identification and quantitation.

All data have been determined to be useable for the purpose of assessing the presence/absence and quantitative concentrations of the compounds and analytes in the media tested (i.e. groundwater) without qualification. Completeness of 100% was achieved for this data set. This is within the goal of 90-100% and is acceptable.

A glossary of data qualifier definitions is included in Appendix A of this report. The qualified data summary table is attached as Appendix B of this report. The support documentation for data qualifications is included in Appendix C of this report. Each nonconformance with specific data usability criteria is discussed below.

1.0 BTEX by SW 8260C

No data issues were noted. No data qualifications were required.

2.0 PAHs by SW 8270D

No data issues were noted. No data qualifications were required.

3.0 Total Cyanide by 9014

No data issues were noted. No data qualifications were required.

4.0 Field Duplicate Precision

A field duplicate sample was collected for sample MW-3. Table 2 below lists the RPDs for those parameters for which there were detections. Field duplicate results were evaluated using the following criteria.

Organics: The RPD must be ≤ 30% for groundwaters, for results greater than or equal to two times the reporting limit. If one of the results is non-detect or less than two times the reporting limit, and the duplicate is greater than two times the reporting limit, the difference between the parent and field duplicate results must be less than or equal to two times the reporting limit.

Action applies only to the affected analyte in the organic duplicate sample pair.

Inorganics: The RPD must be ≤ 30% for groundwaters, for results greater than or equal to five times the reporting limit. For results less than five times the reporting limit, the difference between the parent and field duplicate results must be less than or equal to two times the reporting limit for groundwaters.

Action applies to the affected analyte in all inorganic samples of the same matrix prepared and analyzed by the same method.

Field sampling/laboratory precision and sample homogeneity were acceptable. No data qualification was required.

The following notations are used in the field precision tables.

RPD: Relative percent difference

NC: RPD could not be calculated

±2RL**:** The difference between the parent and field duplicate results was less than the twice the reporting limit for results less than two times the reporting limit. Variation of this magnitude is acceptable for organics.

Table 2 – Field Duplicate Precision
NG/Babylon Former MGP Site

Parameter	Units	MW-3	DUPE 2-20-2020	RPD (%)
All parent and field duplicate results were non-detect.				

5.0 Notes

Matrix spike and matrix spike duplicates and laboratory duplicates that were performed on non-project samples were not evaluated because matrix similarity to project samples could not be assumed.

Appendix A

Glossary of Data Qualifier Codes

AECOM

Glossary of Data Qualifier Codes

U	The analyte was analyzed for but was not detected above the level of the reported sample quantitation limit.
J	The analyte was positively identified. The associated numerical value is the approximate concentration of the analyte in the sample.
UJ	The analyte was analyzed for but was not detected. The reported quantitation limit is approximated and may be inaccurate or imprecise.
J+	The result is an estimated quantity but may be biased high.
J-	The result is an estimated quantity but may be biased low.
R	The data are unusable. The sample results are rejected due to serious deficiencies in the ability to meet quality control criteria. The presence or absence of the analyte cannot be verified.
N	(Organics) The analysis indicates the presence of an analyte for which there is presumptive evidence to make a tentative identification.
NJ	(Organics) The analysis indicates the presence of an analyte that has been tentatively identified and the associated numerical value represents its approximate concentration.

Appendix B

Qualified Data Summary Table

The data were accepted as reported by Pace Analytical Services. No data qualifications were required.

Appendix C

Support Documentation

Pace Analytical
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CHAIN-OF-CUSTODY / Analytical Request D

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields mu

WO#:70122514

Section A Required Client Information:		Section B Required Project Information:		Section C Invoice Information:	
Company:	AECOM-Chestnut Ridge	Report To:	Eleanor Vivaudou	Attention:	
Address:	100 Red Schoolhouse Rd	Copy To:		Company Name:	
Chestnut Ridge, NY 10977				Address:	
Email:	eleanor.vivaudou@aecom.com	Purchase Order #:		Pace Quote:	
Phone:	(845) 425-4980 Fax:	Project Name:	Babylon Former MGP Site	Pace Project Manager:	jennifer.aracri@pacelabs.com,
Requested Due Date:	STANDARD	Project #:		Pace Profile #:	8339

Regulatory Agency
NYSDEC
State / Location
New York

ITEM #	SAMPLE ID (One Character per box. (A-Z, 0-9 / , -) Sample Ids must be unique)	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED START DATE	COLLECTED START TIME	COLLECTED END DATE	COLLECTED END TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Methanol	Other	Requested Analysis Filtered (Y/N) Y/N	Analyses Test: BTEX by 8260	PAH by 8270	Cyanide	Residual Chlorine (Y/N)	
1	MW-01	WT	G	2-20-20		2-20-20	1015		5	2	1		2						X	X	X		
2	MW-02	WT	G				1130		15	6	3		6						X	X	X		MS/MSD
3	MW-03	WT	G				0900		5	2	1		2						X	X	X		
4	DUPE 2-20-2020	WT	G				—		5	2	1		2						X	X	X		
5	TRIP BLANK	WT	G			2-20-20	—		2				2						X				
6																							
7																							
8																							
9																							
10																							
11																							
12																							

MATRIX CODE: Drinking Water DW; Water WT; Waste Water WW; Product P; Soil/Solid SL; Oil OL; Wipe WP; Air AR; Other OT; Tissue TS

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
	/AECOM	2-20-20	1300	Pace LI	2/20/20	12:50	1.5	W	N	Y

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: STEVE WRIGHT

SIGNATURE of SAMPLER: DATE Signed: 2-20-2020

TEMP in C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

Pace Analytical

Sample Condition Upon Receipt

WO#:70122514
PM: JSA Due Date: 03/05/20
CLIENT: AECOM-C

Client Name: AECOM-C Pro

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☑ Client ☐ Commercial ☐ Pace ☐ Other

Tracking #:

Custody Seal on Cooler/Box Present: ☐ Yes ☑ No Seals intact: ☐ Yes ☑ No

Temperature Blank Present: ☐ Yes ☑ No

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☐ Ziploc ☑ None ☐ Other

Type of Ice: (Wet) Blue None

Thermometer Used: TH081 Correction Factor: +0.2

☐ Samples on ice, cooling process has begun

Cooler Temperature (°C): 1.5 Cooler Temperature Corrected (°C): 1.7

Date/Time 5035A kits placed in freezer

Temp should be above freezing to 6.0°C

USDA Regulated Soil (☑ N/A, water sample)

Date and Initials of person examining contents: 2/20/20 JP

Did samples originate in a quarantine zone within the United States: AL, AR, CA, FL, GA, ID, LA, MS, NC, NM, NY, OK, OR, SC, TN, TX, or VA (check map)? ☐ YES ☐ NO

Did samples orignate from a foreign source (internationally, including Hawaii and Puerto Rico)? ☐ Yes ☒ No

If Yes to either question, fill out a Regulated Soil Checklist (F-LI-C-010) and include with SCUR/COC paperwork.

				COMMENTS:
Chain of Custody Present:	☑Yes	☐No		1.
Chain of Custody Filled Out:	☑Yes	☐No		2.
Chain of Custody Relinquished:	☑Yes	☐No		3.
Sampler Name & Signature on COC:	☑Yes	☐No	☐N/A	4.
Samples Arrived within Hold Time:	☑Yes	☐No		5.
Short Hold Time Analysis (<72hr):	☐Yes	☑No		6.
Rush Turn Around Time Requested:	☐Yes	☑No		7.
Sufficient Volume: (Triple volume provided for MS/MSD	☑Yes	☐No		8.
Correct Containers Used:	☑Yes	☐No		9.
-Pace Containers Used:	☑Yes	☐No		
Containers Intact:	☑Yes	☐No		10.
Filtered volume received for Dissolved tests	☐Yes	☐No	☑N/A	11. Note if sediment is visible in the dissolved container.
Sample Labels match COC:	☑Yes	☐No		12.
-Includes date/time/ID/Analysis Matrix SL (WT) OIL				
All containers needing preservation have been checked	☑Yes	☐No	☐N/A	13. ☐ HNO_3 ☐ H_2SO_4 ☐ NaOH ☐ HCl
pH paper Lot # HC998032				
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO_3, H_2SO_4, HCl, NaOH>9 Sulfide, NAOH>12 Cyanide)	☑Yes	☐No	☐N/A	Sample #
Exceptions: (VOA), Coliform, TOC/DOC, Oil and Grease, DRO/8015 (water). Per Method, VOA pH is checked after analysis				Initial when completed: / Lot # of added preservative: / Date/Time preservative added
Samples checked for dechlorination:	☐Yes	☐No	☑N/A	14.
KI starch test strips Lot #				
Residual chlorine strips Lot #				Positive for Res. Chlorine? Y N
Headspace in VOA Vials (>6mm):	☐Yes	☑No	☐N/A	15.
Trip Blank Present:	☑Yes	☐No	☐N/A	16.
Trip Blank Custody Seals Present	☑Yes	☐No	☐N/A	
Pace Trip Blank Lot # (if applicable):				

Client Notification/ Resolution: Field Data Required? Y / N

Person Contacted: Date/Time:

Comments/ Resolution:

* PM (Project Manager) review is documented electronically in LIMS.

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

PROJECT NARRATIVE

Project: BABLYON FORMER MGP SITE 2/20
Pace Project No.: 70122514

Method: **EPA 8270D**
Description: 8270 MSSV
Client: AECOM-Chestnut Ridge
Date: February 28, 2020

General Information:
4 samples were analyzed for EPA 8270D. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 3510C with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Internal Standards:
All internal standards were within QC limits with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

PROJECT NARRATIVE

Project: BABLYON FORMER MGP SITE 2/20
Pace Project No.: 70122514

Method: **EPA 8260C/5030C**
Description: 8260C Volatile Organics
Client: AECOM-Chestnut Ridge
Date: February 28, 2020

General Information:
5 samples were analyzed for EPA 8260C/5030C. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Internal Standards:
All internal standards were within QC limits with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

PROJECT NARRATIVE

Project: BABLYON FORMER MGP SITE 2/20
Pace Project No.: 70122514

Method: **EPA 9014 Total Cyanide**
Description: 9014 Cyanide, Total
Client: AECOM-Chestnut Ridge
Date: February 28, 2020

General Information:
4 samples were analyzed for EPA 9014 Total Cyanide. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 9010C with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

QUALITY CONTROL DATA

Project: BABLYON FORMER MGP SITE 2/20
Pace Project No.: 70122514

QC Batch: 151297 Analysis Method: EPA 8260C/5030C
QC Batch Method: EPA 8260C/5030C Analysis Description: 8260 MSV
Associated Lab Samples: 70122514001, 70122514002, 70122514003, 70122514004, 70122514005

METHOD BLANK: 726298 Matrix: Water
Associated Lab Samples: 70122514001, 70122514002, 70122514003, 70122514004, 70122514005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Benzene	ug/L	<1.0	1.0	02/27/20 14:34	
Ethylbenzene	ug/L	<1.0	1.0	02/27/20 14:34	
m&p-Xylene	ug/L	<2.0	2.0	02/27/20 14:34	
o-Xylene	ug/L	<1.0	1.0	02/27/20 14:34	
Toluene	ug/L	<1.0	1.0	02/27/20 14:34	
Xylene (Total)	ug/L	<3.0	3.0	02/27/20 14:34	
1,2-Dichloroethane-d4 (S)	%	87	68-153	02/27/20 14:34	
4-Bromofluorobenzene (S)	%	92	79-124	02/27/20 14:34	
Toluene-d8 (S)	%	94	69-124	02/27/20 14:34	

LABORATORY CONTROL SAMPLE: 726299

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Benzene	ug/L	50	49.9	100	73-119	
Ethylbenzene	ug/L	50	48.6	97	70-113	
m&p-Xylene	ug/L	100	96.9	97	72-115	
o-Xylene	ug/L	50	48.2	96	73-117	
Toluene	ug/L	50	49.9	100	72-119	
Xylene (Total)	ug/L	150	145	97	71-109	
1,2-Dichloroethane-d4 (S)	%			84	68-153	
4-Bromofluorobenzene (S)	%			93	79-124	
Toluene-d8 (S)	%			96	69-124	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 726673 726674

Parameter	Units	70122514002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Qual
Benzene	ug/L	<1.0	50	50	48.2	43.3	96	87	73-119	11	
Ethylbenzene	ug/L	<1.0	50	50	47.9	44.2	96	88	70-113	8	
m&p-Xylene	ug/L	<2.0	100	100	94.5	86.2	95	86	72-115	9	
o-Xylene	ug/L	<1.0	50	50	46.9	43.5	94	87	73-117	7	
Toluene	ug/L	<1.0	50	50	47.9	44.9	96	90	72-119	7	
Xylene (Total)	ug/L	<3.0	150	150	141	130	94	87	71-109	9	
1,2-Dichloroethane-d4 (S)	%						82	79	68-153		
4-Bromofluorobenzene (S)	%						94	93	79-124		
Toluene-d8 (S)	%						96	96	69-124		

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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

QUALITY CONTROL DATA

Project: BABLYON FORMER MGP SITE 2/20
Pace Project No.: 70122514

QC Batch: 150495 Analysis Method: EPA 8270D
QC Batch Method: EPA 3510C Analysis Description: 8270 Water MSSV
Associated Lab Samples: 70122514001, 70122514002, 70122514003, 70122514004

METHOD BLANK: 722039 Matrix: Water
Associated Lab Samples: 70122514001, 70122514002, 70122514003, 70122514004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
2-Methylnaphthalene	ug/L	<5.0	5.0	02/21/20 20:04	
Acenaphthene	ug/L	<5.0	5.0	02/21/20 20:04	
Acenaphthylene	ug/L	<5.0	5.0	02/21/20 20:04	
Anthracene	ug/L	<5.0	5.0	02/21/20 20:04	
Benzo(a)anthracene	ug/L	<5.0	5.0	02/21/20 20:04	
Benzo(a)pyrene	ug/L	<5.0	5.0	02/21/20 20:04	
Benzo(b)fluoranthene	ug/L	<5.0	5.0	02/21/20 20:04	
Benzo(g,h,i)perylene	ug/L	<5.0	5.0	02/21/20 20:04	
Benzo(k)fluoranthene	ug/L	<5.0	5.0	02/21/20 20:04	
Chrysene	ug/L	<5.0	5.0	02/21/20 20:04	
Dibenz(a,h)anthracene	ug/L	<5.0	5.0	02/21/20 20:04	
Fluoranthene	ug/L	<5.0	5.0	02/21/20 20:04	
Fluorene	ug/L	<5.0	5.0	02/21/20 20:04	
Indeno(1,2,3-cd)pyrene	ug/L	<5.0	5.0	02/21/20 20:04	
Naphthalene	ug/L	<5.0	5.0	02/21/20 20:04	
Phenanthrene	ug/L	<5.0	5.0	02/21/20 20:04	
Pyrene	ug/L	<5.0	5.0	02/21/20 20:04	
1,2-Dichlorobenzene-d4 (S)	%	55	16-110	02/21/20 20:04	
2,4,6-Tribromophenol (S)	%	88	10-123	02/21/20 20:04	
2-Chlorophenol-d4 (S)	%	68	33-110	02/21/20 20:04	
2-Fluorobiphenyl (S)	%	75	43-116	02/21/20 20:04	
2-Fluorophenol (S)	%	44	21-110	02/21/20 20:04	
Nitrobenzene-d5 (S)	%	86	35-114	02/21/20 20:04	
p-Terphenyl-d14 (S)	%	86	33-141	02/21/20 20:04	
Phenol-d5 (S)	%	31	10-110	02/21/20 20:04	

LABORATORY CONTROL SAMPLE: 722040

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
2-Methylnaphthalene	ug/L	25	19.3	77	31-123	
Acenaphthene	ug/L	25	23.6	94	50-116	
Acenaphthylene	ug/L	25	22.8	91	50-109	
Anthracene	ug/L	25	24.1	97	54-117	
Benzo(a)anthracene	ug/L	25	26.1	104	31-128	
Benzo(a)pyrene	ug/L	25	27.9	112	30-146	
Benzo(b)fluoranthene	ug/L	25	28.6	114	43-147	
Benzo(g,h,i)perylene	ug/L	25	30.5	122	25-153	
Benzo(k)fluoranthene	ug/L	25	26.8	107	28-148	
Chrysene	ug/L	25	26.8	107	42-140	
Dibenz(a,h)anthracene	ug/L	25	28.9	115	22-147	

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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

QUALITY CONTROL DATA

Project: BABLYON FORMER MGP SITE 2/20
Pace Project No.: 70122514

LABORATORY CONTROL SAMPLE: 722040

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Fluoranthene	ug/L	25	25.3	101	50-123	
Fluorene	ug/L	25	24.9	100	51-118	
Indeno(1,2,3-cd)pyrene	ug/L	25	30.7	123	26-156	
Naphthalene	ug/L	25	19.3	77	39-107	
Phenanthrene	ug/L	25	24.5	98	52-126	
Pyrene	ug/L	25	27.6	110	41-137	
1,2-Dichlorobenzene-d4 (S)	%			58	16-110	
2,4,6-Tribromophenol (S)	%			104	10-123	
2-Chlorophenol-d4 (S)	%			72	33-110	
2-Fluorobiphenyl (S)	%			84	43-116	
2-Fluorophenol (S)	%			45	21-110	
Nitrobenzene-d5 (S)	%			90	35-114	
p-Terphenyl-d14 (S)	%			95	33-141	
Phenol-d5 (S)	%			33	10-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 722433 722434

Parameter	Units	70122514002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Qual
2-Methylnaphthalene	ug/L	<5.0	25	25	18.7	20.3	75	81	31-123	8	
Acenaphthene	ug/L	<5.0	25	25	19.5	22.0	78	88	50-116	12	
Acenaphthylene	ug/L	<5.0	25	25	18.8	21.2	75	85	50-109	12	
Anthracene	ug/L	<5.0	25	25	17.9	20.3	71	81	54-117	13	
Benzo(a)anthracene	ug/L	<5.0	25	25	19.3	21.8	77	87	31-128	12	
Benzo(a)pyrene	ug/L	<5.0	25	25	21.1	23.7	85	95	30-146	11	
Benzo(b)fluoranthene	ug/L	<5.0	25	25	20.6	22.9	83	92	43-147	10	
Benzo(g,h,i)perylene	ug/L	<5.0	25	25	25.2	27.9	101	111	25-153	10	
Benzo(k)fluoranthene	ug/L	<5.0	25	25	20.6	22.9	82	92	28-148	11	
Chrysene	ug/L	<5.0	25	25	20.0	22.3	80	89	42-140	11	
Dibenz(a,h)anthracene	ug/L	<5.0	25	25	22.8	26.1	91	104	22-147	14	
Fluoranthene	ug/L	<5.0	25	25	19.0	21.5	76	86	50-123	13	
Fluorene	ug/L	<5.0	25	25	19.6	22.2	78	89	51-118	13	
Indeno(1,2,3-cd)pyrene	ug/L	<5.0	25	25	24.4	27.2	98	109	26-156	11	
Naphthalene	ug/L	<5.0	25	25	19.4	20.1	77	80	39-107	4	
Phenanthrene	ug/L	<5.0	25	25	18.4	21.1	74	84	52-126	13	
Pyrene	ug/L	<5.0	25	25	20.4	23.1	81	92	41-137	12	
1,2-Dichlorobenzene-d4 (S)	%						56	69	16-110		
2,4,6-Tribromophenol (S)	%						86	87	10-123		
2-Chlorophenol-d4 (S)	%						60	59	33-110		
2-Fluorobiphenyl (S)	%						78	82	43-116		
2-Fluorophenol (S)	%						34	31	21-110		
Nitrobenzene-d5 (S)	%						85	85	35-114		
p-Terphenyl-d14 (S)	%						78	73	33-141		
Phenol-d5 (S)	%						16	21	10-110		

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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

QUALITY CONTROL DATA

Project: BABLYON FORMER MGP SITE 2/20
Pace Project No.: 70122514

QC Batch: 150683 Analysis Method: EPA 9014 Total Cyanide
QC Batch Method: EPA 9010C Analysis Description: 9014 Cyanide, Total
Associated Lab Samples: 70122514001, 70122514002, 70122514003, 70122514004

METHOD BLANK: 723195 Matrix: Water
Associated Lab Samples: 70122514001, 70122514002, 70122514003, 70122514004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Cyanide	ug/L	<10.0	10.0	02/24/20 14:15	

LABORATORY CONTROL SAMPLE: 723196

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cyanide	ug/L	75	68.5	91	85-115	

MATRIX SPIKE SAMPLE: 723197

Parameter	Units	70122514002 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Cyanide	ug/L	<10.0	100	121	120	75-125	

SAMPLE DUPLICATE: 723198

Parameter	Units	70122514002 Result	Dup Result	RPD	Qualifiers
Cyanide	ug/L	<10.0	<10.0		

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Appendix C Summary of Vadose Soil Zone Results

Table C-1
Summary of Soil Concentrations - MGP Constituents
Babylon Former MGP Site

Location ID Sample Date Depth Interval (ft.)	Restricted Residential Use Soil Cleanup Objectives	SB-01 9/12/2019 0-8	SB-02 9/12/2019 0-8	SB-02 9/12/2019 0-8	SB-03 9/11/2019 0-8	TP-01 9/13/2019 0-8	TP-02 9/13/2019 0-8	TP-03 9/13/2019 0-8
BTEX (ug/Kg)								
Benzene	60	< 1.1	< 14.4	< 15.7	< 1.0	< 1.1	**5.6**	< 1.0
Ethylbenzene	1000	< 0.89	**386**	**362**	< 0.85	< 0.87	**15.3**	< 0.84
Toluene	700	< 0.88	< 12.9	< 14.1	< 0.84	< 0.86	**2.7**	< 0.83
Xylenes (total)	1600	< 0.76	< 25.0	< 27.3	< 0.73	< 0.75	**11.2**	< 0.72
Total BTEX	NL	< 1.1	**386**	**362**	< 1.0	< 1.1	**34.8**	< 1.0
PAHs (ug/Kg)								
2-Methylnaphthalene	NL	< 19.2	**6360**	**3880**	< 19.4	< 19.9	< 20.4	< 19.8
Acenaphthene	98000	< 15.1	**1390**	**971**	< 15.2	< 15.6	< 15.9	< 15.5
Acenaphthylene	100000	**119**	< 31.0	< 15.6	**590**	< 15.7	**155**	< 15.6
Anthracene	100000	< 14.0	**2460**	**1360**	**261**	< 14.5	**85.4**	< 14.4
Benzo(a)anthracene	1000	**219**	**1580**	**999**	**365**	**93.2**	**357**	< 22.2
Benzo(a)pyrene	1000	**292**	**1080**	**640**	**950**	**76.4**	**308**	< 22.2
Benzo(b)fluoranthene	1000	**347**	**1050**	**541**	**868**	**79.3**	**634**	**79.60**
Benzo(ghi)perylene	100000	**230**	**424**	**263**	**642**	< 32.9	**389**	< 32.7
Benzo(k)fluoranthene	1700	**111**	**378**	**229**	**303**	< 22.5	**247**	< 22.3
Chrysene	1000	**338**	**1670**	**1160**	**417**	**108**	**514**	< 20.5
Dibenz(a,h)anthracene	330	< 30.9	< 63.3	< 31.8	**124**	< 32.0	**87.3**	< 31.8
Fluoranthene	100000	**298**	**2780**	**1710**	**535**	**148**	**601**	< 21.0
Fluorene	100000	< 13.5	**1490**	**1060**	< 13.7	< 14.0	< 14.3	< 13.9
Indeno(1,2,3-cd)pyrene	500	**210**	**418**	**241**	**549**	< 34.3	**361**	< 34.0
Naphthalene	12000	< 15.1	**1790**	**1120**	< 15.2	< 15.6	**221**	< 15.5
Phenanthrene	100000	**152**	**5480**	**3860**	**396**	**79.4**	**216**	< 14.5
Pyrene	100000	**489**	**3460**	**2390**	**605**	**257**	**813**	< 24.5
Total PAHs	NL	**2805**	**31810**	**20424**	**6605**	**841.3**	**4988.7**	**79.6**

Notes:
Exceedance of Restricted Residential Use Soil Cleanup Objectives

Table C-2
Summary of Soil Concentrations - Non-MGP Constituents
Babylon Former MGP Site

Location ID	Restricted Residential Use Soil Cleanup Objectives	SB-01	SB-02	SB-02	SB-03	TP-01	TP-02	TP-03
Sample Date		9/12/2019	9/12/2019	9/12/2019	9/11/2019	9/13/2019	9/13/2019	9/13/2019
Depth Interval (ft.)		0-8	0-8	0-8	0-8	0-8	0-8	0-8
Total Petroleum Hydrocarbons (mg/Kg)								
TPH	NL	**151**	**842**	**1280**	**147**	< 24.0	**262**	< 23.5
Volatile Organic Compounds (ug/Kg)								
1,1,1-Trichloroethane	680	< 1.3	< 9.8	< 10.7	< 1.3	< 1.3	< 1.1	< 1.3
1,1,2,2-Tetrachloroethane	NL	< 0.85	< 12.9	< 14.1	< 0.81	< 0.83	< 0.70	< 0.81
1,1,2-Trichloro-1,2,2-trifluoroethane	NL	< 1.5	< 51.3	< 56.0	< 1.5	< 1.5	< 1.3	< 1.4
1,1,2-Trichloroethane	NL	< 1.1	< 11.8	< 12.9	< 1.1	< 1.1	< 0.93	< 1.1
1,1-Dichloroethane	270	< 1.3	< 19.7	< 21.5	< 1.2	< 1.2	< 1.0	< 1.2
1,1-Dichloroethene	330	< 1.3	< 46.0	< 50.2	< 1.2	< 1.2	< 1.0	< 1.2
1,2,4-Trichlorobenzene	NL	< 1.1	< 29.8	< 32.5	< 1.1	< 1.1	< 0.92	< 1.1
1,2-Dibromo-3-chloropropane	NL	< 0.79	< 34.5	< 37.7	< 0.76	< 0.78	< 0.65	< 0.75
1,2-Dibromoethane	NL	< 0.75	< 17.9	< 19.6	< 0.72	< 0.73	< 0.62	< 0.71
1,2-Dichlorobenzene	1100	< 0.89	< 16.8	< 18.3	< 0.85	< 0.87	< 0.73	< 0.84
1,2-Dichloroethane	20	< 1.1	< 16.0	< 17.5	< 1.1	< 1.1	< 0.93	< 1.1
1,2-Dichloropropane	NL	< 0.96	< 14.6	< 15.9	< 0.92	< 0.94	< 0.79	< 0.91
1,3-Dichlorobenzene	2400	< 0.90	< 15.8	< 17.2	< 0.86	< 0.88	< 0.75	< 0.86
1,4-Dichlorobenzene	1800	< 0.99	< 18.2	< 19.9	< 0.95	< 0.97	< 0.82	< 0.94
2-Butanone	120	**4.9**	< 36.2	< 39.6	< 1.1	< 1.1	**8.3**	< 1.1
2-Hexanone	NL	< 0.85	< 19.1	< 20.9	< 0.81	< 0.83	< 0.70	< 0.81
4-Methyl-2-pentanone	NL	< 1.3	< 47.3	< 51.7	< 1.3	< 1.3	< 1.1	< 1.3
Acetone	50	**64.6**	< 57.4	< 62.7	**45.4**	**7.5**	**99.6**	**38.2**
Bromodichloromethane	NL	< 0.99	< 10.8	< 11.8	< 0.95	< 0.97	< 0.82	< 0.94
Bromoform	NL	< 1.2	< 25.9	< 28.3	< 1.2	< 1.2	< 1.0	< 1.2
Bromomethane	NL	< 0.94	< 65.2	< 71.3	< 0.90	< 0.92	< 0.78	< 0.90
Carbon disulfide	NL	< 1.1	< 42.4	< 46.3	< 1.1	< 1.1	< 0.92	< 1.1
Carbon tetrachloride	760	< 1.6	< 16.0	< 17.4	< 1.5	< 1.6	< 1.3	< 1.5
Chlorobenzene	1100	< 0.81	< 23.6	< 25.8	< 0.78	< 0.79	< 0.67	< 0.77
Chloroethane	NL	< 1.5	< 90.4	< 98.7	< 1.5	< 1.5	< 1.3	< 1.4
Chloroform	370	< 1.1	< 11.3	< 12.3	< 1.0	< 1.1	< 0.89	< 1.0
Chloromethane	NL	< 0.94	< 20.9	< 22.8	< 0.90	< 0.92	< 0.77	< 0.89
cis-1,2-Dichloroethene	250	< 1.1	< 14.3	< 15.6	< 1.1	< 1.1	< 0.94	< 1.1
cis-1,3-Dichloropropene	NL	< 0.75	< 18.7	< 20.4	< 0.72	< 0.73	< 0.62	< 0.71
Cyclohexane	NL	< 1.4	< 25.3	< 27.7	< 1.3	< 1.4	< 1.1	< 1.3
Dibromochloromethane	NL	< 0.72	< 23.5	< 25.6	< 0.69	< 0.71	< 0.60	< 0.69
Dichlorodifluoromethane	NL	< 0.88	< 36.9	< 40.3	< 0.84	< 0.86	< 0.73	< 0.83
Isopropylbenzene	NL	< 1.3	**846**	**748**	< 1.2	< 1.2	**7.8**	< 1.2
Methyl acetate	NL	< 0.91	< 37.3	< 40.7	< 0.87	< 0.89	< 0.75	< 0.86
Methyl tert-butyl ether	930	< 1.9	< 16.5	< 18.1	< 1.8	< 1.8	< 1.5	< 1.8
Methylcyclohexane	NL	< 0.89	< 45.3	< 49.5	< 0.85	< 0.87	**2.7**	< 0.85
Methylene chloride	50	**4.2**	< 15.3	< 16.7	**5.2**	< 1.7	**3.6**	**3.6**
Styrene	NL	< 1.0	< 24.4	< 26.6	< 0.99	< 1.0	< 0.86	< 0.98
Tetrachloroethene	1300	< 0.58	< 69.4	< 75.8	< 0.55	< 0.56	< 0.48	< 0.55
Total VOCs	NL	**73.7**	**846**	**748**	**50.6**	**7.5**	**141.5**	**41.8**
trans-1,2-Dichloroethene	190	< 1.4	< 27.4	< 30.0	< 1.4	< 1.4	< 1.2	< 1.3
trans-1,3-Dichloropropene	NL	< 0.70	< 13.2	< 14.5	< 0.67	< 0.69	< 0.58	< 0.66
Trichloroethene	470	< 0.80	< 18.8	< 20.5	< 0.77	< 0.78	< 0.66	< 0.76
Trichlorofluoromethane	NL	< 1.3	< 33.7	< 36.8	< 1.2	< 1.3	< 1.1	< 1.2
Vinyl chloride	20	< 0.95	< 25.2	< 27.5	< 0.91	< 0.93	< 0.78	< 0.90

Notes:

Exceedance of Restricted Residential Use Soil Cleanup Objectives

Table C-2 (Cont.)
Summary of Soil Concentrations - Non-MGP Constituents
Babylon Former MGP Site

Location ID	Restricted Residential Use Soil Cleanup Objectives	SB-01	SB-02	SB-02	SB-03	TP-01	TP-02	TP-03
Sample Date		9/12/2019	9/12/2019	9/12/2019	9/11/2019	9/13/2019	9/13/2019	9/13/2019
Depth Interval (ft.)		0-8	0-8	0-8	0-8	0-8	0-8	0-8
Semi-Volatile Organic Compounds (ug/Kg)								
1,1'-Biphenyl	NL	< 15.7	< 32.1	< 16.1	< 15.8	< 16.3	< 16.6	< 16.1
1,2,4-Trichlorobenzene	NL	< 20.7	< 42.4	< 21.3	< 20.9	< 21.4	< 21.9	< 21.3
2,2'-oxybis(1-Chloropropane)	NL	< 17.8	< 36.4	< 18.3	< 17.9	< 18.4	< 18.8	< 18.3
2,4,5-Trichlorophenol	NL	< 14.0	< 28.7	< 14.4	< 14.1	< 14.5	< 14.8	< 14.4
2,4,6-Trichlorophenol	NL	< 10.3	< 21.2	< 10.6	< 10.4	< 10.7	< 10.9	< 10.6
2,4-Dichlorophenol	NL	< 16.4	< 33.5	< 16.8	< 16.5	< 16.9	< 17.3	< 16.8
2,4-Dimethylphenol	NL	< 41.1	< 84.1	< 42.2	< 41.4	< 42.5	< 43.5	< 42.2
2,4-Dinitrophenol	NL	< 25.1	< 51.3	< 25.8	< 25.3	< 26.0	< 26.5	< 25.8
2,4-Dinitrotoluene	NL	< 25.1	< 51.3	< 25.8	< 25.3	< 26.0	< 26.5	< 25.8
2,6-Dinitrotoluene	NL	< 20.9	< 42.8	< 21.5	< 21.1	< 21.7	< 22.1	< 21.5
2-Chloronaphthalene	NL	< 15.3	< 31.3	< 15.7	< 15.4	< 15.8	< 16.2	< 15.7
2-Chlorophenol	NL	< 15.0	< 30.7	< 15.4	< 15.1	< 15.5	< 15.9	< 15.4
2-Methylphenol	330	< 37.5	< 76.8	< 38.6	< 37.8	< 38.9	< 39.7	< 38.6
2-Nitroaniline	NL	< 24.1	< 49.3	< 24.8	< 24.3	< 24.9	< 25.5	< 24.8
2-Nitrophenol	NL	< 28.4	< 58.1	< 29.2	< 28.6	< 29.4	< 30.0	< 29.1
3,3'-Dichlorobenzidine	NL	< 25.8	< 52.9	< 26.6	< 26.1	< 26.8	< 27.3	< 26.6
3-and 4-Methylphenol	NL	< 22.7	< 46.5	< 23.4	< 22.9	< 23.5	< 24.0	< 23.3
3-Nitroaniline	NL	< 30.0	< 61.4	< 30.9	< 30.3	< 31.1	< 31.8	< 30.8
4,6-Dinitro-2-methylphenol	NL	< 335	< 685	< 344	< 338	< 347	< 354	< 344
4-Bromophenyl phenyl ether	NL	< 17.2	< 35.1	< 17.7	< 17.3	< 17.8	< 18.2	< 17.6
4-Chloro-3-methylphenol	NL	< 26.2	< 53.6	< 26.9	< 26.4	< 27.1	< 27.7	< 26.9
4-Chloroaniline	NL	< 23.3	< 47.8	< 24.0	< 23.5	< 24.2	< 24.7	< 24.0
4-Chlorophenyl phenyl ether	NL	< 15.3	< 31.3	< 15.7	< 15.4	< 15.8	< 16.2	< 15.7
4-Nitroaniline	NL	< 20.9	< 42.7	< 21.5	< 21.0	< 21.6	< 22.1	< 21.4
4-Nitrophenol	NL	< 292	< 598	< 301	< 295	< 303	< 309	< 300
Acetophenone	NL	< 22.4	< 45.8	< 23.0	< 22.6	< 23.2	**174**	< 23.0
Atrazine	NL	< 27.3	< 55.8	< 28.0	< 27.5	< 28.2	< 28.9	< 28.0
Benzaldehyde	NL	< 47.5	< 97.3	< 48.9	**73.7**	< 49.2	**462**	< 48.8
bis(2-Chloroethoxy)methane	NL	< 15.9	< 32.6	**186**	< 16.0	< 16.5	< 16.8	< 16.3
bis(2-Chloroethyl) ether	NL	< 20.1	< 41.2	< 20.7	< 20.3	< 20.9	< 21.3	< 20.7
bis(2-Ethylhexyl) phthalate	NL	< 50.3	< 103	< 51.7	**128**	**75.7**	< 53.2	< 51.7
Butyl benzyl phthalate	NL	< 22.6	< 46.3	< 23.3	< 22.8	< 23.4	< 23.9	< 23.3
Caprolactam	NL	< 25.3	< 51.8	< 26.0	< 25.5	< 26.2	< 26.8	< 26.0
Carbazole	NL	< 14.2	< 29.1	< 14.6	**70.4**	< 14.7	< 15.0	< 14.6
Dibenzofuran	59000	< 14.6	< 29.9	< 15.0	< 14.7	< 15.1	< 15.4	< 15.0
Diethyl phthalate	NL	< 18.2	< 37.3	< 18.7	< 18.4	< 18.9	< 19.3	< 18.7
Dimethyl phthalate	NL	< 18.2	< 37.3	< 18.7	< 18.4	< 18.9	< 19.3	< 18.7
Di-n-butyl phthalate	NL	< 30.4	< 62.3	< 31.3	< 30.7	< 31.5	< 32.2	< 31.3
Di-n-octyl phthalate	NL	< 32.3	< 66.2	< 33.2	< 32.6	< 33.5	< 34.2	< 33.2
Hexachlorobenzene	1200	< 17.0	< 34.8	< 17.5	< 17.2	< 17.6	< 18.0	< 17.5
Hexachlorobutadiene	NL	< 18.7	< 38.2	< 19.2	< 18.8	< 19.3	< 19.7	< 19.2
Hexachlorocyclopentadiene	NL	< 126	< 258	< 129	< 127	< 130	< 133	< 129
Hexachloroethane	NL	< 18.5	< 37.9	< 19.0	< 18.7	< 19.2	< 19.6	< 19.0
Isophorone	NL	< 25.4	< 52.1	< 26.2	< 25.7	< 26.4	< 26.9	< 26.2
Nitrobenzene	NL	< 28.7	< 58.9	< 29.6	< 29.0	< 29.8	< 30.4	< 29.5
N-Nitrosodi-n-propylamine	NL	< 22.8	< 46.6	< 23.4	< 23.0	< 23.6	< 24.1	< 23.4
N-Nitrosodiphenylamine	NL	< 13.5	< 27.7	< 13.9	< 13.7	< 14.0	< 14.3	< 13.9
Pentachlorophenol	800	< 296	< 606	< 305	< 299	< 307	< 313	< 304
Phenol	330	< 39.9	< 81.6	< 41.0	< 40.2	< 41.3	< 42.2	< 41.0
Total SVOCs	NL	**2805**	**31810**	**20610**	**6877.1**	**917**	**5624.7**	**79.6**
PCBs (ug/Kg)								
Aroclor 1016	NL	< 24.6	< 25.1	< 24.9	< 24.7	< 25.3	< 25.5	< 24.9
Aroclor 1221	NL	< 49.9	< 51.0	< 50.5	< 50.2	< 51.3	< 51.9	< 50.5
Aroclor 1232	NL	< 23.4	< 23.9	< 23.7	< 23.5	< 24.1	< 24.3	< 23.7
Aroclor 1242	NL	< 15.2	< 15.5	< 15.4	< 15.3	< 15.6	< 15.8	< 15.4
Aroclor 1248	NL	< 10.1	< 10.4	< 10.3	< 10.2	< 10.4	< 10.5	< 10.3
Aroclor 1254	NL	< 14.9	< 15.3	< 15.1	< 15.0	< 15.4	< 15.5	< 15.1
Aroclor 1260	NL	< 6.3	< 6.4	< 6.4	< 6.3	< 6.5	< 6.5	< 6.3
PCB (Total) (ppm)	1000	< 6.3	< 6.4	< 6.4	< 6.3	< 6.5	< 6.5	< 6.3

Notes:
Exceedance of Restricted Residential Use Soil Cleanup Objectives

Table C-2 (Cont.)
Summary of Soil Concentrations - Non-MGP Constituents
Babylon Former MGP Site

Location ID	Restricted Residential Use Soil Cleanup Objectives	SB-01	SB-02	SB-02	SB-03	TP-01	TP-02	TP-03
Sample Date		9/12/2019	9/12/2019	9/12/2019	9/11/2019	9/13/2019	9/13/2019	9/13/2019
Depth Interval (ft.)		0-8	0-8	0-8	0-8	0-8	0-8	0-8
Metals (mg/Kg)								
Aluminum	NL	**2380**	**4260**	**3550**	**2560**	**5960**	**5340**	**3780**
Antimony	NL	< 0.44	< 0.49	< 0.44	< 0.46	< 0.45	< 0.47	< 0.49
Arsenic	16	**3.2**	**1.9**	**2.1**	**1.4**	**1.8**	**2.2**	**1.7**
Barium	400	**12.3**	**17.9**	**18.2**	**10.4**	**12.7**	**16.7**	**11.0**
Beryllium	47	< 0.0069	< 0.0077	< 0.0070	< 0.0072	< 0.0072	< 0.0074	< 0.0078
Cadmium	4.3	< 0.013	< 0.015	< 0.013	**0.45**	< 0.014	< 0.014	< 0.015
Calcium	NL	**4650**	**9920**	**10600**	**2060**	**1250**	**2620**	**1010**
Chromium	NL	**4.8**	**5.7**	**6.2**	**5.3**	**7.2**	**6.4**	**4.5**
Cobalt	NL	< 0.11	< 0.12	< 0.11	< 0.12	**3.2**	**3.4**	< 0.13
Copper	270	**16.2**	**7.4**	**8.3**	**30.8**	**5.8**	**12.3**	**6.9**
Iron	NL	**11300**	**6260**	**5720**	**4610**	**7390**	**8180**	**6130**
Lead	400	**21.8**	**13.4**	**16.2**	**6.7**	**6.0**	**22.7**	**11.2**
Magnesium	NL	**2740**	**5750**	**5930**	**750**	**1400**	**1670**	**841**
Manganese	2000	**75.1**	**51.9**	**53.4**	**40.9**	**56.1**	**57.6**	**44.1**
Mercury	0.73	**0.33**	**0.23**	**0.40**	< 0.025	< 0.024	**1.1**	< 0.024
Nickel	130	**3.8**	**4.3**	**4.9**	**3.2**	**5.4**	**5.0**	**3.4**
Potassium	NL	**299**	**396**	**351**	**271**	**387**	**364**	**276**
Selenium	4	< 0.23	< 0.26	< 0.23	< 0.24	< 0.24	< 0.24	< 0.26
Silver	8.3	< 0.032	< 0.035	< 0.032	< 0.033	< 0.033	< 0.034	< 0.036
Sodium	NL	< 20.3	< 22.6	< 20.4	< 21.1	< 21.0	< 21.6	< 22.9
Thallium	NL	< 0.23	< 0.26	< 0.23	< 0.24	< 0.24	< 0.25	< 0.26
Vanadium	NL	**9.1**	**9.4**	**9.5**	**6.3**	**13.8**	**16.8**	**7.8**
Zinc	2480	**79.4**	**20.0**	**25.1**	**27.7**	**11.5**	**19.5**	**13.5**
Cyanide (mg/Kg)								
Total Cyanide	27	< 0.0073	< 0.0074	< 0.0075	< 0.0072	< 0.0073	< 0.0078	< 0.0074
Monitored Natural Aattenuation Parameters								
BTU	NL	**91.0**	**180**	**132**	**140**	**109**	**285**	**237**
Cyanide (Reactivity)	NL	< 104	< 106	< 105	< 105	< 108	< 109	< 106
Ignitability	NL	< 0	< 0	< 0	< 0	< 0	< 0	< 0
pH	NL	**8.1**	**7.8**	**8.2**	**8.2**	**5.4**	**6.8**	**7.0**
Sulfide (Reactivity)	NL	< 99.5	< 99.7	< 99.2	< 100	< 99.7	< 99.5	< 99.7
Temperature	NL	**22.8**	**22.8**	**22.8**	**22.8**	**23.1**	**23.1**	**23.1**

Notes:
Exceedance of Restricted Residential Use Soil Cleanup Objectives

Table C-3
Summary of Soil Leachate Concentrations
Babylon Former MGP Site

Location ID Sample Date Depth Interval (ft.)	Restricted Residential Use Soil Cleanup Objectives	SB-01 9/12/2019 0-8	SB-02 9/12/2019 0-8	SB-02 9/12/2019 0-8	SB-03 9/11/2019 0-8	TP-01 9/13/2019 0-8	TP-02 9/13/2019 0-8	TP-03 9/13/2019 0-8
Volatile Organic Compounds -TCLP (mg/L)								
1,2-Dichloroethane	NL	< 0.00094	< 0.00094	< 0.00094	< 0.00094	< 0.00094	< 0.00094	< 0.00094
Chlorobenzene	NL	< 0.00092	< 0.00092	< 0.00092	< 0.00092	< 0.00092	< 0.00092	< 0.00092
Tetrachloroethene	NL	< 0.0014	< 0.0014	< 0.0014	< 0.0014	< 0.0014	< 0.0014	< 0.0014
Carbon tetrachloride	NL	< 0.00098	< 0.00098	< 0.00098	< 0.00098	< 0.00098	< 0.00098	< 0.00098
Chloroform	NL	< 0.00098	< 0.00098	< 0.00098	< 0.00098	< 0.00098	< 0.00098	< 0.00098
Benzene	NL	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0011
Vinyl chloride	NL	< 0.0017	< 0.0017	< 0.0017	< 0.0017	< 0.0017	< 0.0017	< 0.0017
1,1-Dichloroethene	NL	< 0.00095	< 0.00095	< 0.00095	< 0.00095	< 0.00095	< 0.00095	< 0.00095
2-Butanone	NL	< 0.00065	< 0.00065	< 0.00065	< 0.00065	< 0.00065	< 0.00065	< 0.00065
Trichloroethene	NL	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0011
Total VOCs	NL	< 0.0017	< 0.0017	< 0.0017	< 0.0017	< 0.0017	< 0.0017	< 0.0017
Semi-Volatile Organic Compounds - TCLP (mg/L)								
1,4-Dichlorobenzene	NL	< 0.00026	< 0.00026	< 0.00026	< 0.00026	< 0.00026	< 0.00026	< 0.00026
2,4,5-Trichlorophenol	NL	< 0.00027	< 0.00027	< 0.00027	< 0.00027	< 0.00027	< 0.00027	< 0.00027
2,4,6-Trichlorophenol	NL	< 0.00025	< 0.00025	< 0.00025	< 0.00025	< 0.00025	< 0.00025	< 0.00025
2,4-Dinitrotoluene	NL	< 0.00036	< 0.00036	< 0.00036	< 0.00036	< 0.00036	< 0.00036	< 0.00036
2-Methylphenol	NL	< 0.00046	< 0.00046	< 0.00046	< 0.00046	< 0.00046	< 0.00046	< 0.00046
3-and 4-Methylphenol	NL	< 0.00032	< 0.00032	< 0.00032	< 0.00032	< 0.00032	< 0.00032	< 0.00032
Hexachlorobenzene	NL	< 0.00039	< 0.00039	< 0.00039	< 0.00039	< 0.00039	< 0.00039	< 0.00039
Hexachlorobutadiene	NL	< 0.00039	< 0.00039	< 0.00039	< 0.00039	< 0.00039	< 0.00039	< 0.00039
Hexachloroethane	NL	< 0.00023	< 0.00023	< 0.00023	< 0.00023	< 0.00023	< 0.00023	< 0.00023
Nitrobenzene	NL	< 0.00027	< 0.00027	< 0.00027	< 0.00027	< 0.00027	< 0.00027	< 0.00027
Pentachlorophenol	NL	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0040
Pyridine	NL	< 0.00024	< 0.00024	< 0.00024	< 0.00024	< 0.00024	< 0.00024	< 0.00024
Total SVOCs	NL	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0040	< 0.0040

Notes: NL - Soil Cleanup Objective Not Listed

Table C-3 (Cont.)
Summary of Soil Leachate Concentrations
Babylon Former MGP Site

Location ID Sample Date Depth Interval (ft.)	Restricted Residential Use Soil Cleanup Objectives	SB-01 9/12/2019 0-8	SB-02 9/12/2019 0-8	SB-02 9/12/2019 0-8	SB-03 9/11/2019 0-8	TP-01 9/13/2019 0-8	TP-02 9/13/2019 0-8	TP-03 9/13/2019 0-8
Metals-TCLP (mg/L)								
Silver	NL	< 0.011	< 0.011	< 0.043	< 0.011	< 0.043	< 0.043	< 0.043
Selenium	NL	< 0.037	< 0.037	< 0.022	< 0.037	< 0.022	< 0.022	< 0.022
Mercury	NL	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010
Lead	NL	< 0.022	< 0.022	< 0.013	< 0.022	< 0.013	**0.056**	< 0.013
Chromium	NL	< 0.0076	< 0.0076	< 0.021	< 0.0076	< 0.021	< 0.021	< 0.021
Cadmium	NL	< 0.0042	< 0.0042	< 0.0017	**0.017**	< 0.0017	< 0.0017	< 0.0017
Barium	NL	< 0.0040	< 0.0040	< 0.072	< 0.0040	< 0.072	< 0.072	< 0.072
Arsenic	NL	< 0.041	< 0.041	< 0.028	< 0.041	< 0.028	< 0.028	< 0.028
Herbicides-TCLP (mg/L)								
2,4,5-TP (Silvex)	NL	< 0.0000030	< 0.0000030	< 0.0000030	< 0.0000030	< 0.0000030	< 0.0000030	< 0.0000030
2,4-D	NL	< 0.0000050	< 0.0000050	< 0.0000050	< 0.0000050	< 0.0000050	< 0.0000050	< 0.0000050
Chlordane	NL	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0011
Endrin	NL	< 0.000015	< 0.000015	< 0.000015	< 0.000015	< 0.000015	< 0.000015	< 0.000015
Gamma BHC - Lindane	NL	< 0.000012	< 0.000012	< 0.000012	< 0.000012	< 0.000012	< 0.000012	< 0.000012
Heptachlor	NL	< 0.000016	< 0.000016	< 0.000016	< 0.000016	< 0.000016	< 0.000016	< 0.000016
Heptachlor Epoxide	NL	< 0.000017	< 0.000017	< 0.000017	< 0.000017	< 0.000017	< 0.000017	< 0.000017
Methoxychlor	NL	< 0.000026	< 0.000026	< 0.000026	< 0.000026	< 0.000026	< 0.000026	< 0.000026
Toxaphene	NL	< 0.00046	< 0.00046	< 0.00046	< 0.00046	< 0.00046	< 0.00046	< 0.00046

Notes: NL - Soil Cleanup Objective Not Listed

Appendix D Solidification Treatability Test Report

BABYLON FORMER MGP SITE
TREATABILITY STUDY FINAL REPORT

KEMRON Project Number: SH0727

February 10, 2020

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Acronyms

ASTM	American Society of Testing and Materials
˚C	Degrees Celsius
˚F	Degrees Fahrenheit
cm/sec	Centimeters per second
g	Grams
DI	De-ionized
EPA	U.S. Environmental Protection Agency
KEMRON	KEMRON Environmental Services
psi	Pounds per square inch
UCS	Unconfined Compressive Strength
pcf	Pounds per cubic foot
tsf	Tons per square foot
mg/L	Milligrams per Liter
mg/Kg	Milligrams per Kilogram
%	Percent

1.0 INTRODUCTION

KEMRON Environmental Services, Inc. (KEMRON) is pleased to present AECOM with this final report of the Solidification/Stabilization Bench-Scale Treatability Study (Study) performed on material sampled from the Babylon Former MGP site. This report summarizes the results of testing performed and presents the protocols used in testing of the site materials. All testing performed during the study was conducted in accordance with KEMRON's cost proposal 18-ATG-4035 and subsequent conversations with AECOM.

The bench-scale testing was performed in a phased approach and included as-received material characterization, untreated composite characterization, preliminary stabilization evaluations and optimization stabilization evaluations. Throughout the study, KEMRON and AECOM were in frequent communication, and the progression of the study was relatively fluid.

The primary objective of the bench-scale study was to evaluate the effectiveness of different reagent admixtures at improving the physical properties of the site materials. The physical properties included UCS and Hydraulic Conductivity.

2.0 MATERIAL RECIEPT, HOMOGENIZATION, AND CHARACTERIZATION

On September 24, 2019, KEMRON received three 5-gallon buckets of material from the site. The buckets were labeled "SB-1 (8-35)," "SB-2 (8-35)" and "SB-3 (8-25)." Immediately following the receipt of the site materials, KEMRON logged the materials into a sample-tracking database and placed them in a 4-degree-Celsius (°C) walk-in cooler for storage. A copy of the sample chain of custody is provided in **Appendix A**.

KEMRON was instructed to perform physical characterization testing, in duplicate, on the as-received site materials. KEMRON performed the following testing on each of the as-received site materials:

PARAMETER	**METHOD**
Particle Size with hydrometer	ASTM D422
Atterberg Limits	ASTM D2487
Solid Specific Gravity	ASTM D854
Moisture Content	ASTM D2216
Loss on Ignition	ASTM D2974
Bulk Density (unit weight)	ASTM D7263

The results of the as-received physical characterization testing are summarized in **Table 1** and the data sheets are provided in **Appendix B**.

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BABYLON FORMER MGP ISS
KEMRON PROJECT No. SH0727

TABLE 1

As-Received Physical Characterization

Testing Parameter	Test Method	Unit	Untreated Material					
			SB-1 (8-35)	SB-1 (8-35)-DUP	SB-2 (8-35)	SB-2 (8-35)-DUP	SB-3 (8-25)	SB-3 (8-25)-DUP
Particle Size Distribution	ASTM D422							
Gravel (<1/2")		%	5.5	11.3	22.5	17.6	18.6	15.6
Sand		%	85.8	80.3	67.8	74.6	76.6	79.5
Silt		%	5.9	5.7	6.2	5.6	3.8	3.9
Clay		%	2.8	2.7	3.5	2.2	1.0	1.0
Sample Description [1]	ASTM D2487		Yellowish brown poorly graded sand with silt	Yellowish brown poorly graded sand with silt	Yellowish brown well-graded sand with silt and gravel	Yellowish brown poorly graded sand with silt and gravel	Yellowish brown poorly graded sand with gravel	Yellowish brown poorly graded sand with gravel
Sample Classification [2]	ASTM D2487		SP-SM	SP-SM	SW-SM	SP-SM	SP	SP
Atterburg Limits	ASTM D4317							
LL			NV	NV	NV	NV	NV	NV
PL			NP	NP	NP	NP	NP	NP
PI			NP	NP	NP	NP	NP	NP
Solid Specific Gravity	ASTM D854		2.70	2.69	2.67	2.69	2.69	2.67
Moisture Content	ASTM D2216							
Average ASTM Moisture Content		%	9.86	10.56	8.79	10.07	6.28	6.00
Average Percent Solids		%	91.02	90.45	91.93	90.86	94.09	94.34
Loss on Ignition	ASTM D2974							
ASTM Moisture Content		%	10.59	8.85	10.16	9.77	5.73	6.02
Average Loss on Ignition @ 440°C		%	0.69	0.51	0.38	0.45	0.39	0.39
Unit Weight	ASTM D7263							
Average Bulk Unit Weight		pcf	117.1	119.0	132.7	131.9	123.8	123.9

Notes:
(1)Sample color determined by the Munsell Soil Color Charts.
(2) Sample classification based on the Unified Classification System.
%= Percent
pcf = pounds per cubic foot
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index

The results presented in Table 1 indicate that the SB-1 (8-35) material is classified as a poorly graded sand with silt in the test sample and the duplicate. The SB-2 (8-35) material is classified as a poorly graded sand with gravel in the test sample and duplicate, and the SB-3 (8-25) material is classified as a well-graded sand with silt and gravel in the test sample and a poorly graded sand with silt and gravel in the duplicate sample. Atterberg testing performed on the as-received site materials indicate that all of the materials were non-plastic. The as-received site materials exhibited specific gravity values ranging from 2.67 to 2.70, and moisture content values ranging from 6.00 to 10.56%. The as-received site materials showed loss on ignition values ranging from 0.38 to 0.69%, and bulk densities ranging from 117.1 to 132.7 pounds per cubic foot (pcf).

Following the physical characterization of the as-received site materials, KEMRON was instructed to prepare a composite of the site materials to produce one untreated site material for the solidification treatability study. KEMRON labeled the composite material as “SB-Comp.” KEMRON homogenized the site materials by placing the contents from all shipping containers into a pre-cleaned plastic mixing pan and gently blending by hand using a stainless steel spoon until visually homogenous. During homogenization, any solid particles measuring greater than 0.5 inches in diameter were removed in order to facilitate bench-scale treatment and adhere to particle-size limits outlined in certain ASTM and EPA test methods. Approximately 2,784.5 g of particles greater than 0.5 inches in diameter were removed from the composite material. The total weight of the composite material was approximately 85 pounds.

To characterize the physical properties of the untreated composite material, KEMRON performed the following testing on aliquots of the untreated SB-Comp material in duplicate:

PARAMETER	**METHOD**
Particle Size with hydrometer	ASTM D422
Moisture Content	ASTM D2216
Bulk Density (unit weight)	ASTM D7263

A summary of the results of the physical characterization testing performed on the SB-Comp material is presented in **Table 2** and the data sheets are provided in **Appendix C**.

Review of the results presented in **Table 2** indicates that the SB-Comp material is classified as a poorly graded sand with silt and gravel in the test sample and a poorly graded sand with silt in the duplicate sample. The results also indicated that the SB-Comp material exhibited a moisture content of ranging from 12.02 to 12.38%, a bulk density ranging from 127.0 to 128.1 pcf and a dry density ranging from 113.0 to 114.4 pcf. Note that the sample descriptions differed between test and duplicate samples. However, the sample soil classifications were identical and the grain size distributions were very similar. Testing is performed on relatively small quantity grab samples and slight soil heterogeneity is often encountered.

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TABLE 2

Untreated Physical Composite Physical Characterization

TESTING	TEST	UNIT	SAMPLE	
			SB-Comp	SB-Comp-DUP-2
Particle Size Distribution	ASTM D422			
Gravel		%	15.20	12.40
Sand		%	77.30	79.40
Silt		%	7.30	8.00
Clay		%	0.20	0.20
Sample Description (1)	ASTM D2487		Brown poorly graded sand with silt and gravel	Brown poorly graded sand with silt
Sample Classification (2)	ASTM D2487		SP-SM	SP-SM
Moisture Content	ASTM D2216			
ASTM Moisture Content		%	12.02	12.38
Percent Solids		%	89.27	88.98
Unit Weight	ASTM D7263			
Average Bulk Density		pcf	128.1	127.0
Average Dry Density		pcf	114.4	113.0

Notes
% = Percent
Sample descriptions based on the Unified Classification System.
Sample color determined by the Munsell Soil Color Charts.
pcf = pounds per cubic foot

3.0 PRELIMINARY STABILIZATION EVALUATIONS

Initially, AECOM provided KEMRON with six separate mixture designs for the SB-Comp material. These mixtures included varying addition rates of Type I Portland cement added and a 60:40 mixture of Type I Portland Cement and Ground Granulated Blast Furnace Slag (GGBFS). The mixtures were evaluated for strength gain as determined by Unconfined Compressive Strength (UCS) testing, and hydraulic conductivity reduction. The mixture designs prepared during this screening phase of the study are presented in **Table 3**. Note that this table presents the specific mixture identification number assigned to each mixture, the type of untreated material treated in the specific mixture, the reagent or reagent combination utilized as well as the corresponding addition rates, and the amount of water added to the reagent combination prior to blending with the untreated soil. Also, note that the reagents or reagent blends were added to the untreated material as a pumpable slurry using potable tap water.

The reagent additions were calculated on a by-weight basis according to the quantity of untreated material utilized. The water used in each mixture was based on the total weight of the reagent or reagents utilized in the mixture. For example in a mixture with 5.0% Portland cement and with a 100% water addition, for every 100 grams (g) of untreated material, 5.0 g of Portland cement and 5.0 g of potable laboratory water was used. This quantity of reagent slurry was prepared for every 100 g of untreated material and blended until visually homogenous. Mixture development sheets for the stabilization mixtures are provided in **Appendix D**.

All mixtures were prepared using a Hobart-type kitchen mixer with a paddle-type mixing arm. Mixtures were developed by preparing the appropriate reagents. An aliquot of the appropriate untreated material was placed into the mixing chamber. The reagent slurry was then added to the untreated material while mixing. Each mixture was blended for a period of approximately 60 to 90 seconds at a rate of approximately 60 revolutions per minute (rpm). Treatment utilizing this mixer is intended to simulate potential full-scale remediation options, to the extent possible on the bench-scale. This approach is routinely utilized to simulate a wide range of potential full-scale remediation approaches, including both in-situ and ex-situ applications.

The following is a summary of treated material curing techniques, testing performed on the treated samples, and brief descriptions of the protocols utilized for the preliminary stabilization evaluations:

The six mixtures were poured into cylindrical curing molds. Each sample mold was firmly tapped on a hard surface to remove air voids, and allowed to cure at ambient temperature (68 ˚F to 72 ˚F) in moisture-sealed containers.

Pocket penetrometer testing was performed by KEMRON on the mixtures at cure times including 3, 5 and 7 days to evaluate the potential setting properties of each mixture. Approximately 100 grams of each treated material was placed into a small plastic cup then cured and tested at the above intervals to evaluate the potential setting characteristics. Results of the pocket penetrometer testing are noted individually on each of the mixture design sheets provided in **Appendix E**, and are summarized on **Table 3** below.

After 7 days of curing, KEMRON tested the unconfined compressive strength (UCS) of each of the six mixtures. UCS testing was performed in accordance with ASTM Method D1633 by first removing each cured sample specimen from its cylindrical mold. The weight and physical dimensions of the sample were recorded on the appropriate data sheet, and the specimen was

placed on a UCS load frame and compressed at a rate of 1% strain per minute until the sample failed or 15% strain had been achieved. Throughout the testing, KEMRON documented the load at specific strain values. A representative aliquot of the post-test specimen was then subjected to moisture content testing. UCS test results are presented on **Table 3**, and the data sheets are provided in **Appendix E**.

Review of the results presented in **Table 3** indicate that all of the mixtures exceeded the maximum penetrometer instrument limit of 4.5 tsf after 7 days of curing during the pocket penetrometer testing. The results also indicate that the treated materials exhibited UCS strengths ranging from 61.1 pounds per square inch (psi) to 281.9 psi after 7 days of curing.

AECOM
BABYLON FORMER MGP ISS
KEMRON PROJECT No. SH0727

TABLE 3

Preliminary Stabilization Evaluations
Mixture Designs, Pocket Penotrometer and Unconfined Compressive Strength

KEMRON Sample Number	Untreated Material Type	Reagent Type	Reagent Addition % by Wet Soil wt.	Water Addition % by Reagent wt.	Pocket Penotrometer (TSF)			Cure Day	Unconfined Compressive Strength ASTM D2166			
					3 Day	5 Day	7 Day		Moisture Content (%)	Bulk Density (lb/ft^3)	Dry Density (lb/ft^3)	UCS (lb/in^2)
0727-001	SB-Comp	Type I Portland Cement	5.0	100.0	>4.5	>4.5	>4.5	7	10.48	136.4	123.5	98.4
0727-002	SB-Comp	Type I Portland Cement	8.0	100.0	>4.5	>4.5	>4.5	7	15.45	130.3	112.9	157.6
0727-003	SB-Comp	Type I Portland Cement	11.0	100.0	>4.5	>4.5	>4.5	7	17.72	132.6	112.6	281.9
0727-004	SB-Comp	Type I PC/GGBFS 60:40	5.0	100.0	>4.5	>4.5	>4.5	7	11.22	133.0	119.5	61.1
0727-005	SB-Comp	Type I PC/GGBFS 60:40	8.0	100.0	>4.5	>4.5	>4.5	7	14.23	130.4	114.1	167.5
0727-006	SB-Comp	Type I PC/GGBFS 60:40	11.0	100.0	>4.5	>4.5	>4.5	7	16.19	130.8	112.5	221.2

Notes:
% = Percent
Wt= Weight
lb/ft^3 = pounds per cubic foot
lb/in^2 = pounds per square inch

4.0 OPTIMIZATION STABILIZATION EVALUATIONS

Based on the results of the preliminary testing, AECOM instructed KEMRON prepare four mixtures replicating the 5% Type I Portland cement mixture, and the 5, 8, and 11% addition rates of the 60:40 blend of Type I Portland cement and GGBFS previously evaluated in the preliminary phase of mixture evaluations. The repeat mixtures were prepared following the previously mentioned protocol. The mixture designs are presented in **Table 4** and the mixture development sheets are provided in **Appendix F**.

The following is a summary of treated material curing techniques, testing performed on the treated samples, and brief descriptions of the protocols utilized for the preliminary stabilization evaluations:

The four mixtures were poured into cylindrical curing molds. Each sample mold was firmly tapped on a hard surface to remove air voids, and allowed to cure at ambient temperature (68 ˚F to 72 ˚F) in moisture-sealed containers.

After 7 and 28 days of curing, KEMRON tested the unconfined compressive strength (UCS) of each of the four mixtures following previously mentioned protocols. UCS testing results are presented on **Table 4**, and the data sheets are provided in **Appendix G**.

Hydraulic Conductivity testing was also conducted on each of the four mixtures after 28 days of curing in accordance with ASTM D5084. The mixtures were removed from the curing molds, and the weights and physical dimensions of the samples were recorded on the appropriate data sheets. The permeameter was assembled, and the samples were saturated to a minimum value of 95%, and then consolidated using a standard 10-psi confining pressure. Water was then passed through the samples, and the Hydraulic Conductivity was determined. Hydraulic Conductivity test results are presented on **Table 4** below, and the data sheets are provided in **Appendix G**.

Review of the results presented in **Table 4** indicate that all of the confirmation mixtures exceeded the penetrometer limit of 4.5 psi at the 3-day curing interval. Following 7 days of curing, the mixtures exhibited strength values ranging from 57.1 to 187.1 psi. At a curing interval of 28-days all of the treated materials showed a significant increase in strength compared to the 7-day testing results. KEMRON's experience has shown that the use of GGBFS will often continue to provide additional strength gains with extended curing times. Specifically 28-day UCS results show strength values ranging from 132.1 to 490.4 psi. In addition to UCS testing, each treated sample was subjected to hydraulic conductivity testing at the 28-day cure time. The results indicate that the mixtures prepared with the 5% addition of Type I Portland cement alone, and the 5% addition of the Portland and GGBFS blended at a 60:40 ratio exhibited hydraulic conductivity values in the 10^{-7} centimeters per second (cm/sec) range. The mixtures prepared using the 8 and 11% addition rates of the 60:40 Portland and GGBFS blend exhibited hydraulic conductivity values in the 10^{-9} cm/sec range.

AECOM
BABYLON FORMER MGP ISS
KEMRON PROJECT No. SH0727

TABLE 4

Optimization Stabilization Evaluations
Mixture Designs, Unconfined Compressive Strength, and Hydraulic Conductivity

KEMRON Sample Number	Untreated Material Type	Reagent Type	Reagent Addition % by Wet Soil Wt.	Water Addition % by Reagent Wt.	Cure Day	Unconfined Compressive Strength ASTM D2166				Hydraulic Conductivity ASTM D5084			
						Moisture Content (%)	Bulk Density (lb/ft^3)	Dry Density (lb/ft^3)	UCS (lb/in^2)	Moisture Content (%)	Bulk Density (lb/ft^3)	Dry Density (lb/ft^3)	K (cm/sec)
0727-007	SB-Comp	Type I Portland Cement	5.0	100.0	7	14.71	130.8	114.0	75.4				
					28	11.87	133.4	119.2	132.1	15.3	131	113.7	2.1×10^{-7}
0727-008	SB-Comp	60:40 Type I Portland Cement/ GGBFS	5.0	100.0	7	15.61	132.0	114.2	57.1				
					28	15.71	130.9	113.1	155.5	15.4	129	111.4	3.6×10^{-7}
0727-009	SB-Comp	60:40 Type I Portland Cement/ GGBFS	8.0	100.0	7	16.94	131.7	112.6	159.5				
					28	14.44	131.5	114.9	382.9	14.7	131	114.2	5.5×10^{-9}
0727-010	SB-Comp	60:40 Type I Portland Cement/ GGBFS	11.0	100.0	7	13.40	130.4	115.0	187.1				
					28	17.72	131.4	111.6	490.4	15.7	131	113.4	4.2×10^{-9}

Notes:
% = Percent
Wt= Weight
lb/ft^3 = pounds per cubic foot
lb/in^2 = pounds per square inch
cm/sec = centimeter per second

5.0 CONCLUSIONS

KEMRON performed testing for the Babylon Former MGP site treatability study to evaluate potential mixture designs capable of improving the strength and permeability of the site materials. Review of the treatability study data indicates that all of the mixture designs provided by AECOM and applied to the SB-Comp material achieved UCS values ranging from 61.1 psi to 490.4 psi. Hydraulic conductivity testing performed on the treated materials were in the 10^{-7} to 10^{-9} cm/sec range.

While all of the mixture designs may be possible candidates for full-scale implementation based on the results of UCS and Hydraulic conductivity testing, the selection of the final candidate or candidate treatments should take into consideration the availability and cost of the treatment reagents, ease of implementation, and final end use of the site following treatment.

This report should be reviewed in its entirety including all attachments prior to making decisions concerning a remedial approach. This study is intended to suggest what will occur in the field but does not guarantee the same results.

Tables

AECOM
BABYLON FORMER MGP ISS
KEMRON PROJECT No. SH0727

TABLE 1

As-Received Physical Characterization

Testing Parameter	Test Method	Unit	Untreated Material					
			SB-1 (8-35)	SB-1 (8-35)-DUP	SB-2 (8-35)	SB-2 (8-35)-DUP	SB-3 (8-25)	SB-3 (8-25)-DUP
Particle Size Distribution	ASTM D422							
Gravel (<1/2")		%	5.5	11.3	22.5	17.6	18.6	15.6
Sand		%	85.8	80.3	67.8	74.6	76.6	79.5
Silt		%	5.9	5.7	6.2	5.6	3.8	3.9
Clay		%	2.8	2.7	3.5	2.2	1.0	1.0
Sample Description [1]	ASTM D2487		Yellowish brown poorly graded sand with silt	Yellowish brown poorly graded sand with silt	Yellowish brown well-graded sand with silt and gravel	Yellowish brown poorly graded sand with silt and gravel	Yellowish brown poorly graded sand with gravel	Yellowish brown poorly graded sand with gravel
Sample Classification [2]	ASTM D2487		SP-SM	SP-SM	SW-SM	SP-SM	SP	SP
Atterburg Limits	ASTM D4317							
LL			NV	NV	NV	NV	NV	NV
PL			NP	NP	NP	NP	NP	NP
PI			NP	NP	NP	NP	NP	NP
Solid Specific Gravity	ASTM D854		2.70	2.69	2.67	2.69	2.69	2.67
Moisture Content	ASTM D2216							
Average ASTM Moisture Content		%	9.86	10.56	8.79	10.07	6.28	6.00
Average Percent Solids		%	91.02	90.45	91.93	90.86	94.09	94.34
Loss on Ignition	ASTM D2974							
ASTM Moisture Content		%	10.59	8.85	10.16	9.77	5.73	6.02
Average Loss on Ignition @ 440°C		%	0.69	0.51	0.38	0.45	0.39	0.39
Unit Weight	ASTM D7263							
Average Bulk Unit Weight		pcf	117.1	119.0	132.7	131.9	123.8	123.9

Notes:
(1)Sample color determined by the Munsell Soil Color Charts.
(2) Sample classification based on the Unified Classification System.
%= Percent
pcf = pounds per cubic foot
LL = Liquid Limit
PL = Plastic Limit
PI = Plasticity Index

AECOM
BABYLON FORMER MGP ISS
PROJECT No. SH0727

TABLE 2

Untreated Physical Composite Physical Characterization

TESTING	TEST	UNIT	SAMPLE	
			SB-Comp	SB-Comp-DUP-2
Particle Size Distribution	ASTM D422			
Gravel		%	15.20	12.40
Sand		%	77.30	79.40
Silt		%	7.30	8.00
Clay		%	0.20	0.20
Sample Description (1)	ASTM D2487		Brown poorly graded sand with silt and gravel	Brown poorly graded sand with silt
Sample Classification (2)	ASTM D2487		SP-SM	SP-SM
Moisture Content	ASTM D2216			
ASTM Moisture Content		%	12.02	12.38
Percent Solids		%	89.27	88.98
Unit Weight	ASTM D7263			
Average Bulk Density		pcf	128.1	127.0
Average Dry Density		pcf	114.4	113.0

Notes
% = Percent
Sample descriptions based on the Unified Classification System.
Sample color determined by the Munsell Soil Color Charts.
pcf = pounds per cubic foot

AECOM
BABYLON FORMER MGP ISS
KEMRON PROJECT No. SH0727

TABLE 3

Preliminary Stabilization Evaluations
Mixture Designs, Pocket Penotrometer and Unconfined Compressive Strength

KEMRON Sample Number	Untreated Material Type	Reagent Type	Reagent Addition % by Wet Soil wt.	Water Addition % by Reagent wt.	Pocket Penotrometer (TSF)			Cure Day	Unconfined Compressive Strength ASTM D2166			
					3 Day	5 Day	7 Day		Moisture Content (%)	Bulk Density (lb/ft^3)	Dry Density (lb/ft^3)	UCS (lb/in^2)
0727-001	SB-Comp	Type I Portland Cement	5.0	100.0	>4.5	>4.5	>4.5	7	10.48	136.4	123.5	98.4
0727-002	SB-Comp	Type I Portland Cement	8.0	100.0	>4.5	>4.5	>4.5	7	15.45	130.3	112.9	157.6
0727-003	SB-Comp	Type I Portland Cement	11.0	100.0	>4.5	>4.5	>4.5	7	17.72	132.6	112.6	281.9
0727-004	SB-Comp	Type I PC/GGBFS 60:40	5.0	100.0	>4.5	>4.5	>4.5	7	11.22	133.0	119.5	61.1
0727-005	SB-Comp	Type I PC/GGBFS 60:40	8.0	100.0	>4.5	>4.5	>4.5	7	14.23	130.4	114.1	167.5
0727-006	SB-Comp	Type I PC/GGBFS 60:40	11.0	100.0	>4.5	>4.5	>4.5	7	16.19	130.8	112.5	221.2

Notes:
% = Percent
Wt= Weight
lb/ft^3 = pounds per cubic foot
lb/in^2 = pounds per square inch

AECOM
BABYLON FORMER MGP ISS
KEMRON PROJECT No. SH0727

TABLE 4

Optimization Stabilization Evaluations
Mixture Designs, Unconfined Compressive Strength, and Hydraulic Conductivity

KEMRON Sample Number	Untreated Material Type	Reagent Type	Reagent Addition % by Wet Soil Wt.	Water Addition % by Reagent Wt.	Cure Day	Unconfined Compressive Strength ASTM D2166				Hydraulic Conductivity ASTM D5084			
						Moisture Content (%)	Bulk Density (lb/ft^3)	Dry Density (lb/ft^3)	UCS (lb/in^2)	Moisture Content (%)	Bulk Density (lb/ft^3)	Dry Density (lb/ft^3)	K (cm/sec)
0727-007	SB-Comp	Type I Portland Cement	5.0	100.0	7	14.71	130.8	114.0	75.4				
					28	11.87	133.4	119.2	132.1	15.3	131	113.7	2.1×10^{-7}
0727-008	SB-Comp	60:40 Type I Portland Cement/ GGBFS	5.0	100.0	7	15.61	132.0	114.2	57.1				
					28	15.71	130.9	113.1	155.5	15.4	129	111.4	3.6×10^{-7}
0727-009	SB-Comp	60:40 Type I Portland Cement/ GGBFS	8.0	100.0	7	16.94	131.7	112.6	159.5				
					28	14.44	131.5	114.9	382.9	14.7	131	114.2	5.5×10^{-9}
0727-010	SB-Comp	60:40 Type I Portland Cement/ GGBFS	11.0	100.0	7	13.40	130.4	115.0	187.1				
					28	17.72	131.4	111.6	490.4	15.7	131	113.4	4.2×10^{-9}

Notes:
% = Percent
Wt= Weight
lb/ft^3 = pounds per cubic foot
lb/in^2 = pounds per square inch
cm/sec = centimeter per second

Appendix A:
Sample Chain of Custody

KEMRON ENVIRONMENTAL SERVICES

KEMRON ENVIRONMENTAL SERVICES, INC.
1359-A Ellsworth Industrial Boulevard, Atlanta, GA 30318
TEL.: (404) 636-0928 FAX: (404) 636-7162
www.KEMRON.com

CHAIN OF CUSTODY

Work Order: _____

Date 9/19/19

COMPANY: AECOM

ADDRESS: 250 APOLLO DR., CHELMSFORD, MA

PHONE: 978-905-2100

SAMPLED BY (PRINT): S. WRIGHT

SAMPLED BY (SIGNATURE):

No. of Containers	SAMPLE ID	SAMPLED DATE	SAMPLED TIME	GRAB	COMPOSITE	MATRIX	PRESERVATIVE	REQUESTED TESTING: GRAIN SIZE	ORGANIC CONTENT	MOISTURE CONTENT	SPECIFIC GRAVITY	ATTERBERG LIMITS	BULK DENSITY	1SS				REMARKS
1	SB-1 (8-35)	9-12-19	1400		X	SOIL	—	X	X	X	X	X	X	X				-PERFORM PHYSICAL PARAMETER ANALYSES ON INDIVIDUAL SAMPLES.
1	SB-2 (8-35)	9-12-19	1000		X	SOIL	—	X	X	X	X	X	X	X				- COMPOSITE REMAINING SOILS INTO SINGLE SAMPLE FOR 1SS ANALYSIS.
1	SB-3 (8-25)	9-11-19	1500		X	SOIL	—	X	X	X	X	X	X	X				- IF POSSIBLE, SPLIT COMPOSITE INTO 2 SAMPLES SO THAT A DUPLICATE CAN BE RUN. (DUP-2)

RELINQUISHED BY	DATE/TIME	RECEIVED BY	DATE/TIME
	9-19-19		9/24/19

Turnaround Time Request (Business Days): STANDARD

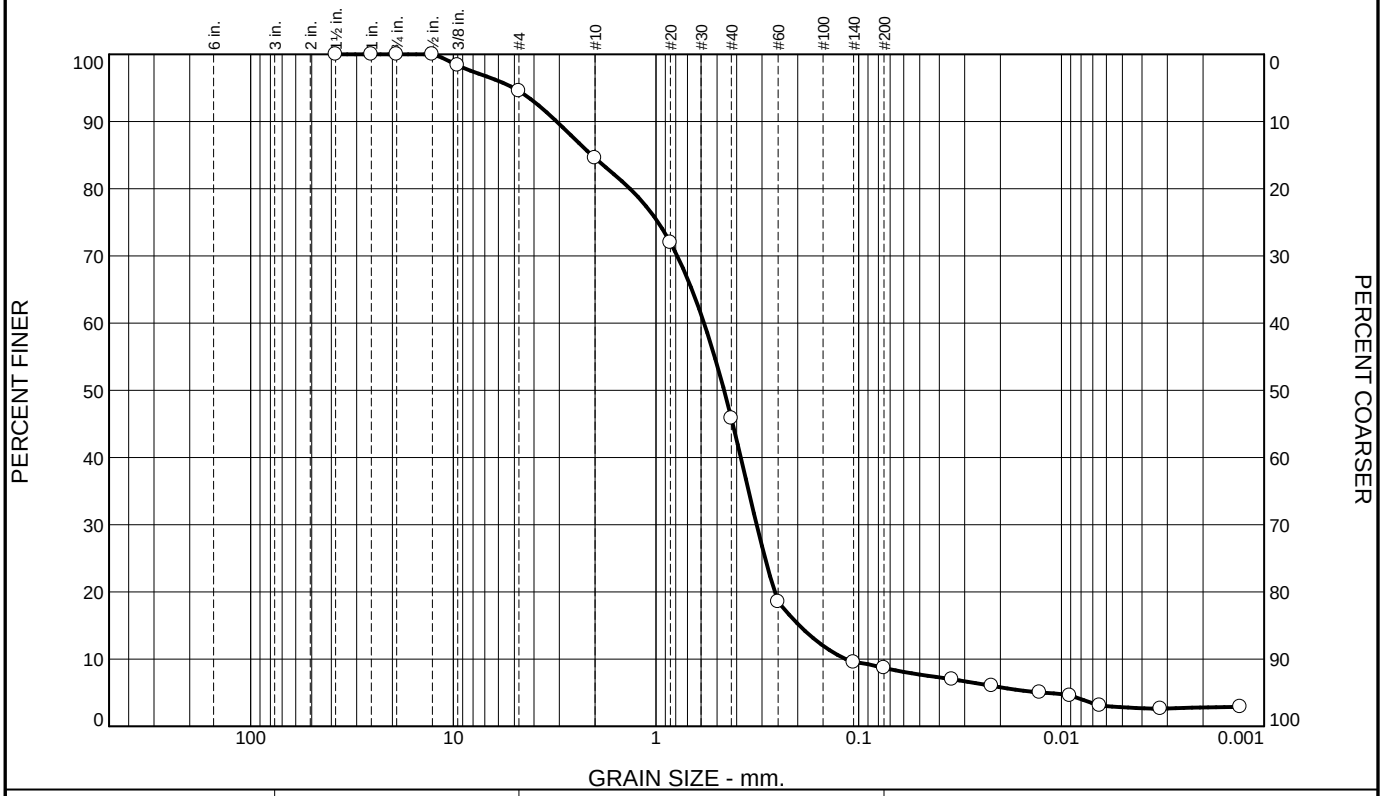
PROJECT INFORMATION:

PROJECT NAME:	GRID - BABYLON
PROJECT No.	60287690
PO #	
SEND REPORT TO:	MARK.MCCABE@AECOM.COM

SPECIAL INSTRUCTIONS/ COMMENTS

Appendix B:
As-Received Physical Characterization Data Sheets

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	5.5	9.9	38.8	37.1	5.9	2.8

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1.0	100.0		
0.75	100.0		
0.5	100.0		
0.375	98.4		
#4	94.5		
#10	84.6		
#20	72.0		
#40	45.8		
#60	18.5		
#140	9.5		
#200	8.7		
0.0347 mm.	7.0		
0.0221 mm.	6.0		
0.0128 mm.	5.0		
0.0091 mm.	4.6		
0.0065 mm.	3.1		
0.0032 mm.	2.6		
0.0013 mm.	2.9		

* (no specification provided)

Soil Description

Yellowish brown poorly graded sand with silt

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 3.0952 D_{85}= 2.0760 D_{60}= 0.5797
D_{50}= 0.4614 D_{30}= 0.3189 D_{15}= 0.1962
D_{10}= 0.1157 C_u= 5.01 C_c= 1.52

Classification

USCS= SP-SM AASHTO= A-1-b

Remarks

Sample Number: SB-1(8-35)

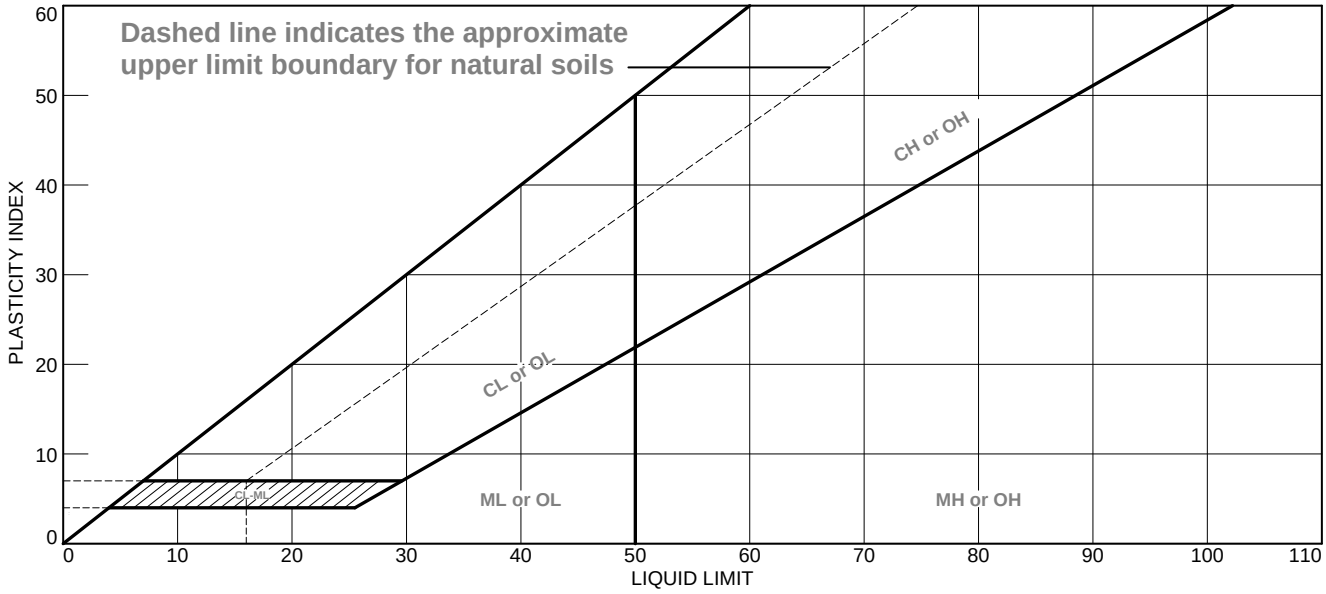
Date: 10/4/19

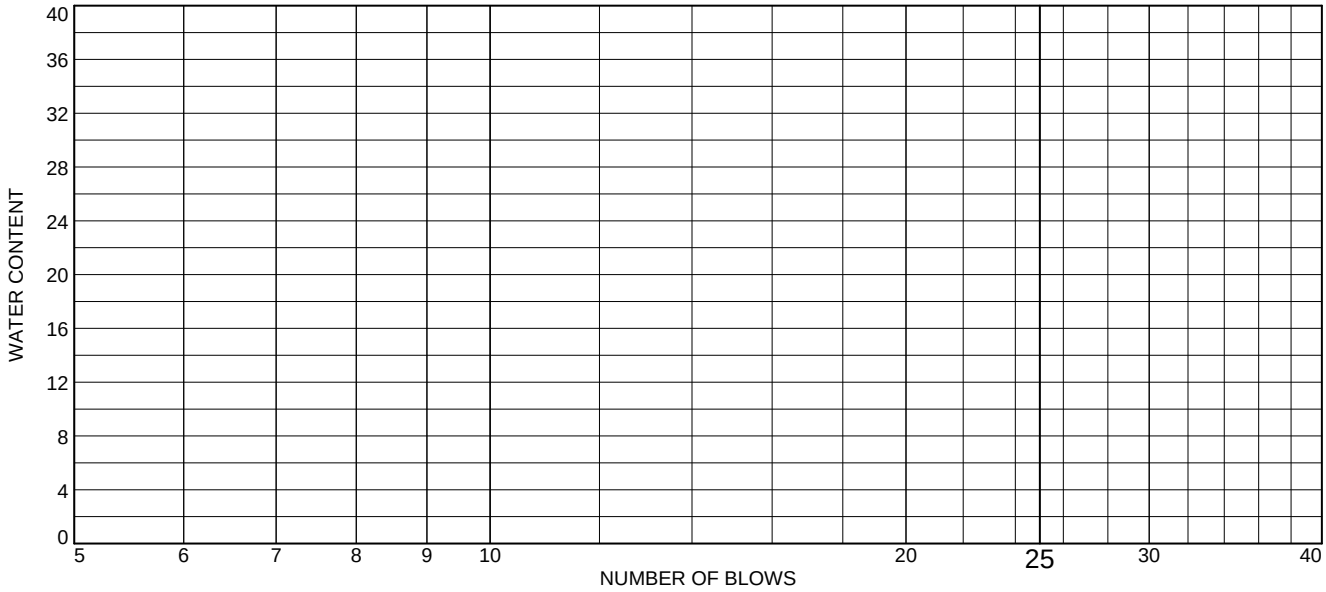
KEMRON Environmental Services Inc.
Atlanta, Georgia

Client: AECOM
Project: Babylon Former MGP ISS
Project No: SH0727 **Figure** D580

Tested By: ISM **Checked By:** TNB

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Yellowish brown poorly graded sand with silt	NV	NP	NP	45.8	8.7	SP-SM

Project No. SH0727 **Client:** AECOM

Project: Babylon Former MGP ISS

Sample Number: SB-1(8-35)

KEMRON Environmental Services Inc.

Atlanta, Georgia

Remarks:

Figure D580

Tested By: ISM **Checked By:** TNB

SOLID SPECIFIC GRAVITY

ASTM D 854
DATA SHEET

PROJECT:	Babylon Former MGP Site
PROJECT No.:	SH0727
TESTING DATE:	10/7/2019
TESTED BY:	MTC
TRACKING CODE:	D580
SAMPLE NO:	SB-1 (8-35)

SOLID SPECIFIC GRAVITY	
1. SAMPLE NUMBER	
2. FLASK NUMBER	3
3. TEMPERATURE	20.0 °C
4. WT. FLASK & WATER	221.29 g
5. WT. WATER, FLASK & SOIL	244.56 g
6. WT OF SOIL	23.27 g
7. CALIBRATION WATER & FLASK	350.86 g
8. DEAIRED SAMPLE	365.52 g
9. SPECIFIC GRAVITY	2.70
10. CORRECTION FACTOR K	1.0000
11. Gs @ 20 °C	2.70

MOISTURE CONTENT DETERMINATION

REPORT FORM
ASTM D 2216

PROJECT:	Babylon Former MGP Site
PROJECT No.:	SH0727
SAMPLE No.:	SB-1 (8-35)
TESTING DATE:	10/04/19
TESTED BY:	ISM
TRACKING CODE:	D580

MOISTURE CONTENT (Dry & Wet Basis)					
1. MOISTURE TIN NO.	A		B		C	
2. WT MOISTURE TIN (tare weight)	1.0046	g	1.0214	g	1.0632	g
3. WT WET SOIL + TARE	20.9744	g	20.7662	g	20.9923	g
4. WT DRY SOIL + TARE	19.0842	g	19.0217	g	19.2734	g
5. WT WATER, Ww	1.8902	g	1.7445	g	1.7189	g
6. WT DRY SOIL, Ws	18.0796	g	18.0003	g	18.2102	g
7. ASTM MOISTURE CONTENT	10.45	%	9.69	%	9.44	%
8. PERCENT SOLIDS	90.53	%	91.16	%	91.37	%
9. AVERAGE ASTM MOISTURE CONTENT	9.86	%				
10. AVERAGE PERCENT SOLIDS	91.02	%				

LOSS ON IGNITION
(ORGANIC CONTENT)
ASTM D2974

PROJECT:	Babylon Former MGP Site
PROJECT No.:	SH0727
SAMPLE No.:	SB-1 (8-35)
TESTING DATE:	10/4/2019
TESTED BY:	ISM
TRACKING CODE:	D580

MOISTURE CONTENT / LOSS ON IGNITION						
1. MOISTURE TIN NO.	A		B		C	
2. WT MOISTURE TIN (tare weight)	65.596	g	65.364	g	68.608	g
3. WT WET SOIL + TARE	116.126	g	116.421	g	119.325	g
4. WT DRY SOIL + TARE	111.150	g	111.737	g	114.404	g
5. WT WATER, Ww	4.976	g	4.683	g	4.921	g
6. WT DRY SOIL, Ws	45.554	g	46.373	g	45.797	g
7. WT FINAL SOIL + TARE	110.936	g	111.319	g	114.090	g
8. WT FINAL SOIL, Wf	45.339	g	45.955	g	45.482	g
9. WT ORGANICS, Wo	0.215	g	0.419	g	0.315	g
10. MOISTURE CONTENT(ASTM)	10.92	%	10.10	%	10.75	%
11. LOSS ON IGNITION	0.47	%	0.90	%	0.69	%
12. AVERAGE MOISTURE CONTENT	10.59	%				
13. AVERAGE LOSS ON IGNITION	0.69	%				

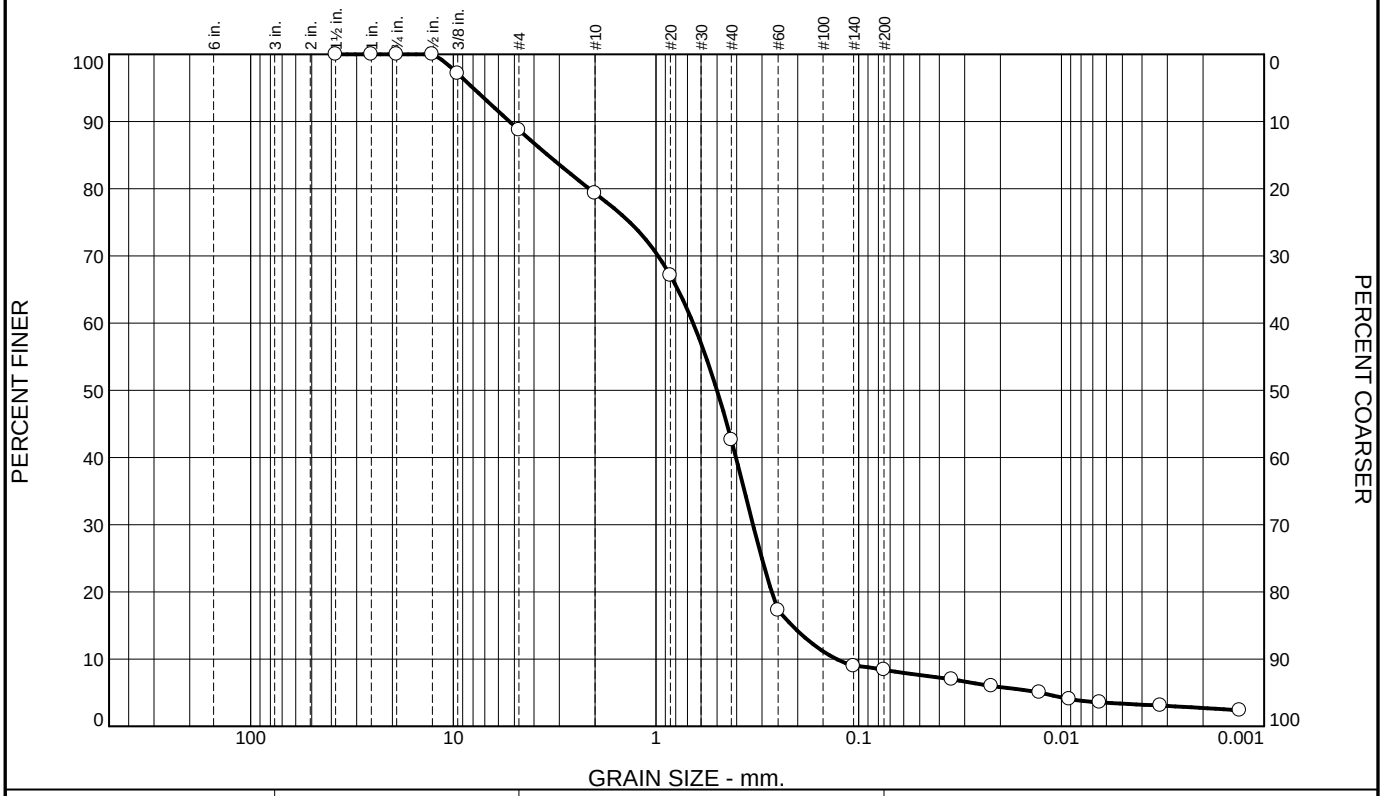
UNIT WEIGHT DETERMINATION

DATA SHEET
ASTM D7263

PROJECT:	Babylon Former MGP Site
PROJECT No.:	SH0727
SAMPLE No.:	SB-1 (8-35)
TESTING DATE:	10/04/19
TESTED BY:	JBA
TRACKING CODE:	D580

UNIT WEIGHT (DENSITY)						
1. SAMPLE NO.	A		B		C	
2. WT OF MOLD (tare weight)	18.20	g	18.20	g	18.18	g
3. WT OF MOLD + SOIL	394.63	g	408.96	g	410.30	g
4. WT OF WET SOIL, W	376.43	g	390.76	g	392.12	g
5. DIAMETER OF SPECIMEN, D	2.00	in	2.00	in	2.00	in
6. HEIGHT OF SPECIMEN, H	4.00	in	4.00	in	4.00	in
7. VOLUME OF SPECIMEN	12.57	in^3	12.57	in^3	12.57	in^3
8. BULK UNIT WEIGHT	114.1	pcf	118.5	pcf	118.9	pcf
9. BULK SPECIFIC GRAVITY	1.8		1.9		1.9	
10. AVERAGE BULK UNIT WEIGHT	117.1	pcf				
11. AVERAGE BULK SPECIFIC GRAVITY	1.9					

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	11.3	9.4	36.7	34.2	5.7	2.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1.0	100.0		
0.75	100.0		
0.5	100.0		
0.375	97.1		
#4	88.7		
#10	79.3		
#20	67.1		
#40	42.6		
#60	17.3		
#140	9.0		
#200	8.4		
0.0348 mm.	7.0		
0.0221 mm.	6.0		
0.0128 mm.	5.0		
0.0091 mm.	4.1		
0.0065 mm.	3.6		
0.0032 mm.	3.1		
0.0013 mm.	2.4		

* (no specification provided)

Soil Description

Yellowish brown poorly graded sand with silt

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 5.2899 D_{85}= 3.4177 D_{60}= 0.6563
D_{50}= 0.5003 D_{30}= 0.3323 D_{15}= 0.2132
D_{10}= 0.1286 C_u= 5.10 C_c= 1.31

Classification

USCS= SP-SM AASHTO= A-1-b

Remarks

Sample Number: SB-1(8-35)-DUP

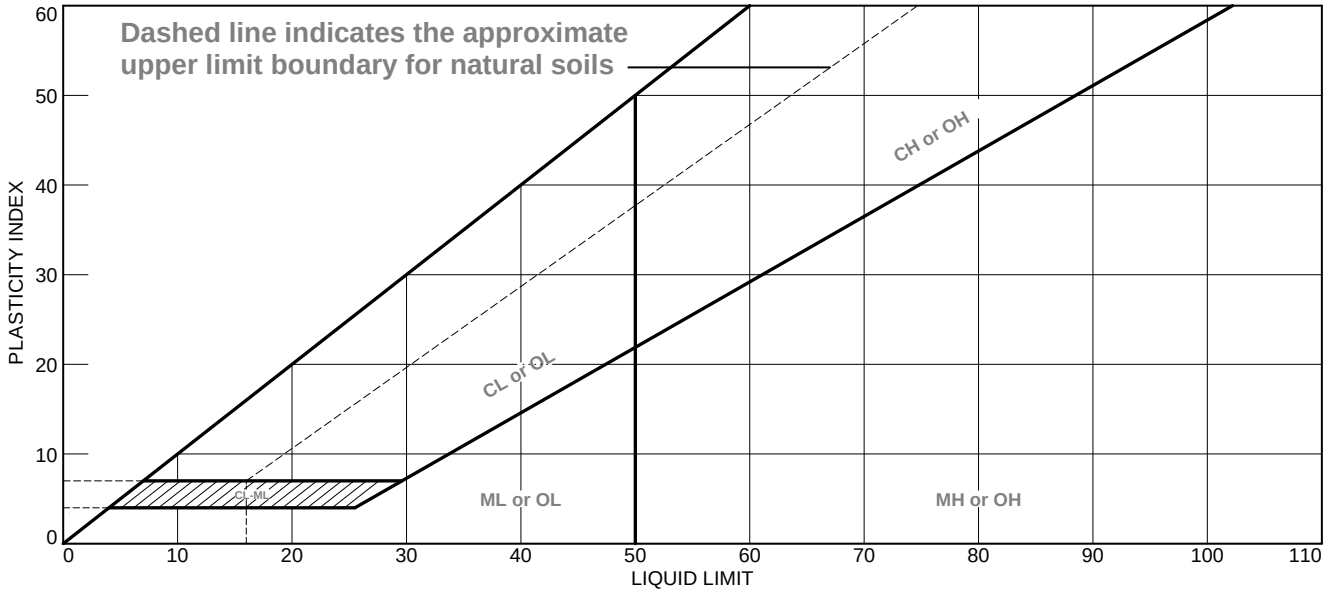
Date: 10/4/19

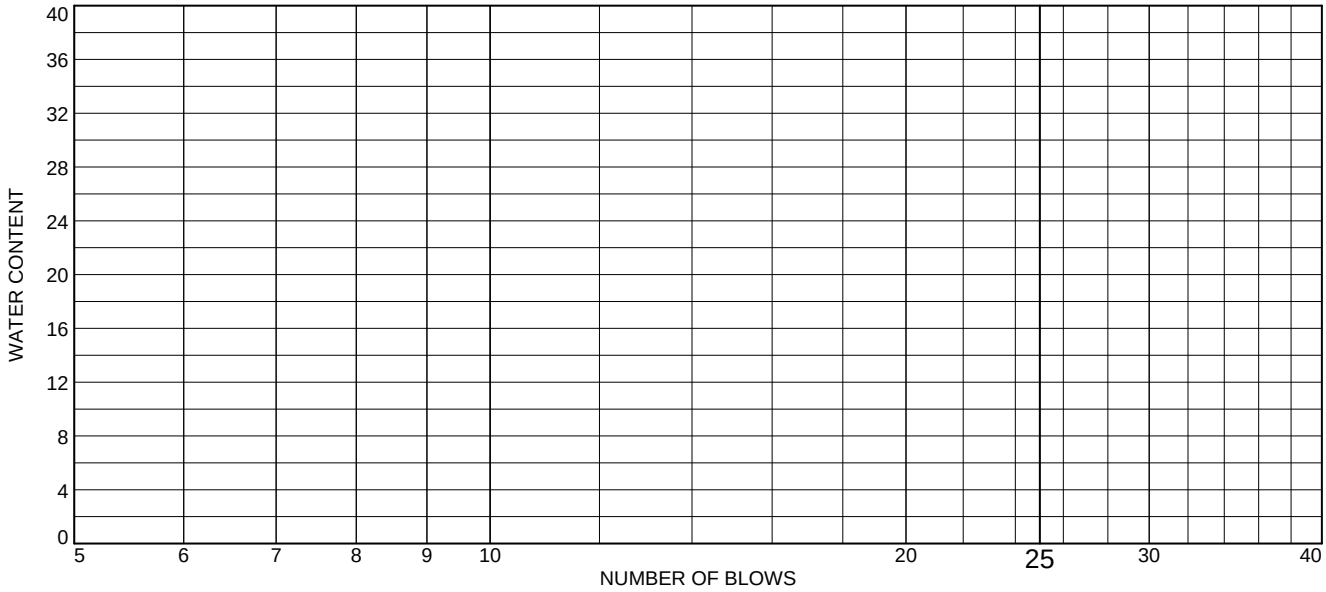
KEMRON Environmental Services Inc.
Atlanta, Georgia

Client: AECOM
Project: Babylon Former MGP ISS
Project No: SH0727 **Figure** D581

Tested By: ISM **Checked By:** TNB

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Yellowish brown poorly graded sand with silt	NV	NP	NP	42.6	8.4	SP-SM

Project No. SH0727 **Client:** AECOM

Project: Babylon Former MGP ISS

Sample Number: SB-1(8-35)-DUP

KEMRON Environmental Services Inc.

Atlanta, Georgia

Remarks:

Figure D581

Tested By: ISM **Checked By:** TNB

SOLID SPECIFIC GRAVITY

ASTM D 854
DATA SHEET

PROJECT:	Babylon Former MGP Site
PROJECT No.:	SH0727
TESTING DATE:	10/8/2019
TESTED BY:	MTC
TRACKING CODE:	D581
SAMPLE NO:	SB-1 (8-35)-DUP

SOLID SPECIFIC GRAVITY		
1. SAMPLE NUMBER		
2. FLASK NUMBER	3	
3. TEMPERATURE	19.0	°C
4. WT. FLASK & WATER	243.91	g
5. WT. WATER, FLASK & SOIL	268.01	g
6. WT OF SOIL	24.10	g
7. CALIBRATION WATER & FLASK	350.92	g
8. DEAIRED SAMPLE	366.05	g
9. SPECIFIC GRAVITY	2.69	
10. CORRECTION FACTOR K	1.0002	
11. Gs @ 20 °C	2.69	

MOISTURE CONTENT DETERMINATION

REPORT FORM
ASTM D 2216

PROJECT:	Babylon Former MGP Site
PROJECT No.:	SH0727
SAMPLE No.:	SB-1 (8-35)-DUP
TESTING DATE:	10/04/19
TESTED BY:	ISM
TRACKING CODE:	D581

MOISTURE CONTENT (Dry & Wet Basis)						
1. MOISTURE TIN NO.	A		B		C	
2. WT MOISTURE TIN (tare weight)	1.0164	g	1.0032	g	1.0512	g
3. WT WET SOIL + TARE	18.0096	g	18.0880	g	18.0914	g
4. WT DRY SOIL + TARE	16.4704	g	16.3537	g	16.4839	g
5. WT WATER, Ww	1.5392	g	1.7343	g	1.6075	g
6. WT DRY SOIL, Ws	15.4540	g	15.3505	g	15.4327	g
7. ASTM MOISTURE CONTENT	9.96	%	11.30	%	10.42	%
8. PERCENT SOLIDS	90.94	%	89.85	%	90.57	%
9. AVERAGE ASTM MOISTURE CONTENT	10.56	%				
10. AVERAGE PERCENT SOLIDS	90.45	%				

LOSS ON IGNITION
(ORGANIC CONTENT)
ASTM D2974

PROJECT:	Babylon Former MGP Site
PROJECT No.:	SH0727
SAMPLE No.:	SB-1 (8-35)-DUP
TESTING DATE:	10/4/2019
TESTED BY:	ISM
TRACKING CODE:	D581

MOISTURE CONTENT / LOSS ON IGNITION						
1. MOISTURE TIN NO.	A		B		C	
2. WT MOISTURE TIN (tare weight)	63.919	g	62.992	g	63.365	g
3. WT WET SOIL + TARE	116.468	g	116.441	g	116.516	g
4. WT DRY SOIL + TARE	112.529	g	112.422	g	111.542	g
5. WT WATER, Ww	3.939	g	4.019	g	4.974	g
6. WT DRY SOIL, Ws	48.611	g	49.430	g	48.177	g
7. WT FINAL SOIL + TARE	112.344	g	112.222	g	111.186	g
8. WT FINAL SOIL, Wf	48.426	g	49.229	g	47.821	g
9. WT ORGANICS, Wo	0.185	g	0.201	g	0.356	g
10. MOISTURE CONTENT(ASTM)	8.10	%	8.13	%	10.32	%
11. LOSS ON IGNITION	0.38	%	0.41	%	0.74	%
12. AVERAGE MOISTURE CONTENT	8.85	%				
13. AVERAGE LOSS ON IGNITION	0.51	%				

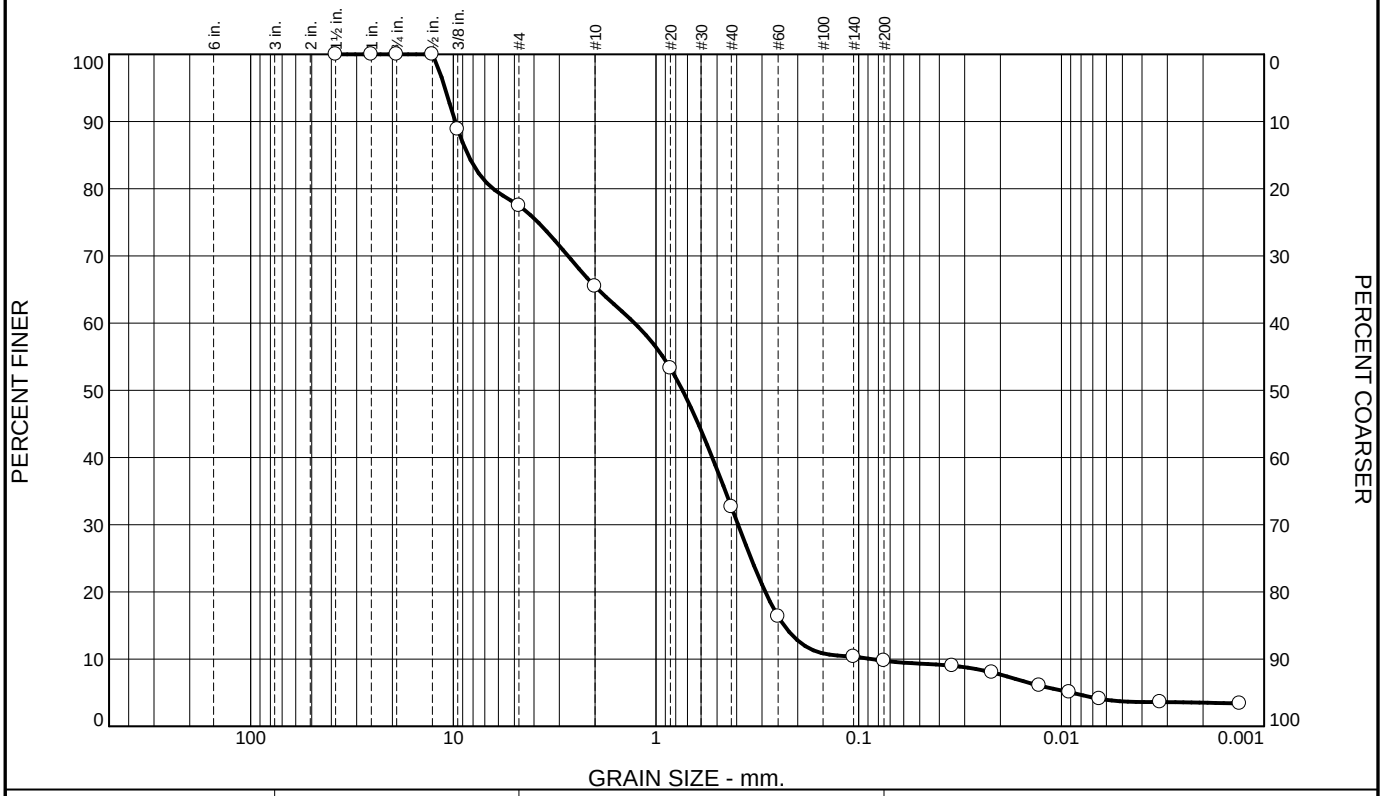
UNIT WEIGHT DETERMINATION

DATA SHEET
ASTM D7263

PROJECT:	Babylon Former MGP Site
PROJECT No.:	SH0727
SAMPLE No.:	SB-1 (8-35)-DUP
TESTING DATE:	10/4/19
TESTED BY:	JBA
TRACKING CODE:	D581

UNIT WEIGHT (DENSITY)						
1. SAMPLE NO.	A		B		C	
2. WT OF MOLD (tare weight)	18.19	g	18.18	g	18.19	g
3. WT OF MOLD + SOIL	408.70	g	409.78	g	414.01	g
4. WT OF WET SOIL, W	390.51	g	391.60	g	395.82	g
5. DIAMETER OF SPECIMEN, D	2.00	in	2.00	in	2.00	in
6. HEIGHT OF SPECIMEN, H	4.00	in	4.00	in	4.00	in
7. VOLUME OF SPECIMEN	12.57	in^3	12.57	in^3	12.57	in^3
8. BULK UNIT WEIGHT	118.4	pcf	118.7	pcf	120.0	pcf
9. BULK SPECIFIC GRAVITY	1.9		1.9		1.9	
10. AVERAGE BULK UNIT WEIGHT	119.0	pcf				
11. AVERAGE BULK SPECIFIC GRAVITY	1.9					

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	22.5	12.0	32.8	23.0	6.2	3.5

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1.0	100.0		
0.75	100.0		
0.5	100.0		
0.375	88.9		
#4	77.5		
#10	65.5		
#20	53.3		
#40	32.7		
#60	16.4		
#140	10.3		
#200	9.7		
0.0346 mm.	9.0		
0.0220 mm.	8.0		
0.0129 mm.	6.1		
0.0091 mm.	5.1		
0.0065 mm.	4.1		
0.0033 mm.	3.6		
0.0013 mm.	3.4		

* (no specification provided)

Soil Description

Yellowish brown well-graded sand with silt and gravel

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 9.8013 D_{85}= 8.4614 D_{60}= 1.2771
D_{50}= 0.7404 D_{30}= 0.3936 D_{15}= 0.2334
D_{10}= 0.0861 C_u= 14.84 C_c= 1.41

Classification

USCS= SW-SM AASHTO= A-1-b

Remarks

Sample Number: SB-2(8-35)

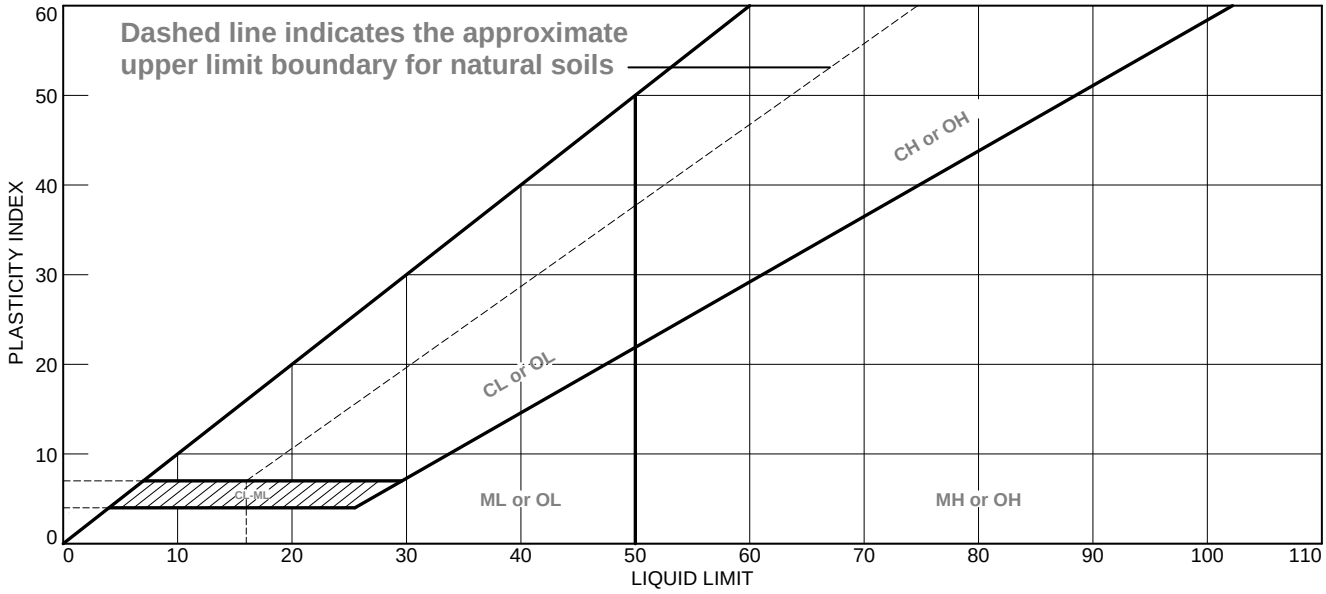
Date: 10/4/19

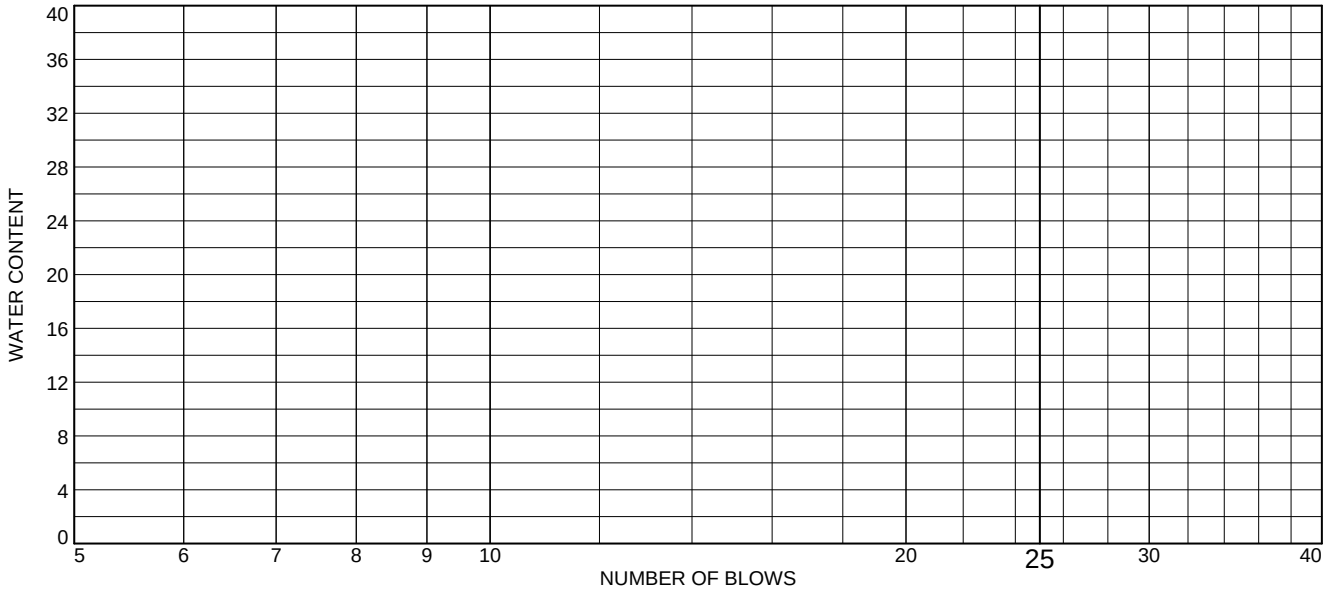
KEMRON Environmental Services Inc.
Atlanta, Georgia

Client: AECOM
Project: Babylon Former MGP ISS
Project No: SH0727 **Figure** D582

Tested By: ISM **Checked By:** TNB

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Yellowish brown well-graded sand with silt and gravel	NV	NP	NP	32.7	9.7	SW-SM

Project No. SH0727 **Client:** AECOM

Project: Babylon Former MGP ISS

Sample Number: SB-2(8-35)

KEMRON Environmental Services Inc.

Atlanta, Georgia

Remarks:

Figure D582

Tested By: ISM **Checked By:** TNB

SOLID SPECIFIC GRAVITY

ASTM D 854
DATA SHEET

PROJECT:	Babylon Former MGP Site
PROJECT No.:	SH0727
TESTING DATE:	10/8/2019
TESTED BY:	MTC
TRACKING CODE:	D582
SAMPLE NO:	SB-2 (8-35)

SOLID SPECIFIC GRAVITY	
1. SAMPLE NUMBER	
2. FLASK NUMBER	3
3. TEMPERATURE	19.0 °C
4. WT. FLASK & WATER	220.99 g
5. WT. WATER, FLASK & SOIL	244.62 g
6. WT OF SOIL	23.63 g
7. CALIBRATION WATER & FLASK	350.92 g
8. DEAIRED SAMPLE	365.69 g
9. SPECIFIC GRAVITY	2.67
10. CORRECTION FACTOR K	1.0002
11. Gs @ 20 °C	2.67

MOISTURE CONTENT DETERMINATION

REPORT FORM
ASTM D 2216

PROJECT:	Babylon Former MGP Site
PROJECT No.:	SH0727
SAMPLE No.:	SB-2 (8-35)
TESTING DATE:	10/04/19
TESTED BY:	ISM
TRACKING CODE:	D582

MOISTURE CONTENT (Dry & Wet Basis)					
1. MOISTURE TIN NO.	A		B		C	
2. WT MOISTURE TIN (tare weight)	1.0083	g	1.0208	g	1.0326	g
3. WT WET SOIL + TARE	25.8905	g	25.8062	g	25.9185	g
4. WT DRY SOIL + TARE	24.0908	g	23.7292	g	23.7759	g
5. WT WATER, Ww	1.7997	g	2.0770	g	2.1426	g
6. WT DRY SOIL, Ws	23.0825	g	22.7084	g	22.7433	g
7. ASTM MOISTURE CONTENT	7.80	%	9.15	%	9.42	%
8. PERCENT SOLIDS	92.77	%	91.62	%	91.39	%
9. AVERAGE ASTM MOISTURE CONTENT	8.79	%				
10. AVERAGE PERCENT SOLIDS	91.93	%				

LOSS ON IGNITION
(ORGANIC CONTENT)
ASTM D2974

PROJECT:	Babylon Former MGP Site
PROJECT No.:	SH0727
SAMPLE No.:	SB-2 (8-35)
TESTING DATE:	10/4/2019
TESTED BY:	ISM
TRACKING CODE:	D582

MOISTURE CONTENT / LOSS ON IGNITION						
1. MOISTURE TIN NO.	A		B		C	
2. WT MOISTURE TIN (tare weight)	61.747	g	69.657	g	63.333	g
3. WT WET SOIL + TARE	121.212	g	121.421	g	121.585	g
4. WT DRY SOIL + TARE	116.189	g	116.502	g	115.924	g
5. WT WATER, Ww	5.022	g	4.919	g	5.661	g
6. WT DRY SOIL, Ws	54.442	g	46.845	g	52.592	g
7. WT FINAL SOIL + TARE	116.012	g	116.322	g	115.692	g
8. WT FINAL SOIL, Wf	54.265	g	46.666	g	52.360	g
9. WT ORGANICS, Wo	0.177	g	0.180	g	0.232	g
10. MOISTURE CONTENT(ASTM)	9.22	%	10.50	%	10.76	%
11. LOSS ON IGNITION	0.32	%	0.38	%	0.44	%
12. AVERAGE MOISTURE CONTENT	10.16	%				
13. AVERAGE LOSS ON IGNITION	0.38	%				

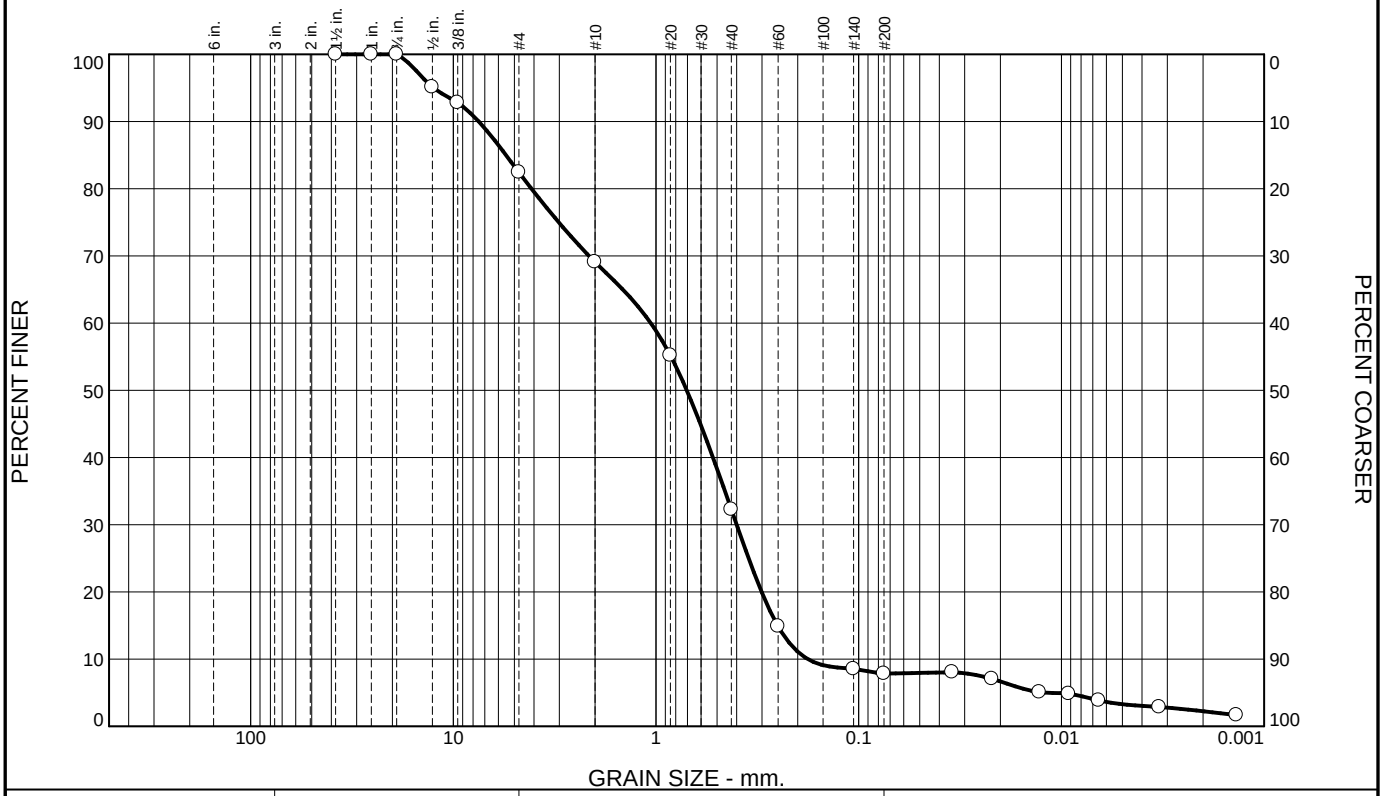
UNIT WEIGHT DETERMINATION

DATA SHEET
ASTM D7263

PROJECT:	Babylon Former MGP Site
PROJECT No.:	SH0727
SAMPLE No.:	SB-2 (8-35)
TESTING DATE:	10/04/19
TESTED BY:	JBA
TRACKING CODE:	D582

UNIT WEIGHT (DENSITY)						
1. SAMPLE NO.	A		B		C	
2. WT OF MOLD (tare weight)	18.17	g	18.18	g	18.18	g
3. WT OF MOLD + SOIL	443.55	g	468.39	g	456.20	g
4. WT OF WET SOIL, W	425.38	g	450.21	g	438.02	g
5. DIAMETER OF SPECIMEN, D	2.00	in	2.00	in	2.00	in
6. HEIGHT OF SPECIMEN, H	4.00	in	4.00	in	4.00	in
7. VOLUME OF SPECIMEN	12.57	in^3	12.57	in^3	12.57	in^3
8. BULK UNIT WEIGHT	129.0	pcf	136.5	pcf	132.8	pcf
9. BULK SPECIFIC GRAVITY	2.1		2.2		2.1	
10. AVERAGE BULK UNIT WEIGHT	132.7	pcf				
11. AVERAGE BULK SPECIFIC GRAVITY	2.1					

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	17.6	13.3	36.8	24.5	5.6	2.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1.0	100.0		
0.75	100.0		
0.5	95.1		
0.375	92.8		
#4	82.4		
#10	69.1		
#20	55.2		
#40	32.3		
#60	14.9		
#140	8.5		
#200	7.8		
0.0346 mm.	8.0		
0.0220 mm.	7.1		
0.0128 mm.	5.1		
0.0092 mm.	4.8		
0.0065 mm.	3.9		
0.0033 mm.	2.9		
0.0014 mm.	1.7		

* (no specification provided)

Soil Description

Yellowish Brown poorly graded sand with silt and gravel

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 7.5029 D_{85}= 5.5037 D_{60}= 1.0616
D_{50}= 0.7055 D_{30}= 0.4001 D_{15}= 0.2515
D_{10}= 0.1785 C_u= 5.95 C_c= 0.84

Classification

USCS= SP-SM AASHTO= A-1-b

Remarks

Sample Number: SB-2(8-35)-DUP

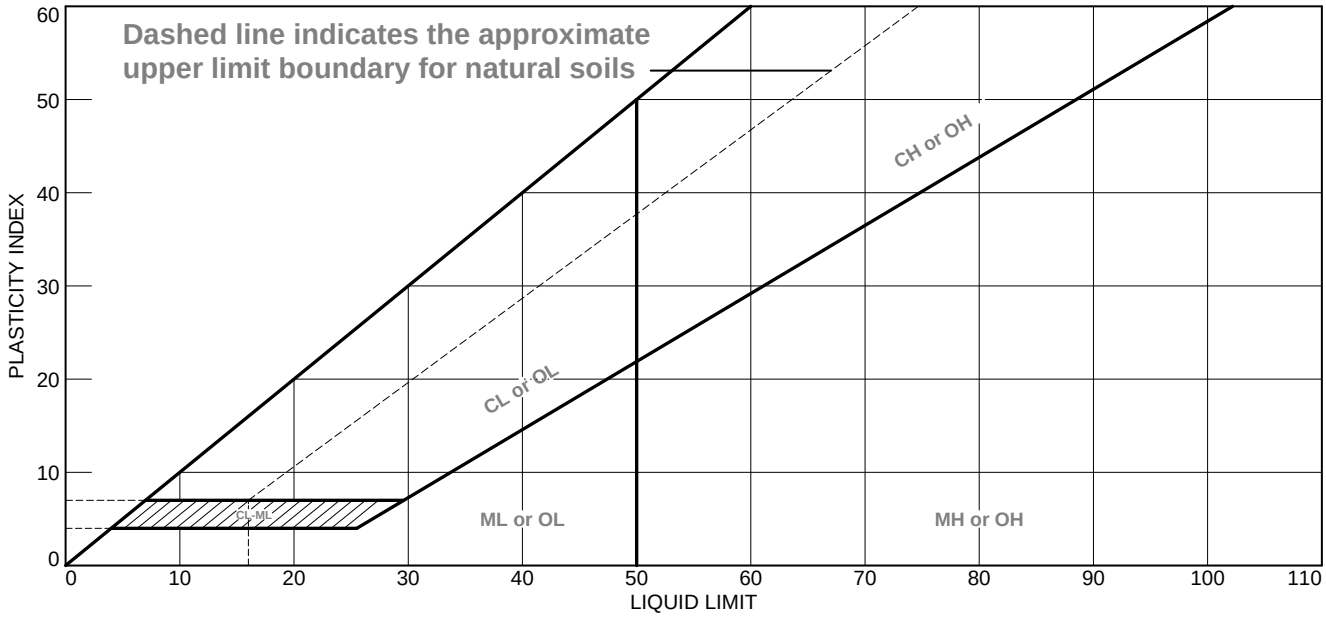
Date: 10/4/2019

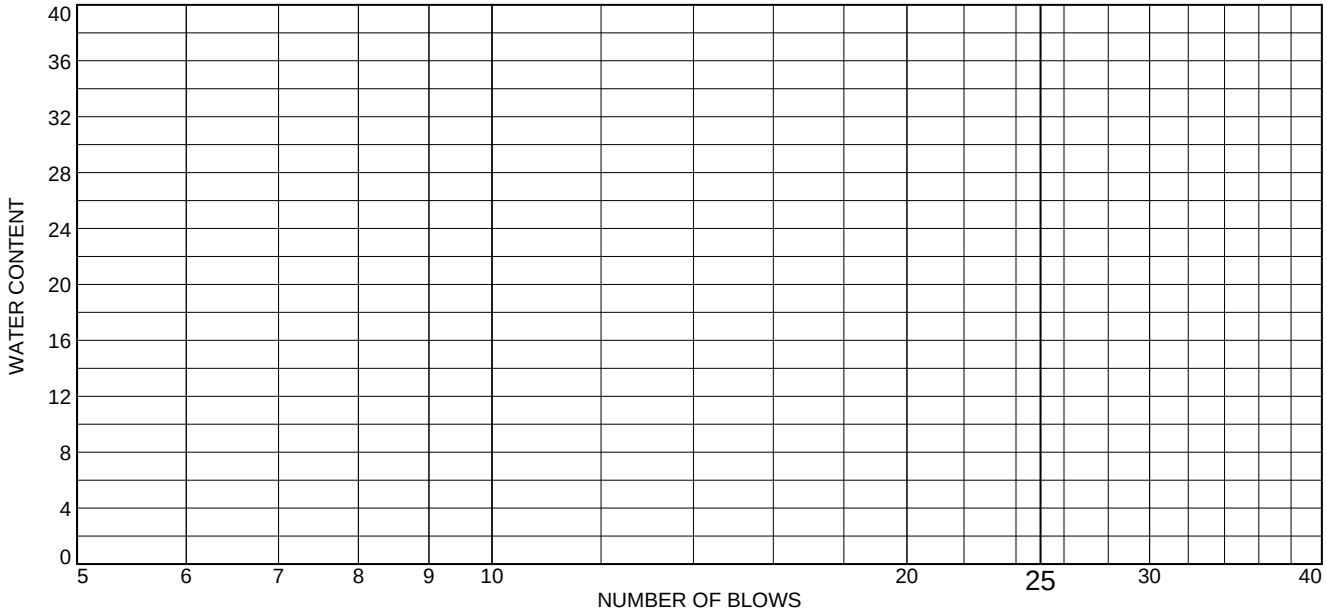
KEMRON Environmental Services Inc.
Atlanta, Georgia

Client: AECOM
Project: Babylon Former MGP ISS
Project No: SH0727 **Figure** D583

Tested By: ISM **Checked By:** TNB

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Yellowish Brown poorly graded sand with silt and gravel	NV	NP	NP	32.3	7.8	SP-SM

Project No. SH0727 **Client:** AECOM

Project: Babylon Former MGP ISS

Sample Number: SB-2(8-35)-DUP

Remarks:

KEMRON Environmental Services Inc.

Atlanta, Georgia

Figure D583

SOLID SPECIFIC GRAVITY

ASTM D 854
DATA SHEET

PROJECT:	Babylon Former MGP Site
PROJECT No.:	SH0727
TESTING DATE:	10/9/2019
TESTED BY:	MTC
TRACKING CODE:	D583
SAMPLE NO:	SB-2 (8-35)-DUP

SOLID SPECIFIC GRAVITY		
1. SAMPLE NUMBER		
2. FLASK NUMBER	3	
3. TEMPERATURE	20.0	°C
4. WT. FLASK & WATER	273.89	g
5. WT. WATER, FLASK & SOIL	297.88	g
6. WT OF SOIL	23.99	g
7. CALIBRATION WATER & FLASK	350.86	g
8. DEAIRED SAMPLE	365.92	g
9. SPECIFIC GRAVITY	2.69	
10. CORRECTION FACTOR K	1.0000	
11. Gs @ 20 °C	2.69	

MOISTURE CONTENT DETERMINATION

REPORT FORM
ASTM D 2216

PROJECT:	Babylon Former MGP Site
PROJECT No.:	SH0727
SAMPLE No.:	SB-2 (8-35)-DUP
TESTING DATE:	10/04/19
TESTED BY:	ISM
TRACKING CODE:	D583

MOISTURE CONTENT (Dry & Wet Basis)						
1. MOISTURE TIN NO.	A		B		C	
2. WT MOISTURE TIN (tare weight)	0.9957	g	1.0485	g	1.0144	g
3. WT WET SOIL + TARE	25.0827	g	25.1694	g	25.2963	g
4. WT DRY SOIL + TARE	22.9723	g	22.9058	g	23.0408	g
5. WT WATER, Ww	2.1104	g	2.2636	g	2.2555	g
6. WT DRY SOIL, Ws	21.9766	g	21.8573	g	22.0264	g
7. ASTM MOISTURE CONTENT	9.60	%	10.36	%	10.24	%
8. PERCENT SOLIDS	91.24	%	90.62	%	90.71	%
9. AVERAGE ASTM MOISTURE CONTENT	10.07	%				
10. AVERAGE PERCENT SOLIDS	90.86	%				

LOSS ON IGNITION
(ORGANIC CONTENT)
ASTM D2974

PROJECT:	Babylon Former MGP Site
PROJECT No.:	SH0727
SAMPLE No.:	SB-2 (8-35)-DUP
TESTING DATE:	10/4/2019
TESTED BY:	ISM
TRACKING CODE:	D583

MOISTURE CONTENT / LOSS ON IGNITION					
1. MOISTURE TIN NO.	A		B		C	
2. WT MOISTURE TIN (tare weight)	53.553	g	56.992	g	53.156	g
3. WT WET SOIL + TARE	121.317	g	121.451	g	121.512	g
4. WT DRY SOIL + TARE	115.029	g	116.601	g	114.771	g
5. WT WATER, Ww	6.288	g	4.850	g	6.741	g
6. WT DRY SOIL, Ws	61.476	g	59.608	g	61.615	g
7. WT FINAL SOIL + TARE	114.787	g	116.346	g	114.441	g
8. WT FINAL SOIL, Wf	61.233	g	59.354	g	61.284	g
9. WT ORGANICS, Wo	0.243	g	0.254	g	0.331	g
10. MOISTURE CONTENT(ASTM)	10.23	%	8.14	%	10.94	%
11. LOSS ON IGNITION	0.39	%	0.43	%	0.54	%
12. AVERAGE MOISTURE CONTENT	9.77	%				
13. AVERAGE LOSS ON IGNITION	0.45	%				

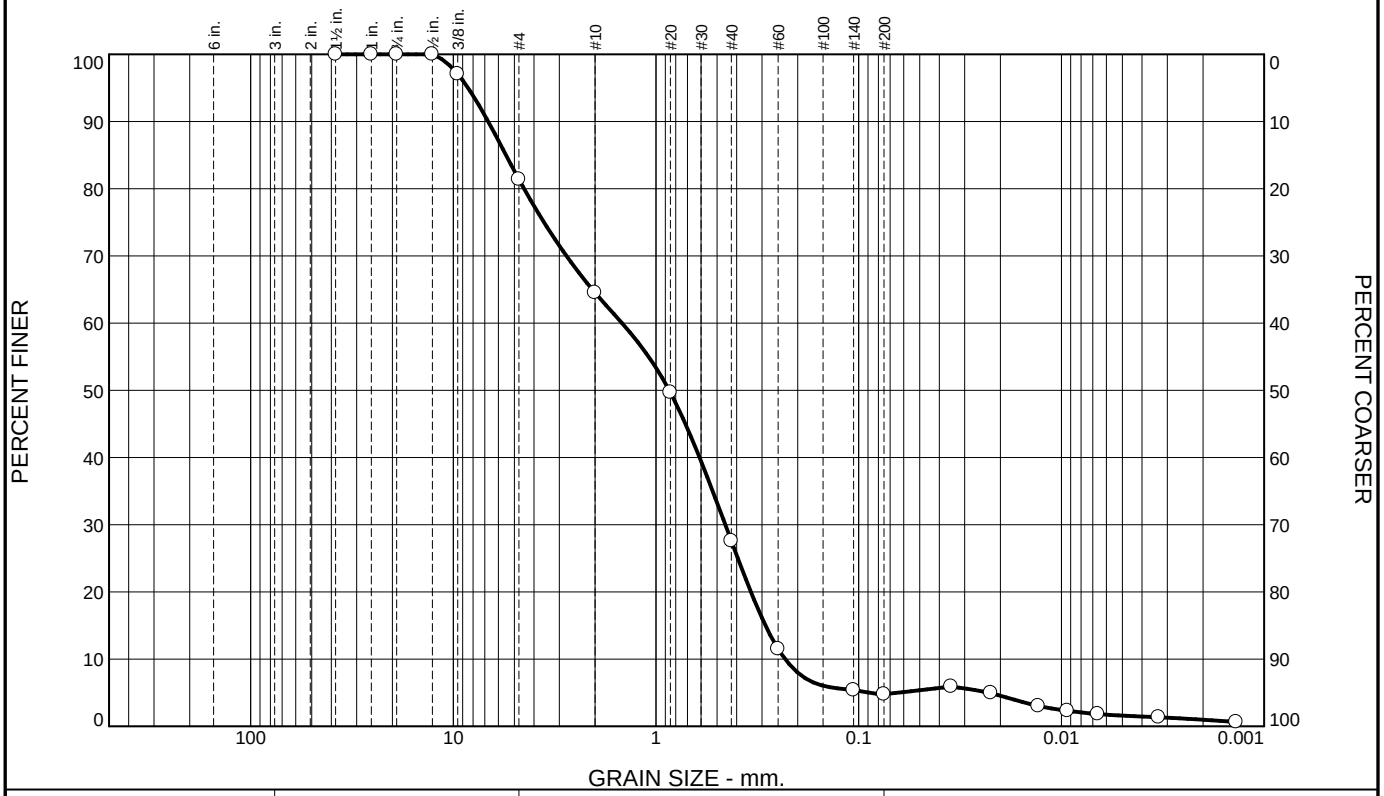
UNIT WEIGHT DETERMINATION

DATA SHEET
ASTM D7263

PROJECT:	Babylon Former MGP Site
PROJECT No.:	SH0727
SAMPLE No.:	SB-2 (8-35)-DUP
TESTING DATE:	10/04/19
TESTED BY:	JBA
TRACKING CODE:	D583

UNIT WEIGHT (DENSITY)			
1. SAMPLE NO.	A	B	C
2. WT OF MOLD (tare weight)	18.19 g	18.19 g	18.19 g
3. WT OF MOLD + SOIL	455.67 g	445.35 g	458.84 g
4. WT OF WET SOIL, W	437.48 g	427.16 g	440.65 g
5. DIAMETER OF SPECIMEN, D	2.00 in	2.00 in	2.00 in
6. HEIGHT OF SPECIMEN, H	4.00 in	4.00 in	4.00 in
7. VOLUME OF SPECIMEN	12.57 in^3	12.57 in^3	12.57 in^3
8. BULK UNIT WEIGHT	132.6 pcf	129.5 pcf	133.6 pcf
9. BULK SPECIFIC GRAVITY	2.1	2.1	2.1
10. AVERAGE BULK UNIT WEIGHT	131.9 pcf		
11. AVERAGE BULK SPECIFIC GRAVITY	2.1		

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	18.6	16.9	36.9	22.8	3.8	1.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1.0	100.0		
0.75	100.0		
0.5	100.0		
0.375	97.1		
#4	81.4		
#10	64.5		
#20	49.7		
#40	27.6		
#60	11.5		
#140	5.4		
#200	4.8		
0.0350 mm.	5.9		
0.0223 mm.	4.9		
0.0130 mm.	3.0		
0.0093 mm.	2.3		
0.0066 mm.	1.8		
0.0033 mm.	1.3		
0.0014 mm.	0.6		

* (no specification provided)

Soil Description

Yellowish brown poorly graded sand with gravel

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 6.7371 D_{85}= 5.5011 D_{60}= 1.4732
D_{50}= 0.8613 D_{30}= 0.4552 D_{15}= 0.2885
D_{10}= 0.2309 C_u= 6.38 C_c= 0.61

Classification

USCS= SP AASHTO= A-1-b

Remarks

Sample Number: SB-3(8-25)

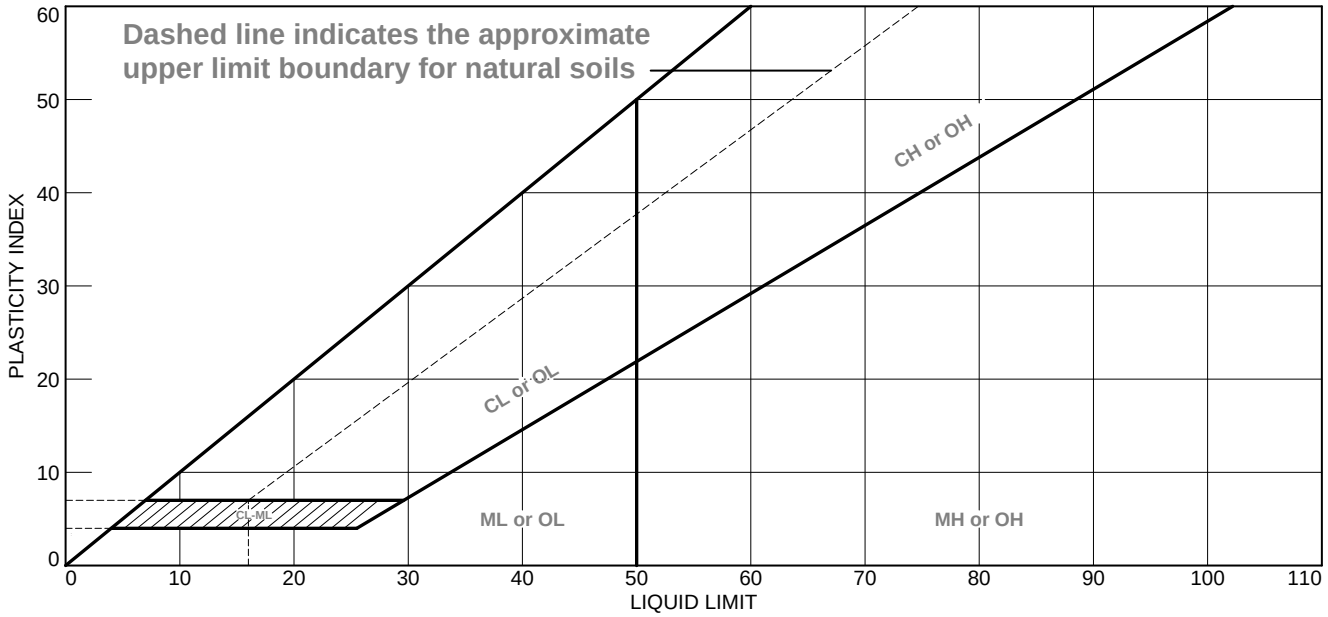
Date: 10/4/2019

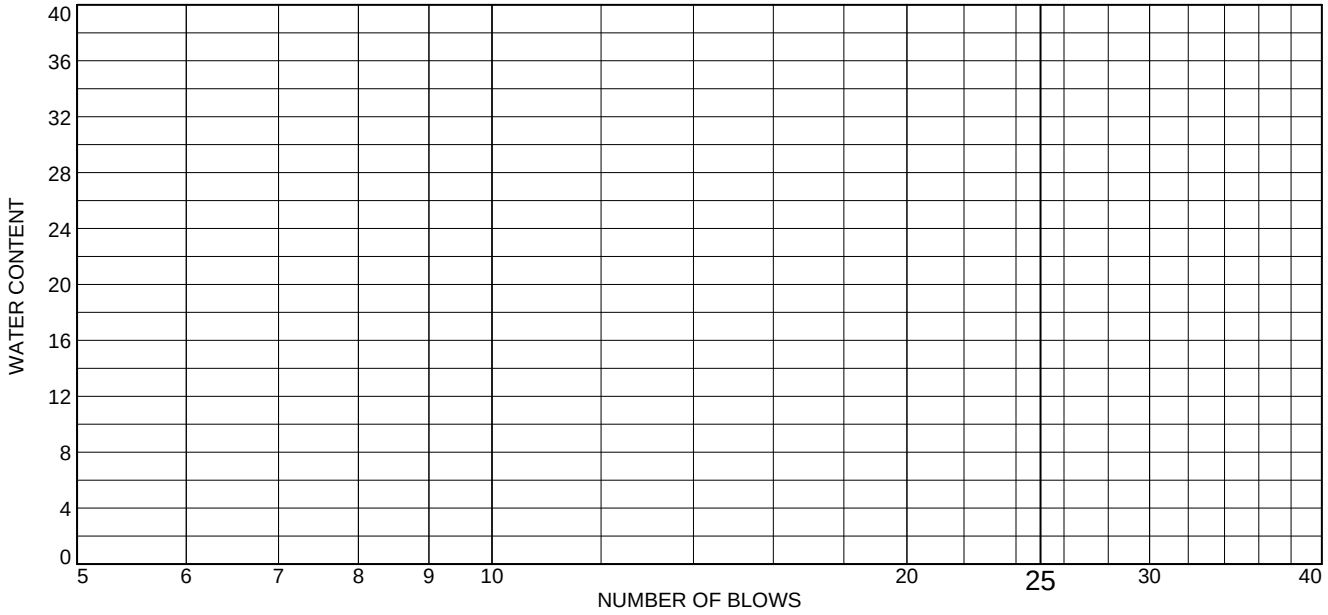
KEMRON Environmental Services Inc.
Atlanta, Georgia

Client: AECOM
Project: Babylon Former MGP ISS
Project No: SH0727 **Figure** D584

Tested By: ISM **Checked By:** TNB

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Yellowish brown poorly graded sand with gravel	NV	NP	NP	27.6	4.8	SP

Project No. SH0727 **Client:** AECOM

Project: Babylon Former MGP ISS

Sample Number: SB-3(8-25)

Remarks:

KEMRON Environmental Services Inc.

Atlanta, Georgia

Figure D584

SOLID SPECIFIC GRAVITY

ASTM D 854
DATA SHEET

PROJECT:	Babylon Former MGP Site
PROJECT No.:	SH0727
TESTING DATE:	10/9/2019
TESTED BY:	MTC
TRACKING CODE:	D584
SAMPLE NO:	SB-3 (8-25)

SOLID SPECIFIC GRAVITY	
1. SAMPLE NUMBER	
2. FLASK NUMBER	3
3. TEMPERATURE	20.0 °C
4. WT. FLASK & WATER	265.00 g
5. WT. WATER, FLASK & SOIL	288.93 g
6. WT OF SOIL	23.93 g
7. CALIBRATION WATER & FLASK	350.86 g
8. DEAIRED SAMPLE	365.90 g
9. SPECIFIC GRAVITY	2.69
10. CORRECTION FACTOR K	1.0000
11. Gs @ 20 °C	2.69

MOISTURE CONTENT DETERMINATION

REPORT FORM
ASTM D 2216

PROJECT:	Babylon Former MGP Site
PROJECT No.:	SH0727
SAMPLE No.:	SB-3 (8-25)
TESTING DATE:	10/08/19
TESTED BY:	MTC
TRACKING CODE:	D584

MOISTURE CONTENT (Dry & Wet Basis)						
1. MOISTURE TIN NO.	A		B		C	
2. WT MOISTURE TIN (tare weight)	1.0633	g	1.0171	g	1.0148	g
3. WT WET SOIL + TARE	24.4393	g	24.9838	g	24.6985	g
4. WT DRY SOIL + TARE	23.0440	g	23.6237	g	23.2583	g
5. WT WATER, Ww	1.3953	g	1.3601	g	1.4402	g
6. WT DRY SOIL, Ws	21.9807	g	22.6066	g	22.2435	g
7. ASTM MOISTURE CONTENT	6.35	%	6.02	%	6.47	%
8. PERCENT SOLIDS	94.03	%	94.33	%	93.92	%
9. AVERAGE ASTM MOISTURE CONTENT	6.28	%				
10. AVERAGE PERCENT SOLIDS	94.09	%				

LOSS ON IGNITION
(ORGANIC CONTENT)
ASTM D2974

PROJECT:	Babylon Former MGP Site
PROJECT No.:	SH0727
SAMPLE No.:	SB-3 (8-25)
TESTING DATE:	10/8/2019
TESTED BY:	MTC
TRACKING CODE:	D584

MOISTURE CONTENT / LOSS ON IGNITION						
1. MOISTURE TIN NO.	A		B		C	
2. WT MOISTURE TIN (tare weight)	63.362	g	65.363	g	68.605	g
3. WT WET SOIL + TARE	114.434	g	116.884	g	120.278	g
4. WT DRY SOIL + TARE	111.801	g	114.033	g	117.395	g
5. WT WATER, Ww	2.632	g	2.851	g	2.883	g
6. WT DRY SOIL, Ws	48.439	g	48.670	g	48.790	g
7. WT FINAL SOIL + TARE	111.620	g	113.820	g	117.213	g
8. WT FINAL SOIL, Wf	48.258	g	48.457	g	48.607	g
9. WT ORGANICS, Wo	0.181	g	0.213	g	0.182	g
10. MOISTURE CONTENT(ASTM)	5.43	%	5.86	%	5.91	%
11. LOSS ON IGNITION	0.37	%	0.44	%	0.37	%
12. AVERAGE MOISTURE CONTENT	5.73	%				
13. AVERAGE LOSS ON IGNITION	0.39	%				

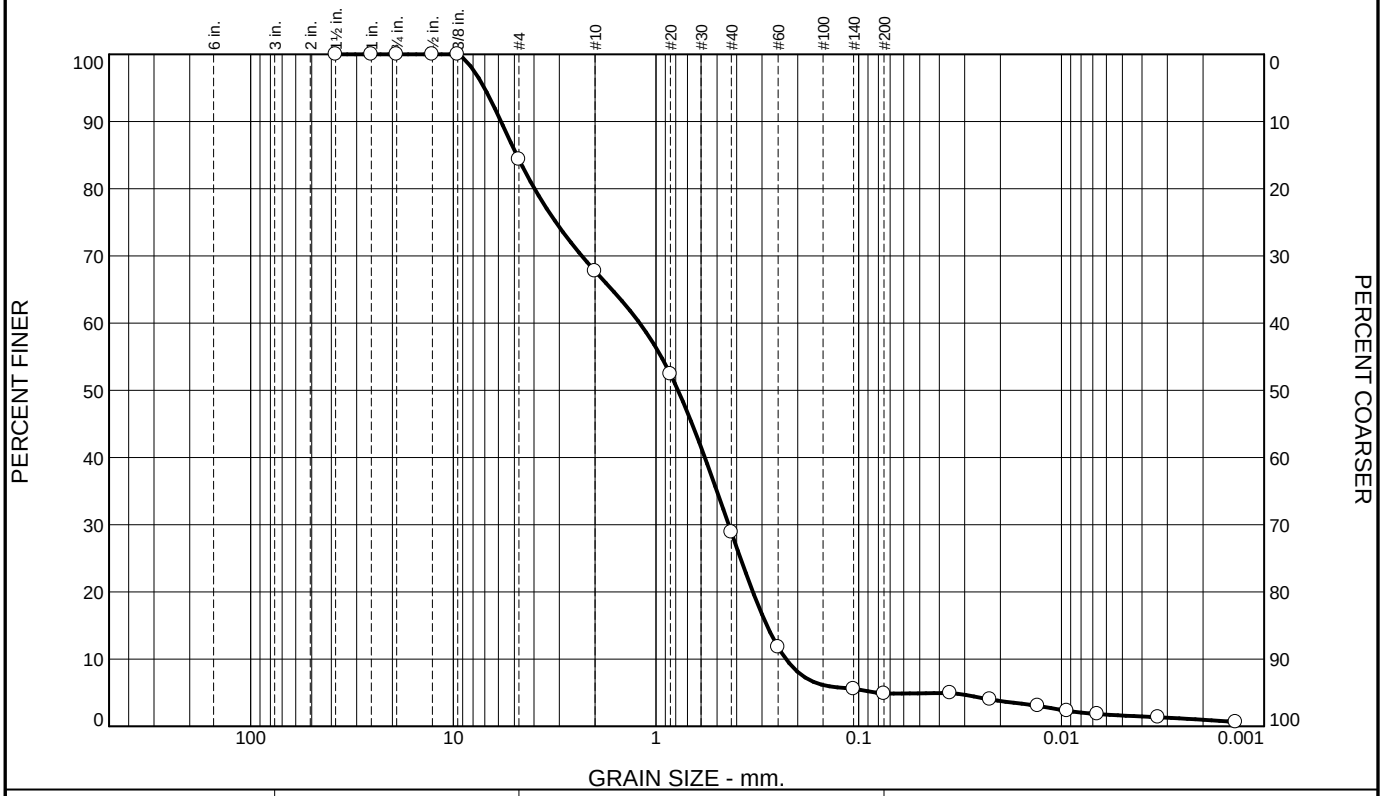
UNIT WEIGHT DETERMINATION

DATA SHEET
ASTM D7263

PROJECT:	Babylon Former MGP Site
PROJECT No.:	SH0727
SAMPLE No.:	SB-3 (8-25)
TESTING DATE:	10/04/19
TESTED BY:	JBA
TRACKING CODE:	D584

UNIT WEIGHT (DENSITY)						
1. SAMPLE NO.	A		B		C	
2. WT OF MOLD (tare weight)	18.19	g	18.20	g	18.18	g
3. WT OF MOLD + SOIL	424.62	g	429.84	g	425.21	g
4. WT OF WET SOIL, W	406.43	g	411.64	g	407.03	g
5. DIAMETER OF SPECIMEN, D	2.00	in	2.00	in	2.00	in
6. HEIGHT OF SPECIMEN, H	4.00	in	4.00	in	4.00	in
7. VOLUME OF SPECIMEN	12.57	in^3	12.57	in^3	12.57	in^3
8. BULK UNIT WEIGHT	123.2	pcf	124.8	pcf	123.4	pcf
9. BULK SPECIFIC GRAVITY	2.0		2.0		2.0	
10. AVERAGE BULK UNIT WEIGHT	123.8	pcf				
11. AVERAGE BULK SPECIFIC GRAVITY	2.0					

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	15.6	16.7	38.8	24.0	3.9	1.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1.0	100.0		
0.75	100.0		
0.5	100.0		
0.375	100.0		
#4	84.4		
#10	67.7		
#20	52.4		
#40	28.9		
#60	11.8		
#140	5.6		
#200	4.9		
0.0354 mm.	5.0		
0.0225 mm.	4.0		
0.0131 mm.	3.0		
0.0094 mm.	2.3		
0.0066 mm.	1.8		
0.0033 mm.	1.4		
0.0014 mm.	0.6		

* (no specification provided)

Soil Description

Yellowish brown poorly graded sand with gravel

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 5.8228 D_{85}= 4.8659 D_{60}= 1.2048
D_{50}= 0.7795 D_{30}= 0.4379 D_{15}= 0.2838
D_{10}= 0.2285 C_u= 5.27 C_c= 0.70

Classification

USCS= SP AASHTO= A-1-b

Remarks

Sample Number: SB-3(8-25)-DUP

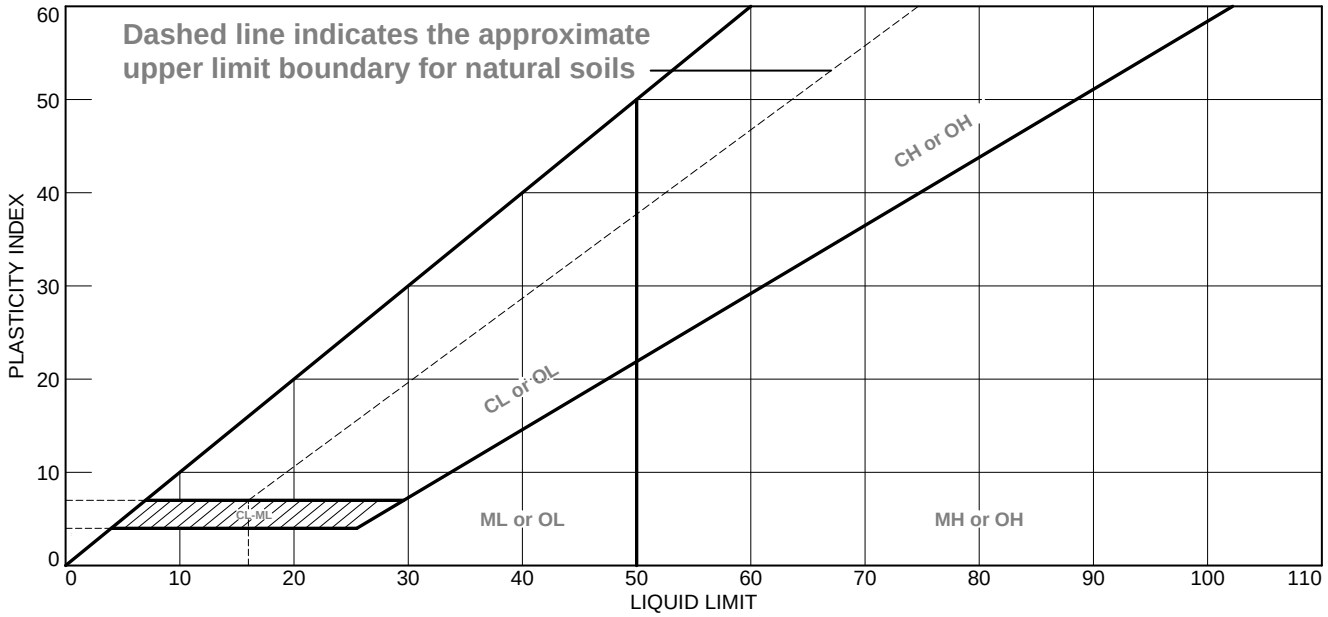
Date: 10/4/2019

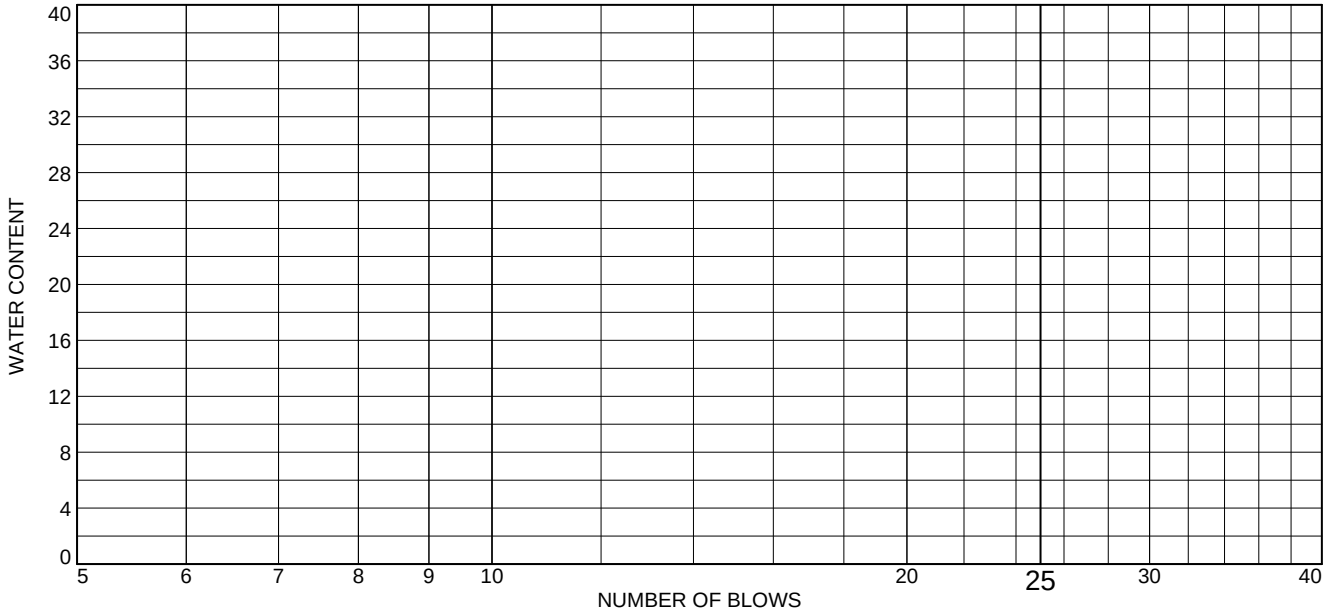
KEMRON Environmental Services Inc.
Atlanta, Georgia

Client: AECOM
Project: Babylon Former MGP ISS
Project No: SH0727 **Figure** D585

Tested By: ISM **Checked By:** TNB

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Yellowish brown poorly graded sand with gravel	NV	NP	NP	28.9	4.9	SP

Project No. SH0727 **Client:** AECOM

Project: Babylon Former MGP ISS

Sample Number: SB-3(8-25)-DUP

Remarks:

KEMRON Environmental Services Inc.

Atlanta, Georgia

Figure D585

SOLID SPECIFIC GRAVITY

ASTM D 854
DATA SHEET

PROJECT:	Babylon Former MGP Site
PROJECT No.:	SH0727
TESTING DATE:	10/10/2019
TESTED BY:	MTC
TRACKING CODE:	D585
SAMPLE NO:	SB-3 (8-25)-DUP

SOLID SPECIFIC GRAVITY		
1. SAMPLE NUMBER		
2. FLASK NUMBER	3	
3. TEMPERATURE	19.0	°C
4. WT. FLASK & WATER	244.36	g
5. WT. WATER, FLASK & SOIL	268.33	g
6. WT OF SOIL	23.97	g
7. CALIBRATION WATER & FLASK	350.92	g
8. DEAIRED SAMPLE	365.90	g
9. SPECIFIC GRAVITY	2.67	
10. CORRECTION FACTOR K	1.0002	
11. Gs @ 20 °C	2.67	

MOISTURE CONTENT DETERMINATION

REPORT FORM
ASTM D 2216

PROJECT:	Babylon Former MGP Site
PROJECT No.:	SH0727
SAMPLE No.:	SB-3 (8-25)-DUP
TESTING DATE:	10/08/19
TESTED BY:	MTC
TRACKING CODE:	D585

MOISTURE CONTENT (Dry & Wet Basis)						
1. MOISTURE TIN NO.	A		B		C	
2. WT MOISTURE TIN (tare weight)	1.0334	g	1.0457	g	1.0704	g
3. WT WET SOIL + TARE	18.6751	g	18.0999	g	18.2176	g
4. WT DRY SOIL + TARE	17.5624	g	17.1378	g	17.3540	g
5. WT WATER, Ww	1.1127	g	0.9621	g	0.8636	g
6. WT DRY SOIL, Ws	16.5290	g	16.0921	g	16.2836	g
7. ASTM MOISTURE CONTENT	6.73	%	5.98	%	5.30	%
8. PERCENT SOLIDS	93.69	%	94.36	%	94.96	%
9. AVERAGE ASTM MOISTURE CONTENT	6.00	%				
10. AVERAGE PERCENT SOLIDS	94.34	%				

LOSS ON IGNITION
(ORGANIC CONTENT)
ASTM D2974

PROJECT:	Babylon Former MGP Site
PROJECT No.:	SH0727
SAMPLE No.:	SB-3 (8-25)-DUP
TESTING DATE:	10/8/2019
TESTED BY:	MTC
TRACKING CODE:	D585

MOISTURE CONTENT / LOSS ON IGNITION						
1. MOISTURE TIN NO.	A		B		C	
2. WT MOISTURE TIN (tare weight)	63.919	g	69.655	g	65.595	g
3. WT WET SOIL + TARE	115.162	g	121.538	g	117.197	g
4. WT DRY SOIL + TARE	112.164	g	118.540	g	114.403	g
5. WT WATER, Ww	2.999	g	2.998	g	2.794	g
6. WT DRY SOIL, Ws	48.245	g	48.886	g	48.808	g
7. WT FINAL SOIL + TARE	111.955	g	118.336	g	114.243	g
8. WT FINAL SOIL, Wf	48.037	g	48.682	g	48.648	g
9. WT ORGANICS, Wo	0.208	g	0.204	g	0.160	g
10. MOISTURE CONTENT(ASTM)	6.22	%	6.13	%	5.72	%
11. LOSS ON IGNITION	0.43	%	0.42	%	0.33	%
12. AVERAGE MOISTURE CONTENT	6.02	%				
13. AVERAGE LOSS ON IGNITION	0.39	%				

UNIT WEIGHT DETERMINATION

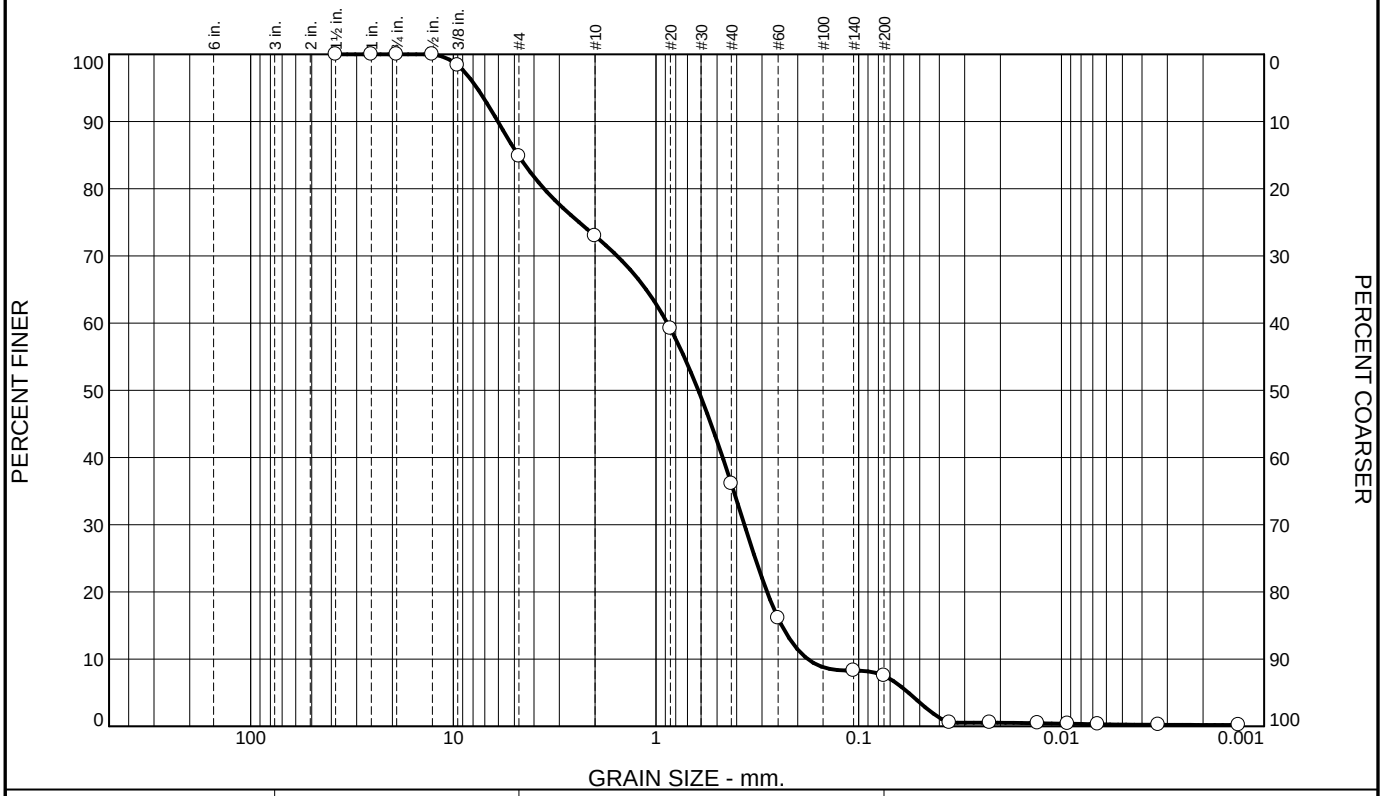
DATA SHEET
ASTM D7263

PROJECT:	Babylon Former MGP Site
PROJECT No.:	SH0727
SAMPLE No.:	SB-3 (8-25)-DUP
TESTING DATE:	10/04/19
TESTED BY:	JBA
TRACKING CODE:	D585

UNIT WEIGHT (DENSITY)			
1. SAMPLE NO.	A	B	C
2. WT OF MOLD (tare weight)	18.17 g	18.17 g	18.19 g
3. WT OF MOLD + SOIL	422.15 g	429.61 g	428.68 g
4. WT OF WET SOIL, W	403.98 g	411.44 g	410.49 g
5. DIAMETER OF SPECIMEN, D	2.00 in	2.00 in	2.00 in
6. HEIGHT OF SPECIMEN, H	4.00 in	4.00 in	4.00 in
7. VOLUME OF SPECIMEN	12.57 in^3	12.57 in^3	12.57 in^3
8. BULK UNIT WEIGHT	122.5 pcf	124.7 pcf	124.4 pcf
9. BULK SPECIFIC GRAVITY	2.0	2.0	2.0
10. AVERAGE BULK UNIT WEIGHT	123.9 pcf		
11. AVERAGE BULK SPECIFIC GRAVITY	2.0		

Appendix C:
Untreated Composite
Physical Characterization
Data Sheets

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	15.2	11.8	36.9	28.6	7.3	0.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1.0	100.0		
0.75	100.0		
0.5	100.0		
0.375	98.4		
#4	84.8		
#10	73.0		
#20	59.2		
#40	36.1		
#60	16.1		
#140	8.3		
#200	7.5		
0.0356 mm.	0.5		
0.0225 mm.	0.5		
0.0131 mm.	0.5		
0.0093 mm.	0.4		
0.0066 mm.	0.3		
0.0033 mm.	0.2		
0.0013 mm.	0.2		

* (no specification provided)

Soil Description

Brown poorly graded sand with silt and gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 6.0356 D_{85}= 4.7872 D_{60}= 0.8789
D_{50}= 0.6190 D_{30}= 0.3665 D_{15}= 0.2398
D_{10}= 0.1783 C_u= 4.93 C_c= 0.86

Classification

USCS= SP-SM AASHTO=

Remarks

Sample Number: SB-Comp

Date: 10/22/2019

KEMRON Environmental Services Inc.
Atlanta, Georgia

Client: AECOM
Project: Babylon Former MGP ISS
Project No: SH0727 **Figure** D622

Tested By: JBA **Checked By:** TNB

MOISTURE CONTENT DETERMINATION

REPORT FORM
ASTM D 2216

PROJECT:	Babylon Former MGP ISS
PROJECT No.:	SH0727
SAMPLE No.:	SB-Comp
TESTING DATE:	10/17/19
TESTED BY:	ISM
TRACKING CODE:	D622

MOISTURE CONTENT (Dry & Wet Basis)						
1. MOISTURE TIN NO.	A		B		C	
2. WT MOISTURE TIN (tare weight)	1.0243	g	1.0218	g	1.0499	g
3. WT WET SOIL + TARE	20.2569	g	20.2879	g	20.2845	g
4. WT DRY SOIL + TARE	18.2662	g	18.1465	g	18.2207	g
5. WT WATER, Ww	1.9907	g	2.1414	g	2.0638	g
6. WT DRY SOIL, Ws	17.2419	g	17.1247	g	17.1708	g
7. ASTM MOISTURE CONTENT	11.55	%	12.50	%	12.02	%
8. PERCENT SOLIDS	89.65	%	88.89	%	89.27	%
9. AVERAGE ASTM MOISTURE CONTENT	12.02	%				
10. AVERAGE PERCENT SOLIDS	89.27	%				

UNIT WEIGHT DETERMINATION

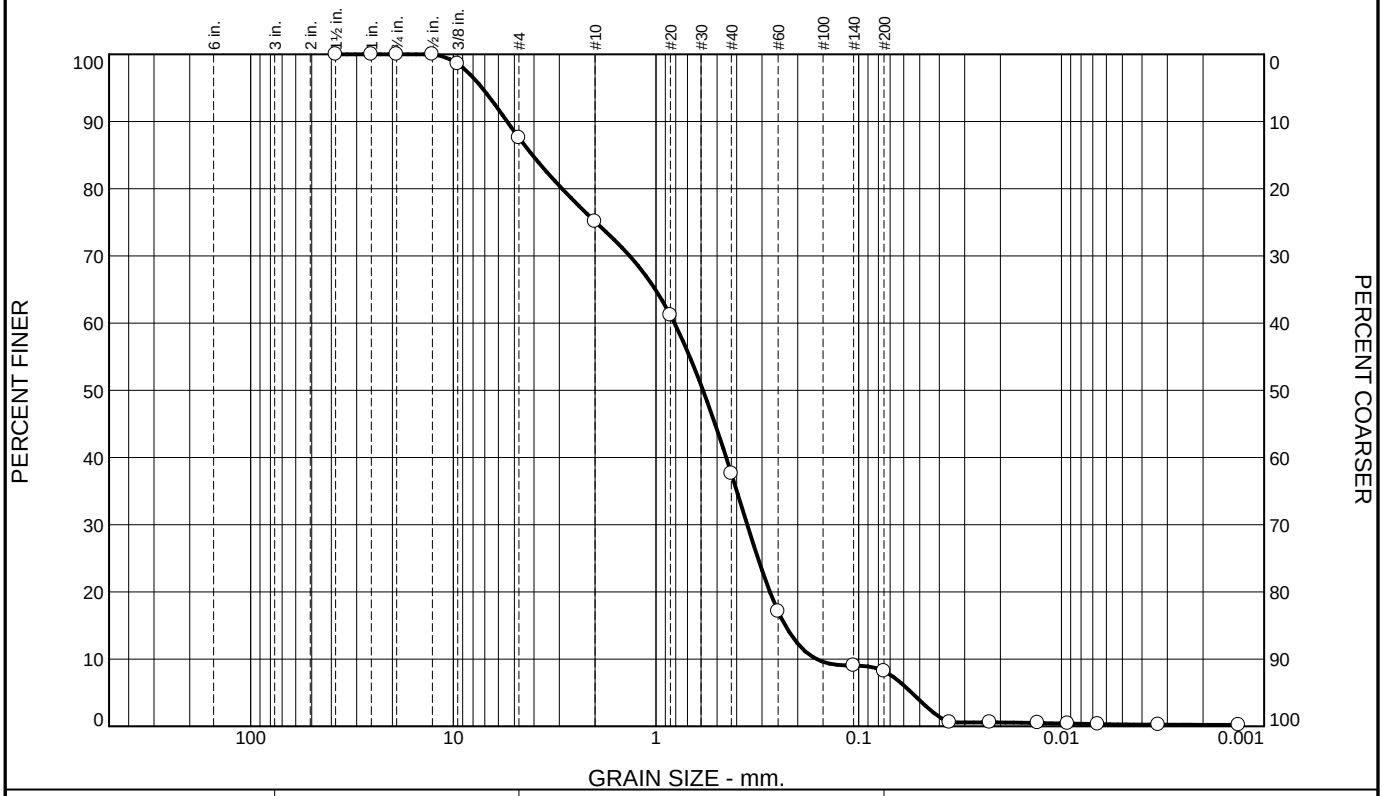
DATA SHEET
ASTM D7263

PROJECT:	Babylon Former MGP ISS
PROJECT No.:	SH0727
SAMPLE No.:	SB-Comp
TESTING DATE:	10/17/19
TESTED BY:	ISM
TRACKING CODE:	D622

UNIT WEIGHT (DENSITY)						
1. SAMPLE NO.	A		B		C	
2. WT OF MOLD (tare weight)	18.20	g	18.20	g	18.20	g
3. WT OF MOLD + SOIL	444.38	g	439.34	g	438.59	g
4. WT OF WET SOIL, W	426.18	g	421.14	g	420.39	g
5. DIAMETER OF SPECIMEN, D	2.00	in	2.00	in	2.00	in
6. HEIGHT OF SPECIMEN, H	4.00	in	4.00	in	4.00	in
7. VOLUME OF SPECIMEN	12.57	in^3	12.57	in^3	12.57	in^3
8. WET DENSITY	129.2	pcf	127.7	pcf	127.4	pcf
9. DRY DENSITY	115.8	pcf	113.5	pcf	113.8	pcf
AVERAGE BULK DENSITY	**128.1**	**pcf**				
AVERAGE DRY DENSITY	**114.4**	**pcf**				

MOISTURE CONTENT (Dry & Wet Basis)						
1. MOISTURE TIN NO.	A		B		C	
2. WT MOISTURE TIN (tare weight)	1.0243	g	1.0218	g	1.0499	g
3. WT WET SOIL + TARE	20.2569	g	20.2879	g	20.2845	g
4. WT DRY SOIL + TARE	18.2662	g	18.1465	g	18.2207	g
5. WT WATER, Ww	1.99	g	2.14	g	2.06	g
6. WT DRY SOIL, Ws	17.24	g	17.12	g	17.17	g
7. ASTM MOISTURE CONTENT, W	11.55	%	12.50	%	12.02	%
8. EPA MOISTURE CONTENT, W	10.35	%	11.11	%	10.73	%

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	12.4	12.5	37.5	29.4	8.0	0.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1.5	100.0		
1.0	100.0		
0.75	100.0		
0.5	100.0		
0.375	98.6		
#4	87.6		
#10	75.1		
#20	61.2		
#40	37.6		
#60	17.1		
#140	9.0		
#200	8.2		
0.0356 mm.	0.6		
0.0225 mm.	0.6		
0.0131 mm.	0.5		
0.0093 mm.	0.4		
0.0066 mm.	0.3		
0.0033 mm.	0.2		
0.0013 mm.	0.2		

* (no specification provided)

Soil Description

Brown poorly graded sand with silt

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 5.4309 D_{85}= 4.0718 D_{60}= 0.8113
D_{50}= 0.5864 D_{30}= 0.3548 D_{15}= 0.2303
D_{10}= 0.1615 C_u= 5.02 C_c= 0.96

Classification

USCS= SP-SM AASHTO=

Remarks

Sample Number: SB-Comp-DUP-2

Date:

KEMRON Environmental Services Inc.
Atlanta, Georgia

Client: AECOM
Project: Babylon Former MGP ISS
Project No: SH0727 **Figure** D623

Tested By: JBA **Checked By:** TNB

MOISTURE CONTENT DETERMINATION

REPORT FORM
ASTM D 2216

PROJECT:	Babylon Former MGP ISS
PROJECT No.:	SH0727
SAMPLE No.:	SB-Comp-DUP-2
TESTING DATE:	10/17/19
TESTED BY:	ISM
TRACKING CODE:	D623

MOISTURE CONTENT (Dry & Wet Basis)					
1. MOISTURE TIN NO.	A		B		C	
2. WT MOISTURE TIN (tare weight)	1.0305	g	1.0245	g	1.0106	g
3. WT WET SOIL + TARE	21.6324	g	21.7419	g	21.6109	g
4. WT DRY SOIL + TARE	19.3540	g	19.4940	g	19.3161	g
5. WT WATER, Ww	2.2784	g	2.2479	g	2.2948	g
6. WT DRY SOIL, Ws	18.3235	g	18.4695	g	18.3055	g
7. ASTM MOISTURE CONTENT	12.43	%	12.17	%	12.54	%
8. PERCENT SOLIDS	88.94	%	89.15	%	88.86	%
9. AVERAGE ASTM MOISTURE CONTENT	12.38	%				
10. AVERAGE PERCENT SOLIDS	88.98	%				

UNIT WEIGHT DETERMINATION

DATA SHEET
ASTM D7263

PROJECT:	Babylon Former MGP ISS
PROJECT No.:	SH0727
SAMPLE No.:	SB-Comp-DUP-2
TESTING DATE:	10/17/19
TESTED BY:	ISM
TRACKING CODE:	D623

UNIT WEIGHT (DENSITY)						
1. SAMPLE NO.	A		B		C	
2. WT OF MOLD (tare weight)	18.20	g	18.21	g	18.20	g
3. WT OF MOLD + SOIL	438.72	g	432.66	g	440.49	g
4. WT OF WET SOIL, W	420.52	g	414.45	g	422.29	g
5. DIAMETER OF SPECIMEN, D	2.00	in	2.00	in	2.00	in
6. HEIGHT OF SPECIMEN, H	4.00	in	4.00	in	4.00	in
7. VOLUME OF SPECIMEN	12.57	in^3	12.57	in^3	12.57	in^3
8. WET DENSITY	127.5	pcf	125.6	pcf	128.0	pcf
9. DRY DENSITY	113.4	pcf	112.0	pcf	113.8	pcf
AVERAGE BULK DENSITY	**127.0**	**pcf**				
AVERAGE DRY DENSITY	**113.0**	**pcf**				

MOISTURE CONTENT (Dry & Wet Basis)						
1. MOISTURE TIN NO.	A		B		C	
2. WT MOISTURE TIN (tare weight)	1.0305	g	1.0245	g	1.0106	g
3. WT WET SOIL + TARE	21.6324	g	21.7419	g	21.6109	g
4. WT DRY SOIL + TARE	19.3540	g	19.4940	g	19.3161	g
5. WT WATER, Ww	2.28	g	2.25	g	2.29	g
6. WT DRY SOIL, Ws	18.32	g	18.47	g	18.31	g
7. ASTM MOISTURE CONTENT, W	12.43	%	12.17	%	12.54	%
8. EPA MOISTURE CONTENT, W	11.06	%	10.85	%	11.14	%

Appendix D:
Preliminary Stabilization Evaluations
Mixture Development Sheets

MIX DEVELOPMENT DATA SHEET

PROJECT:	Babylon Former MGP	MIX No.	
PROJECT No.:	SH0727		0727-001
MIXING DATE:	15-Nov-19	MIXED BY:	ISM

UNTREATED MATERIAL TYPE		SB-Comp
WEIGHT OF UNTREATED MATERIAL		800 g
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Type I Portland Cement #842	5.00 %	40.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition	100 %	40.0 g

OBSERVATIONS / NOTES

40 g of water was added to the Portland Cement to create a slurry. The Portland cement and water slurry was added to the untreated soil.

PP @ 3,5 and 7 day
UCS @ 7 day

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

PENETROMETER ANALYSES

CURE TIME (Days)		3	5	7	
PENETROMETER (tons/ft^2)		>4.5	>4.5	>4.5	

MIX DEVELOPMENT DATA SHEET

PROJECT:	Babylon Former MGP	MIX No.	
PROJECT No.:	SH0727		0727-002
MIXING DATE:	15-Nov-19	MIXED BY:	ISM

UNTREATED MATERIAL TYPE		SB-Comp
WEIGHT OF UNTREATED MATERIAL		800 g
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Type I Portland Cement #842	8.00 %	64.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition	100 %	64.0 g

OBSERVATIONS / NOTES

64 g of water was added to the Portland Cement to create a slurry. The Portland Cement and water slurry was added to the untreated soil.

PP @ 3,5 and 7 day
UCS @ 7 day

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

PENETROMETER ANALYSES

CURE TIME (Days)		3	5	7	
PENETROMETER (tons/ft^2)		>4.5	>4.5	>4.5	

MIX DEVELOPMENT DATA SHEET

PROJECT:	Babylon Former MGP	MIX No.	
PROJECT No.:	SH0727		0727-003
MIXING DATE:	15-Nov-19	MIXED BY:	ISM

UNTREATED MATERIAL TYPE		SB-Comp
WEIGHT OF UNTREATED MATERIAL		800 g
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Type I Portland Cement #842	11.00 %	88.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition	100 %	88.0 g

OBSERVATIONS / NOTES

88 g of water was added to the Portland Cement to create a slurry. The Portland Cement and water slurry was added to the untreated soil.

PP @ 3,5 and 7 day
UCS @ 7 day

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

PENETROMETER ANALYSES

CURE TIME (Days)		3	5	7	
PENETROMETER (tons/ft^2)		>4.5	>4.5	>4.5	

MIX DEVELOPMENT DATA SHEET

PROJECT:	Babylon Former MGP	MIX No.	
PROJECT No.:	SH0727		0727-004
MIXING DATE:	15-Nov-19	MIXED BY:	ISM

UNTREATED MATERIAL TYPE		SB-Comp
WEIGHT OF UNTREATED MATERIAL		800 g
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Type I PC/GGBFS 60:40 #1094	5.00 %	40.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition	100 %	40.0 g

OBSERVATIONS / NOTES

40 g of water was added to the Type I PC/GGBFS to create a slurry. The Type I PC/GGBFS and water slurry was added to the untreated soil.

PP @ 3,5 and 7 day
UCS @ 7 day

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

PENETROMETER ANALYSES

CURE TIME (Days)		3	5	7	
PENETROMETER (tons/ft^2)		>4.5	>4.5	>4.5	

MIX DEVELOPMENT DATA SHEET

PROJECT:	Babylon Former MGP	MIX No.	
PROJECT No.:	SH0727		0727-005
MIXING DATE:	15-Nov-19	MIXED BY:	ISM

UNTREATED MATERIAL TYPE		SB-Comp
WEIGHT OF UNTREATED MATERIAL		800 g
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Type I PC/GGBFS 60:40 #1094	8.00 %	64.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition	100 %	64.0 g

OBSERVATIONS / NOTES

64 g of water was added to the Type I PC/GGBFS to create a slurry. The Type I PC/GGBFS and water slurry was added to the untreated soil.

PP @ 3,5 and 7 day
UCS @ 7 day

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

PENETROMETER ANALYSES

CURE TIME (Days)		3	5	7	
PENETROMETER (tons/ft^2)		>4.5	>4.5	>4.5	

MIX DEVELOPMENT DATA SHEET

PROJECT:	Babylon Former MGP	MIX No.	
PROJECT No.:	SH0727		0727-006
MIXING DATE:	15-Nov-19	MIXED BY:	ISM

UNTREATED MATERIAL TYPE		SB-Comp
WEIGHT OF UNTREATED MATERIAL		800 g
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Type I PC/GGBFS 60:40 #1094	11.00 %	88.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition	100 %	88.0 g

OBSERVATIONS / NOTES

88 g of water was added to the Type I PC/GGBFS to create a slurry. The Type I PC/GGBFS and water slurry was added to the untreated soil.

PP @ 3,5 and 7 day
UCS @ 7 day

MONITORING ACTIVITIES

MONITORING ACTIVITIES	TIME PERIOD				
MAXIMUM PID (ppm)					
Notes / Observations:					

PENETROMETER ANALYSES

CURE TIME (Days)		3	5	7	
PENETROMETER (tons/ft^2)		>4.5	>4.5	>4.5	

Appendix E:
Preliminary Stabilization Evaluations
Physical Characterization Data Sheets

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Babylon Former MGP		
PROJECT No.:	SH0729		
SAMPLE No.:	0727-001 (7day)		
TESTING DATE:	22-Nov-19	LOADING RATE:	0.0400 in./min
TESTED BY:	ISM	TRACKING CODE:	D768

MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	216.35	g
3. WT WET SOIL + TARE	450.27	g
4. WT DRY SOIL + TARE	428.09	g
5. WT WATER, Ww	22.18	g
6. WT DRY SOIL, Ws	211.74	g
7. MOISTURE CONTENT, W	**10.48**	**%**

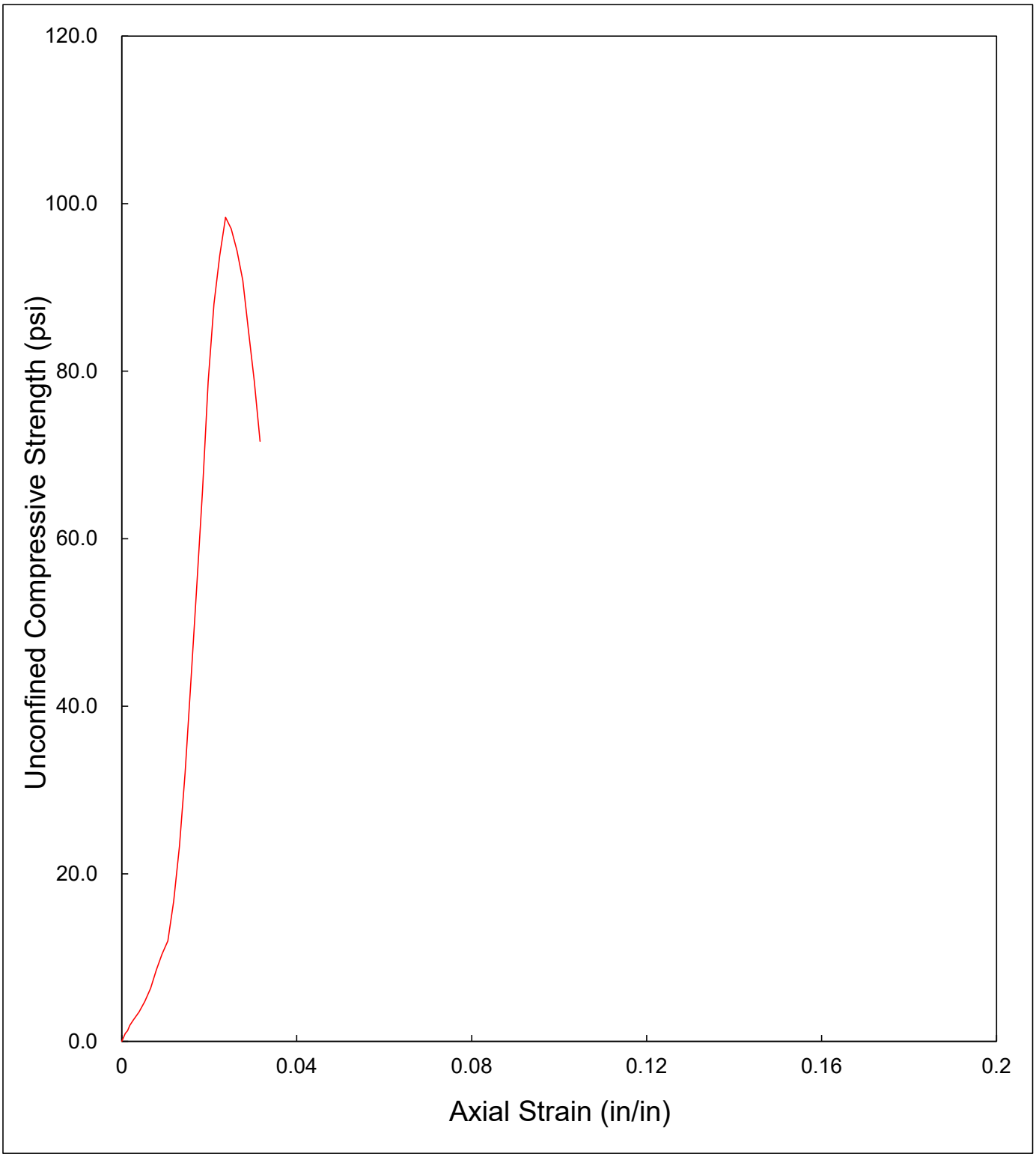
SOIL SPECIMEN DIMENSIONS				
	DIAMETER		*LENGTH*	
No. 1	2.01	in.	3.82	in.
No. 2	2.00	in.	3.79	in.
No. 3	1.99	in.	3.77	in.
Average	**2.00**	**in.**	**3.80**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***426.29***	***g***
Initial Area, Ao	3.14	in^2
Initial Volume, Vo	11.90	in^3
Initial Bulk Unit Weight,	136.4	lb/ft^3
Initial Dry Unit Weight	123.5	lb/ft^3
15 % Strain (0.15 Lo)	0.57	in.
UCS	98.4	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.136	0.0000	0.0
3	0.003	0.003	3.139	0.0008	1.0
4	0.005	0.005	3.140	0.0013	1.3
6	0.007	0.007	3.142	0.0018	1.9
8	0.010	0.010	3.145	0.0026	2.5
11	0.015	0.015	3.149	0.0040	3.5
15	0.020	0.020	3.153	0.0053	4.8
20	0.025	0.025	3.157	0.0066	6.3
27	0.030	0.030	3.161	0.0079	8.5
33	0.035	0.035	3.166	0.0092	10.4
38	0.040	0.040	3.170	0.0105	12.0
53	0.045	0.045	3.174	0.0119	16.7
74	0.050	0.050	3.178	0.0132	23.3
102	0.055	0.055	3.182	0.0145	32.1
137	0.060	0.060	3.187	0.0158	43.0
173	0.065	0.065	3.191	0.0171	54.2
210	0.070	0.070	3.195	0.0184	65.7
252	0.075	0.075	3.200	0.0198	78.8
282	0.080	0.080	3.204	0.0211	88.0
301	0.085	0.085	3.208	0.0224	93.8
316	0.090	0.090	3.213	0.0237	98.4
312	0.095	0.095	3.217	0.0250	97.0
304	0.100	0.100	3.221	0.0263	94.4
293	0.105	0.105	3.226	0.0277	90.8
274	0.110	0.110	3.230	0.0290	84.8
255	0.115	0.115	3.234	0.0303	78.8
232	0.120	0.120	3.239	0.0316	71.6

UNCONFINED COMPRESSION TESTING

Sample No. 0727-001 (7day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Babylon Former MGP		
PROJECT No.:	SH0729		
SAMPLE No.:	0727-001 (7day)		
TESTING DATE:	22-Nov-19	LOADING RATE:	0.0400 in./min
TESTED BY:	ISM	TRACKING CODE:	D768

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	10.5	**%**
BULK UNIT WEIGHT	136.4	lb/ft³
DRY UNIT WEIGHT	123.5	lb/ft³
UCS *	98.4	lb/in²

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Babylon Former MGP		
PROJECT No.:	SH0729		
SAMPLE No.:	0727-002 (7day)		
TESTING DATE:	22-Nov-19	LOADING RATE:	0.0400 in./min
TESTED BY:	ISM	TRACKING CODE:	D769

MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	217.10	g
3. WT WET SOIL + TARE	410.75	g
4. WT DRY SOIL + TARE	384.84	g
5. WT WATER, Ww	25.91	g
6. WT DRY SOIL, Ws	167.74	g
7. MOISTURE CONTENT, W	**15.45**	**%**

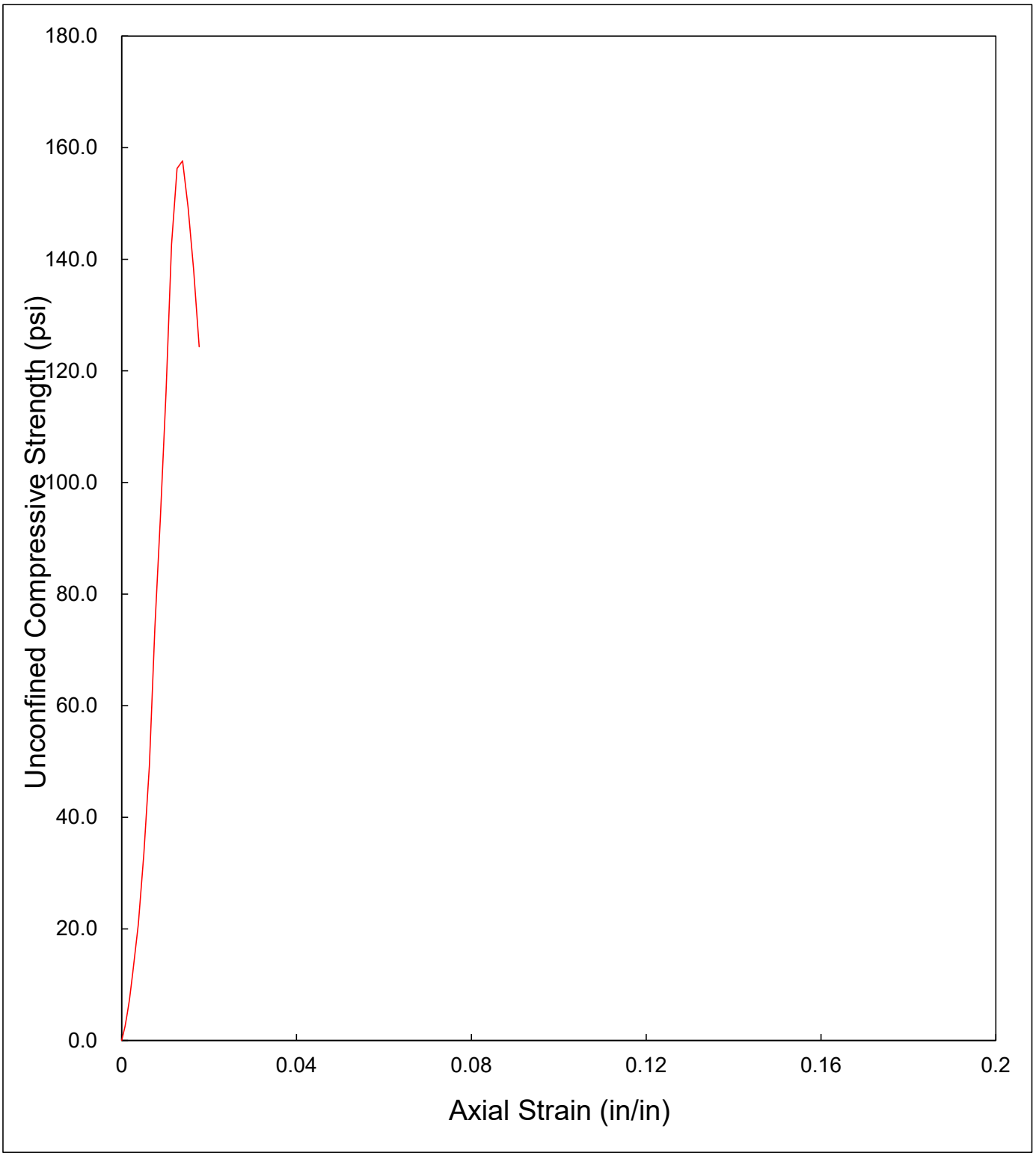
SOIL SPECIMEN DIMENSIONS				
	DIAMETER		*LENGTH*	
No. 1	2.02	in.	3.97	in.
No. 2	2.00	in.	3.94	in.
No. 3	1.99	in.	3.94	in.
Average	**2.00**	**in.**	**3.95**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***425.86***	***g***
Initial Area, Ao	3.15	in^2
Initial Volume, Vo	12.45	in^3
Initial Bulk Unit Weight,	130.3	lb/ft^3
Initial Dry Unit Weight	112.9	lb/ft^3
15 % Strain (0.15 Lo)	0.59	in.
UCS	157.6	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.153	0.0000	0.0
8	0.003	0.003	3.155	0.0008	2.5
15	0.005	0.005	3.157	0.0013	4.8
23	0.007	0.007	3.158	0.0018	7.3
38	0.010	0.010	3.161	0.0025	12.0
66	0.015	0.015	3.165	0.0038	20.9
106	0.020	0.020	3.169	0.0051	33.5
156	0.025	0.025	3.173	0.0063	49.2
235	0.030	0.030	3.177	0.0076	74.0
298	0.035	0.035	3.181	0.0089	93.7
370	0.040	0.040	3.185	0.0101	116.2
455	0.045	0.045	3.189	0.0114	142.7
499	0.050	0.050	3.193	0.0127	156.3
504	0.055	0.055	3.197	0.0139	157.6
478	0.060	0.060	3.201	0.0152	149.3
443	0.065	0.065	3.205	0.0165	138.2
399	0.070	0.070	3.210	0.0177	124.3

UNCONFINED COMPRESSION TESTING

Sample No. 0727-002 (7day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Babylon Former MGP		
PROJECT No.:	SH0729		
SAMPLE No.:	0727-002 (7day)		
TESTING DATE:	22-Nov-19	LOADING RATE:	0.0400 in./min
TESTED BY:	ISM	TRACKING CODE:	D769

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	15.4	**%**
BULK UNIT WEIGHT	130.3	lb/ft³
DRY UNIT WEIGHT	112.9	lb/ft³
UCS *	157.6	lb/in²

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Babylon Former MGP		
PROJECT No.:	SH0729		
SAMPLE No.:	0727-003 (7day)		
TESTING DATE:	22-Nov-19	LOADING RATE:	0.0400 in./min
TESTED BY:	ISM	TRACKING CODE:	D770

MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	221.63	g
3. WT WET SOIL + TARE	404.23	g
4. WT DRY SOIL + TARE	376.74	g
5. WT WATER, Ww	27.49	g
6. WT DRY SOIL, Ws	155.11	g
7. MOISTURE CONTENT, W	**17.72**	**%**

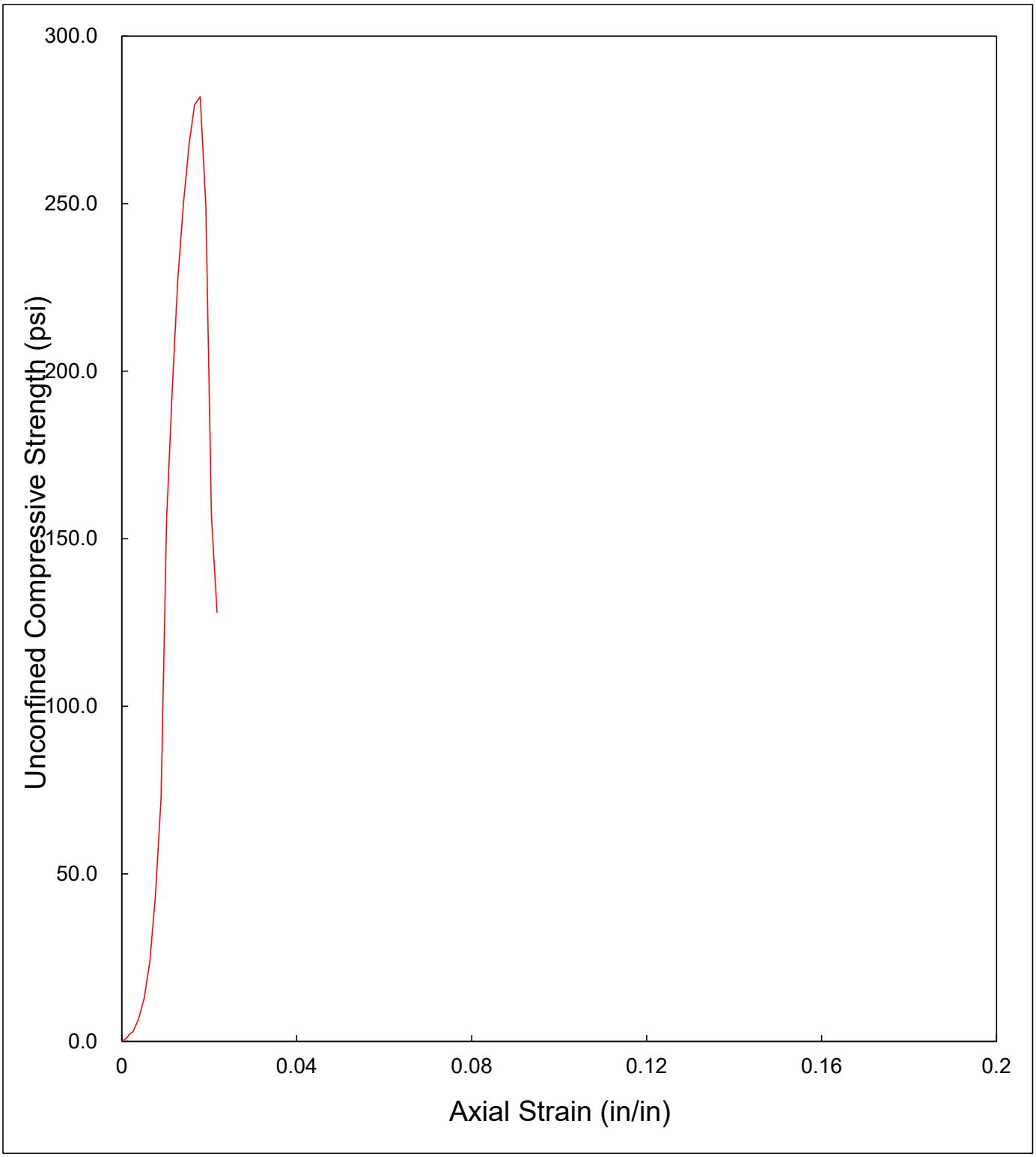
SOIL SPECIMEN DIMENSIONS				
	DIAMETER		*LENGTH*	
No. 1	2.02	in.	3.91	in.
No. 2	2.01	in.	3.89	in.
No. 3	1.99	in.	3.91	in.
Average	**2.00**	**in.**	**3.90**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***428.66***	***g***
Initial Area, Ao	3.16	in^2
Initial Volume, Vo	12.32	in^3
Initial Bulk Unit Weight,	132.6	lb/ft^3
Initial Dry Unit Weight	112.6	lb/ft^3
15 % Strain (0.15 Lo)	0.59	in.
UCS	281.9	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.156	0.0000	0.0
2	0.003	0.003	3.159	0.0008	0.6
4	0.005	0.005	3.160	0.0013	1.3
7	0.007	0.007	3.162	0.0018	2.2
9	0.010	0.010	3.164	0.0026	2.8
21	0.015	0.015	3.168	0.0038	6.6
41	0.020	0.020	3.173	0.0051	12.9
75	0.025	0.025	3.177	0.0064	23.6
138	0.030	0.030	3.181	0.0077	43.4
231	0.035	0.035	3.185	0.0090	72.5
353	0.040	0.040	3.189	0.0102	155.5
496	0.045	0.045	3.193	0.0115	194.5
621	0.050	0.050	3.197	0.0128	227.1
726	0.055	0.055	3.201	0.0141	249.9
800	0.060	0.060	3.206	0.0154	267.7
858	0.065	0.065	3.210	0.0167	279.5
897	0.070	0.070	3.214	0.0179	281.9
906	0.075	0.075	3.218	0.0192	248.9
801	0.080	0.080	3.222	0.0205	157.0
506	0.085	0.085	3.227	0.0218	128.0

UNCONFINED COMPRESSION TESTING

Sample No. 0727-003 (7day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Babylon Former MGP		
PROJECT No.:	SH0729		
SAMPLE No.:	0727-003 (7day)		
TESTING DATE:	22-Nov-19	LOADING RATE:	0.0400 in./min
TESTED BY:	ISM	TRACKING CODE:	D770

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	17.7	**%**
BULK UNIT WEIGHT	132.6	lb/ft³
DRY UNIT WEIGHT	112.6	lb/ft³
UCS *	281.9	lb/in²

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Babylon Former MGP		
PROJECT No.:	SH0729		
SAMPLE No.:	0727-004 (7day)		
TESTING DATE:	22-Nov-19	LOADING RATE:	0.0400 in./min
TESTED BY:	ISM	TRACKING CODE:	D771

MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	215.52	g
3. WT WET SOIL + TARE	387.55	g
4. WT DRY SOIL + TARE	370.19	g
5. WT WATER, Ww	17.36	g
6. WT DRY SOIL, Ws	154.67	g
7. MOISTURE CONTENT, W	**11.22**	**%**

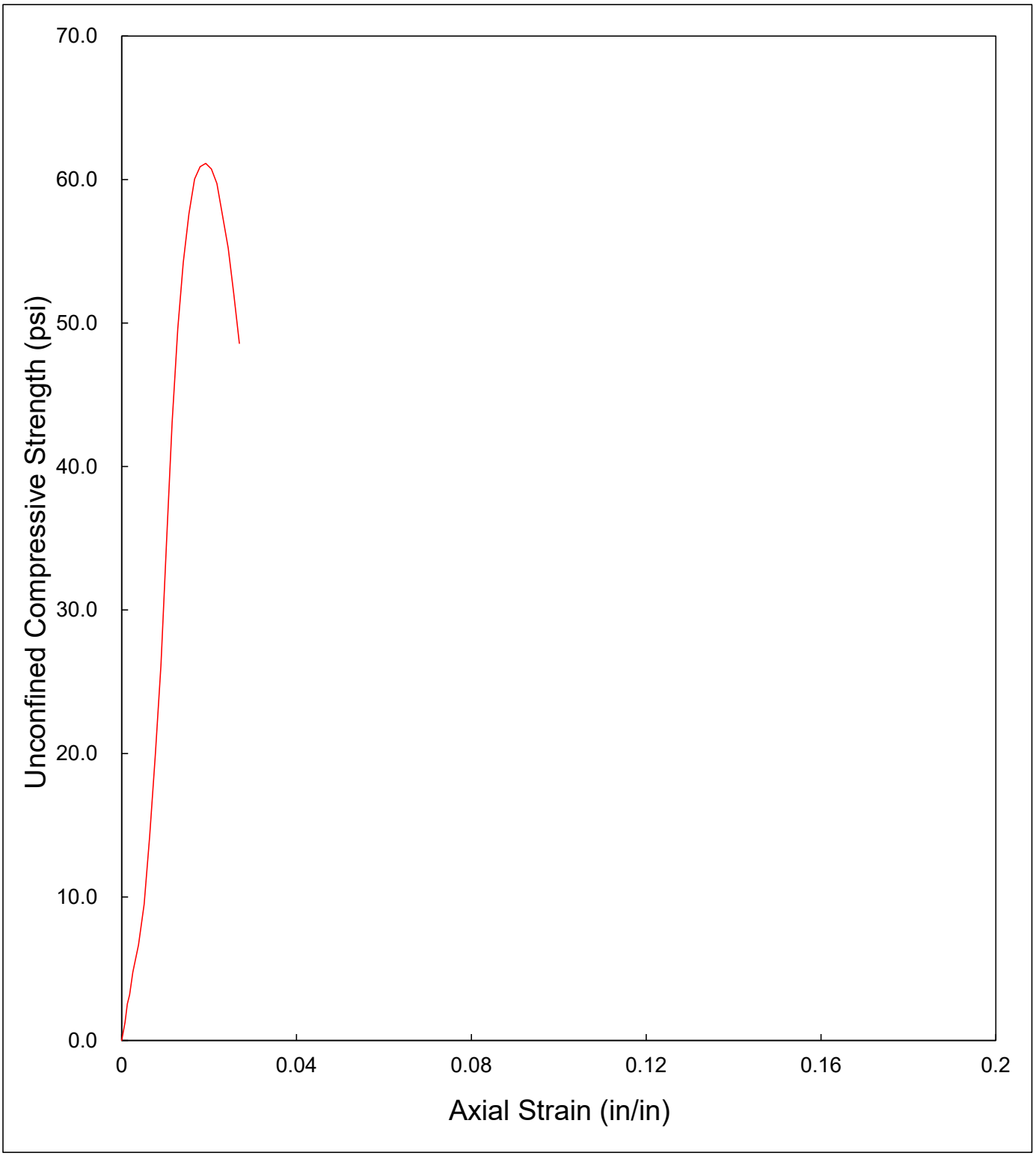
SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	2.01	in.	3.89	in.
No. 2	2.00	in.	3.92	in.
No. 3	1.99	in.	3.89	in.
Average	**2.00**	**in.**	**3.90**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***428.07***	***g***
Initial Area, Ao	3.14	in^2
Initial Volume, Vo	12.26	in^3
Initial Bulk Unit Weight,	133.0	lb/ft^3
Initial Dry Unit Weight	119.5	lb/ft^3
15 % Strain (0.15 Lo)	0.59	in.
UCS	61.1	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.145	0.0000	0.0
4	0.003	0.003	3.147	0.0008	1.3
8	0.005	0.005	3.149	0.0013	2.5
10	0.007	0.007	3.150	0.0018	3.2
15	0.010	0.010	3.153	0.0026	4.8
21	0.015	0.015	3.157	0.0038	6.7
30	0.020	0.020	3.161	0.0051	9.5
45	0.025	0.025	3.165	0.0064	14.2
63	0.030	0.030	3.169	0.0077	19.9
83	0.035	0.035	3.173	0.0090	26.2
110	0.040	0.040	3.177	0.0103	34.6
137	0.045	0.045	3.181	0.0115	43.1
158	0.050	0.050	3.186	0.0128	49.6
173	0.055	0.055	3.190	0.0141	54.2
184	0.060	0.060	3.194	0.0154	57.6
192	0.065	0.065	3.198	0.0167	60.0
195	0.070	0.070	3.202	0.0179	60.9
196	0.075	0.075	3.206	0.0192	61.1
195	0.080	0.080	3.211	0.0205	60.7
192	0.085	0.085	3.215	0.0218	59.7
185	0.090	0.090	3.219	0.0231	57.5
178	0.095	0.095	3.223	0.0244	55.2
168	0.100	0.100	3.227	0.0256	52.1
157	0.105	0.105	3.232	0.0269	48.6

UNCONFINED COMPRESSION TESTING

Sample No. 0727-004 (7day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Babylon Former MGP		
PROJECT No.:	SH0729		
SAMPLE No.:	0727-004 (7day)		
TESTING DATE:	22-Nov-19	LOADING RATE:	0.0400 in./min
TESTED BY:	ISM	TRACKING CODE:	D771

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	11.2	**%**
BULK UNIT WEIGHT	133.0	lb/ft³
DRY UNIT WEIGHT	119.5	lb/ft³
UCS *	61.1	lb/in²

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Babylon Former MGP		
PROJECT No.:	SH0729		
SAMPLE No.:	0727-005 (7day)		
TESTING DATE:	22-Nov-19	LOADING RATE:	0.0400 in./min
TESTED BY:	ISM	TRACKING CODE:	D772

MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	226.53	g
3. WT WET SOIL + TARE	420.64	g
4. WT DRY SOIL + TARE	396.46	g
5. WT WATER, Ww	24.18	g
6. WT DRY SOIL, Ws	169.93	g
7. MOISTURE CONTENT, W	**14.23**	**%**

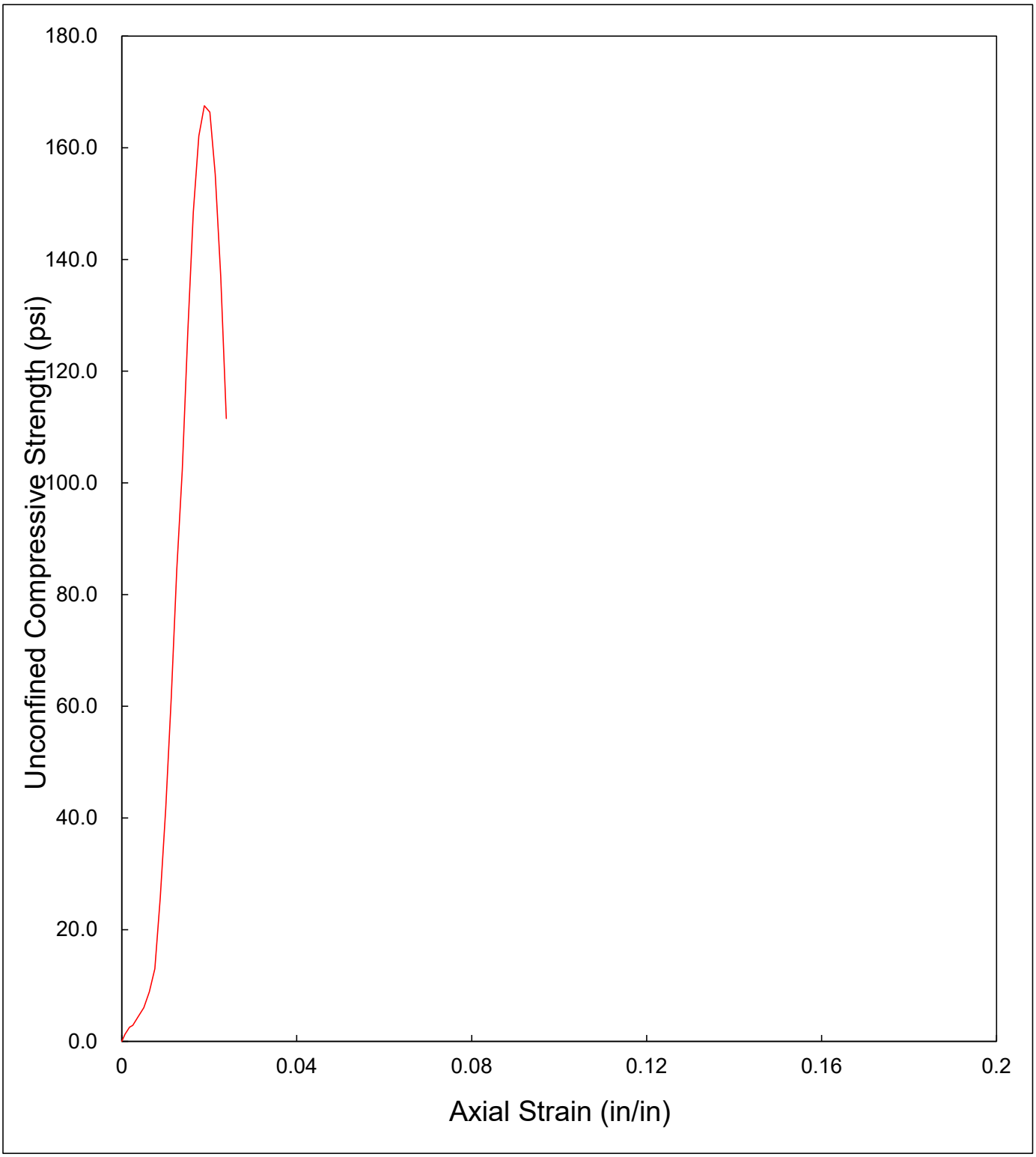
SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	2.00	in.	3.96	in.
No. 2	2.00	in.	3.99	in.
No. 3	1.99	in.	3.99	in.
Average	**2.00**	**in.**	**3.98**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***426.32***	***g***
Initial Area, Ao	3.13	in^2
Initial Volume, Vo	12.46	in^3
Initial Bulk Unit Weight,	130.4	lb/ft^3
Initial Dry Unit Weight	114.1	lb/ft^3
15 % Strain (0.15 Lo)	0.60	in.
UCS	167.5	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.133	0.0000	0.0
4	0.003	0.003	3.136	0.0008	1.3
6	0.005	0.005	3.137	0.0013	1.9
8	0.007	0.007	3.139	0.0018	2.5
9	0.010	0.010	3.141	0.0025	2.9
14	0.015	0.015	3.145	0.0038	4.5
19	0.020	0.020	3.149	0.0050	6.0
28	0.025	0.025	3.153	0.0063	8.9
41	0.030	0.030	3.157	0.0075	13.0
81	0.035	0.035	3.161	0.0088	25.6
132	0.040	0.040	3.165	0.0101	41.7
195	0.045	0.045	3.169	0.0113	61.5
268	0.050	0.050	3.173	0.0126	84.5
325	0.055	0.055	3.177	0.0138	102.3
404	0.060	0.060	3.181	0.0151	127.0
473	0.065	0.065	3.185	0.0164	148.5
517	0.070	0.070	3.189	0.0176	162.1
535	0.075	0.075	3.193	0.0189	167.5
532	0.080	0.080	3.198	0.0201	166.4
497	0.085	0.085	3.202	0.0214	155.2
439	0.090	0.090	3.206	0.0226	136.9
358	0.095	0.095	3.210	0.0239	111.5

UNCONFINED COMPRESSION TESTING

Sample No. 0727-005 (7day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Babylon Former MGP		
PROJECT No.:	SH0729		
SAMPLE No.:	0727-005 (7day)		
TESTING DATE:	22-Nov-19	LOADING RATE:	0.0400 in./min
TESTED BY:	ISM	TRACKING CODE:	D772

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	14.2	**%**
BULK UNIT WEIGHT	130.4	lb/ft³
DRY UNIT WEIGHT	114.1	lb/ft³
UCS *	167.5	lb/in²

* UCS - UNCONFINED COMPRESSIVE STRENGTH

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Babylon Former MGP		
PROJECT No.:	SH0729		
SAMPLE No.:	0727-006 (7day)		
TESTING DATE:	22-Nov-19	LOADING RATE:	0.0400 in./min
TESTED BY:	ISM	TRACKING CODE:	D773

MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	211.86	g
3. WT WET SOIL + TARE	418.13	g
4. WT DRY SOIL + TARE	389.39	g
5. WT WATER, Ww	28.74	g
6. WT DRY SOIL, Ws	177.53	g
7. MOISTURE CONTENT, W	**16.19**	**%**

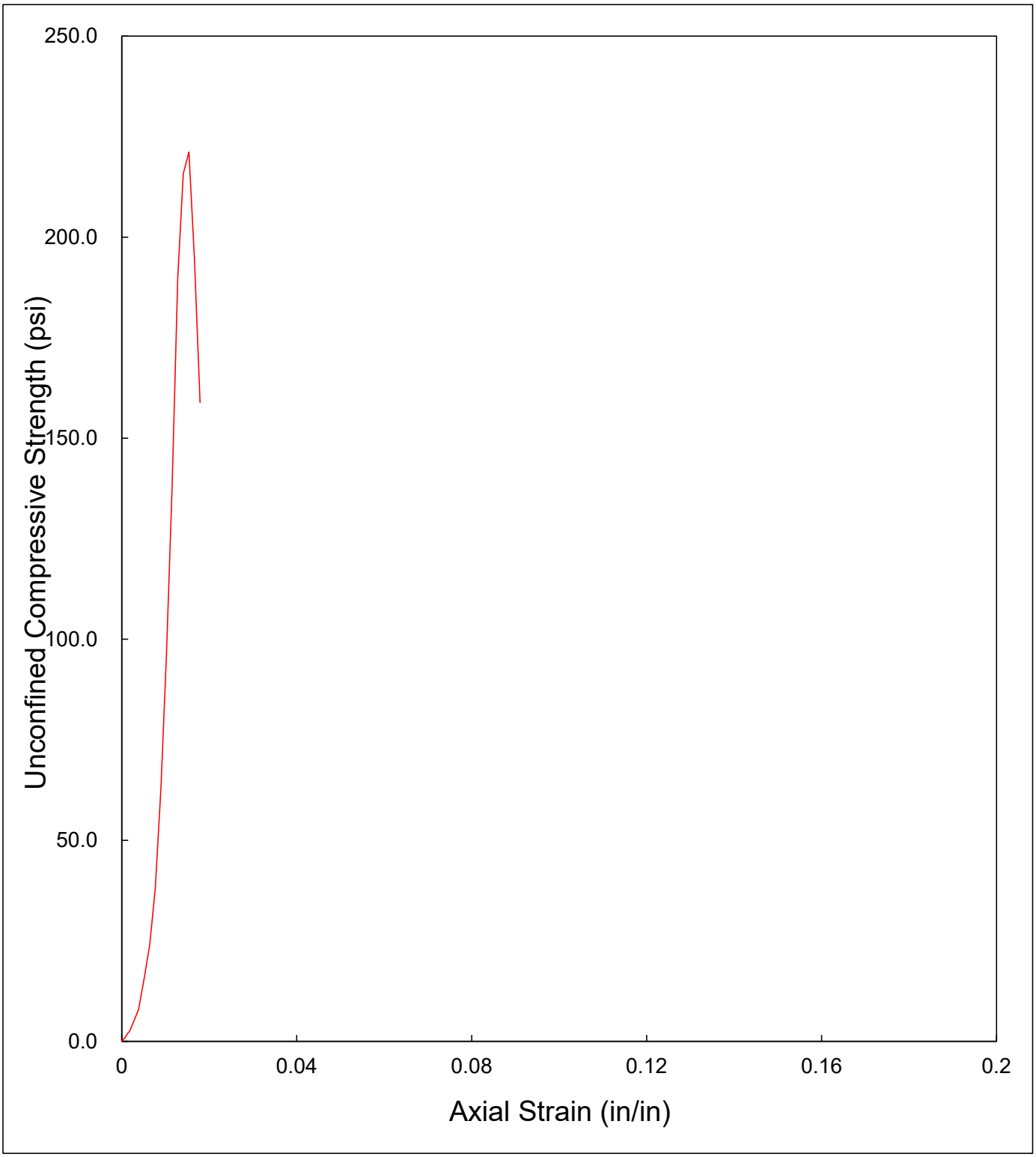
SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	2.00	in.	3.91	in.
No. 2	2.00	in.	3.92	in.
No. 3	1.99	in.	3.90	in.
Average	**2.00**	**in.**	**3.91**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***420.76***	***g***
Initial Area, Ao	3.13	in^2
Initial Volume, Vo	12.26	in^3
Initial Bulk Unit Weight,	130.8	lb/ft^3
Initial Dry Unit Weight	112.5	lb/ft^3
15 % Strain (0.15 Lo)	0.59	in.
UCS	221.2	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.134	0.0000	0.0
3	0.003	0.003	3.137	0.0008	1.0
6	0.005	0.005	3.138	0.0013	1.9
8	0.007	0.007	3.140	0.0018	2.5
14	0.010	0.010	3.142	0.0026	4.5
25	0.015	0.015	3.146	0.0038	7.9
49	0.020	0.020	3.150	0.0051	15.6
76	0.025	0.025	3.154	0.0064	24.1
120	0.030	0.030	3.158	0.0077	38.0
199	0.035	0.035	3.163	0.0089	62.9
304	0.040	0.040	3.167	0.0102	96.0
437	0.045	0.045	3.171	0.0115	137.8
603	0.050	0.050	3.175	0.0128	189.9
686	0.055	0.055	3.179	0.0141	215.8
704	0.060	0.060	3.183	0.0153	221.2
620	0.065	0.065	3.187	0.0166	194.5
507	0.070	0.070	3.191	0.0179	158.9

UNCONFINED COMPRESSION TESTING

Sample No. 0727-006 (7day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Babylon Former MGP		
PROJECT No.:	SH0729		
SAMPLE No.:	0727-006 (7day)		
TESTING DATE:	22-Nov-19	LOADING RATE:	0.0400 in./min
TESTED BY:	ISM	TRACKING CODE:	D773

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	16.2	**%**
BULK UNIT WEIGHT	130.8	lb/ft³
DRY UNIT WEIGHT	112.5	lb/ft³
UCS *	221.2	lb/in²

* UCS - UNCONFINED COMPRESSIVE STRENGTH

Appendix F:
Optimization Evaluations Mixture Development Sheets

MIX DEVELOPMENT DATA SHEET

PROJECT:	Babylon Former MGP	MIX No.	
PROJECT No.:	SH0727		0727-007
MIXING DATE:	19-Dec-19	MIXED BY:	JBA

UNTREATED MATERIAL TYPE		SB-Comp
WEIGHT OF UNTREATED MATERIAL		1,600 g
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
Type I Portland Cement #842	5.00 %	80.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition	100 %	80.0 g

OBSERVATIONS / NOTES

80 g of water was added to the Portland Cement to create a slurry. The Portland cement and water slurry was added to the untreated soil.

UCS @ 7 day, 28 day
Hydraulic Conductivity 28 day

MIX DEVELOPMENT DATA SHEET

PROJECT:	Babylon Former MGP	MIX No.	
PROJECT No.:	SH0727		0727-008
MIXING DATE:	9-Dec-19	MIXED BY:	JBA

UNTREATED MATERIAL TYPE		SB-Comp
WEIGHT OF UNTREATED MATERIAL		1,600 g
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
60:40 Type I Portland Cement/ GGBFS #1094	5.00 %	80.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition	100 %	80.0 g

OBSERVATIONS / NOTES

80 g of water was added to the Portland Cement and GGBFS to create a slurry. The Portland cement, GGBFS and water slurry was added to the untreated soil.

UCS @ 7 day, 28 day
Hydraulic Conductivity 28 day

MIX DEVELOPMENT DATA SHEET

PROJECT:	Babylon Former MGP	MIX No.	
PROJECT No.:	SH0727		0727-009
MIXING DATE:	9-Dec-19	MIXED BY:	JBA

UNTREATED MATERIAL TYPE		SB-Comp
WEIGHT OF UNTREATED MATERIAL		1,600 g
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
60:40 Type I Portland Cement/ GGBFS #1094	8.00 %	128.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition	100 %	128.0 g

OBSERVATIONS / NOTES

128 g of water was added to the Portland Cement and GGBFS to create a slurry. The Portland cement, GGBFS and water slurry was added to the untreated soil.

UCS @ 7 day, 28 day
Hydraulic Conductivity 28 day

MIX DEVELOPMENT DATA SHEET

PROJECT:	Babylon Former MGP	MIX No.	
PROJECT No.:	SH0727		0727-010
MIXING DATE:	9-Dec-19	MIXED BY:	JBA

UNTREATED MATERIAL TYPE		SB-Comp
WEIGHT OF UNTREATED MATERIAL		1,600 g
REAGENT TYPE AND LOT NUMBER	ADDITION RATE	WEIGHT
60:40 Type I Portland Cement/ GGBFS #1094	11.00 %	176.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
	%	0.0 g
Water Addition	100 %	176.0 g

OBSERVATIONS / NOTES

176 g of water was added to the Portland Cement and GGBFS to create a slurry. The Portland cement, GGBFS and water slurry was added to the untreated soil.

UCS @ 7 day, 28 day
Hydraulic Conductivity 28 day

Appendix G:
Optimization Stabilization Evaluations
Physical Characterization Data Sheets

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Babylon Former MGP ISS		
PROJECT No.:	SH0727		
SAMPLE No.:	0727-007 (28 day)		
TESTING DATE:	16-Jan-20	LOADING RATE:	0.0400 in./min
TESTED BY:	FA	TRACKING CODE:	D924

MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	217.78	g
3. WT WET SOIL + TARE	421.05	g
4. WT DRY SOIL + TARE	399.48	g
5. WT WATER, Ww	21.57	g
6. WT DRY SOIL, Ws	181.70	g
7. MOISTURE CONTENT, W	**11.87**	**%**

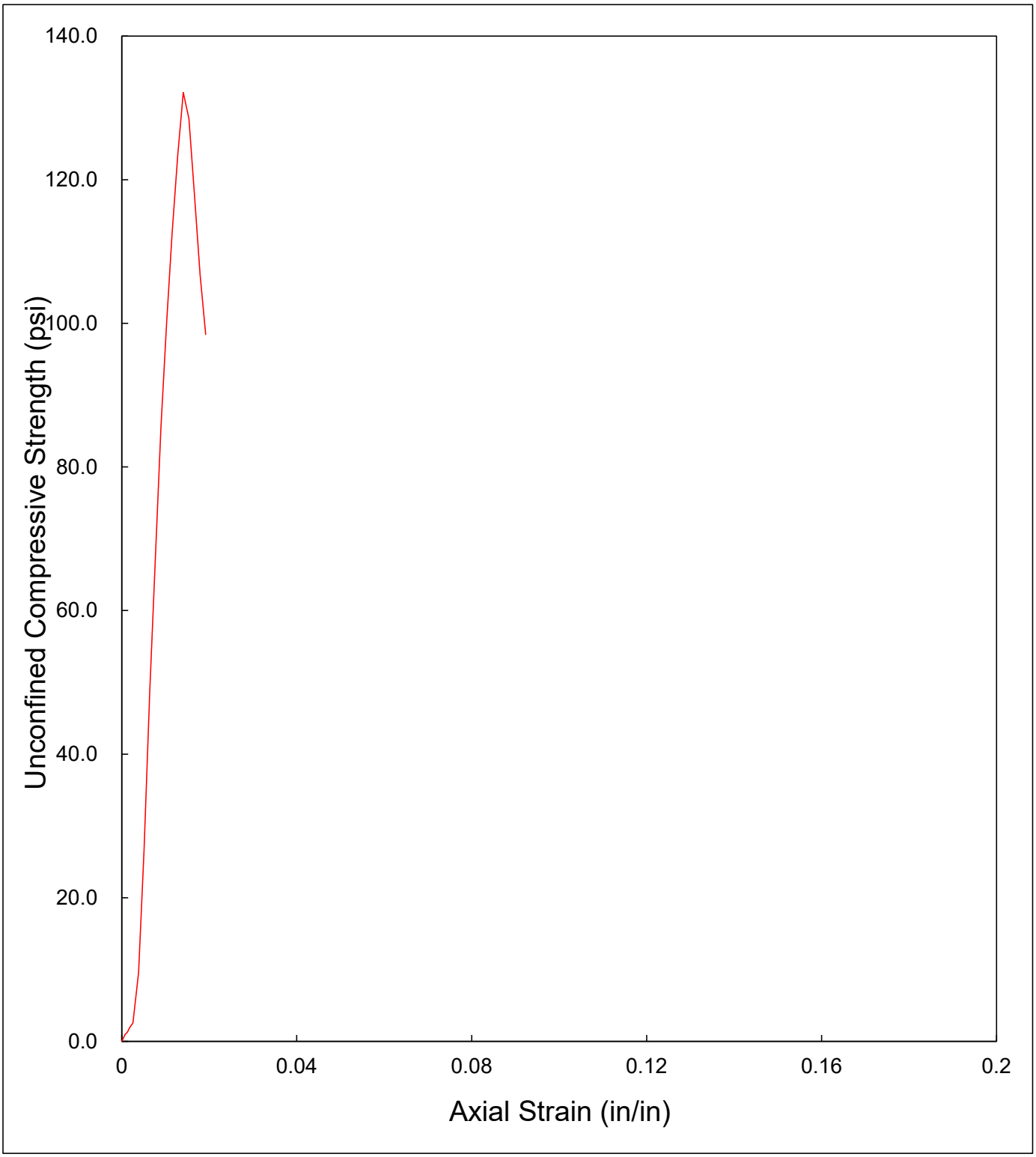
SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	1.99	in.	3.93	in.
No. 2	2.00	in.	3.90	in.
No. 3	1.99	in.	3.90	in.
Average	**1.99**	**in.**	**3.91**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***426.87***	***g***
Initial Area, Ao	3.12	in^2
Initial Volume, Vo	12.19	in^3
Initial Bulk Unit Weight,	133.4	lb/ft^3
Initial Dry Unit Weight	119.2	lb/ft^3
15 % Strain (0.15 Lo)	0.59	in.
UCS	132.1	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.119	0.0000	0.0
3	0.003	0.003	3.121	0.0008	1.0
4	0.005	0.005	3.123	0.0013	1.3
6	0.007	0.007	3.124	0.0018	1.9
8	0.010	0.010	3.127	0.0026	2.6
30	0.015	0.015	3.131	0.0038	9.6
84	0.020	0.020	3.135	0.0051	26.8
153	0.025	0.025	3.139	0.0064	48.7
212	0.030	0.030	3.143	0.0077	67.5
269	0.035	0.035	3.147	0.0090	85.5
315	0.040	0.040	3.151	0.0102	100.0
355	0.045	0.045	3.155	0.0115	112.5
390	0.050	0.050	3.159	0.0128	123.5
418	0.055	0.055	3.163	0.0141	132.1
407	0.060	0.060	3.167	0.0153	128.5
374	0.065	0.065	3.171	0.0166	117.9
339	0.070	0.070	3.175	0.0179	106.8
313	0.075	0.075	3.180	0.0192	98.4

UNCONFINED COMPRESSION TESTING

Sample No. 0727-007 (28 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Babylon Former MGP ISS		
PROJECT No.:	SH0727		
SAMPLE No.:	0727-007 (28 day)		
TESTING DATE:	16-Jan-20	LOADING RATE:	0.0400 in./min
TESTED BY:	FA	TRACKING CODE:	D924

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	11.9	**%**
BULK UNIT WEIGHT	133.4	lb/ft³
DRY UNIT WEIGHT	119.2	lb/ft³
UCS *	132.1	lb/in²

* UCS - UNCONFINED COMPRESSIVE STRENGTH

Client:	Kemron Environmental Services		
Project Name:	Babylon Former MGP ISS		
Project Location:	---		
GTX #:	311209		
Start Date:	1/16/2020	Tested By:	jm
End Date:	1/18/2020	Checked By:	mcm
Boring	---	Test #:	K1
Sample #:	0727-007		
Depth:	---		
Visual Description:	Moist, pale brown solidified soil		

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter by ASTM D5084 Increasing Tailwater

Sample Type:	Core	Permeant Fluid:	de-aired tap water
Orientation:	Vertical	Cell #:	K4

Sample Preparation: Core weighed and dimensioned, then placed in permeameter at the "as-received" moisture content.

Parameter	Initial	Final
Height, in	1.78	1.78
Diameter, in	2.96	2.96
Area, in^2	6.88	6.88
Volume, in^3	12.2	12.2
Mass, g	422	425
Bulk Density, pcf	131	132
Moisture Content, %	15.3	16.1
Dry Density, pcf	113.7	113.7
Degree of Saturation, %	---	98

B COEFFICIENT DETERMINATION

Cell Pressure, psi:	90	Pressure Increment, psi:	9.6
Sample Pressure, psi:	80	B Coefficient:	0.96

FLOW DATA

Date	Trial #	Pressure, psi		Head readings			Elapsed Time, sec	Gradient	Permeability K, cm/sec	Temp, °C	R_t	Permeability K @ 20 °C, cm/sec
		Cell	Sample	H_1	H_2	H_1-H_2						
1/21	1	90	80	189.1	187.7	1.4	300	41.8	2.1E-07	21	0.976	2.0E-07
1/21	2	90	80	187.7	186.0	1.7	360	41.5	2.1E-07	21	0.976	2.0E-07
1/21	3	90	80	186.0	182.5	3.5	720	41.1	2.2E-07	21	0.976	2.1E-07
1/21	4	90	80	182.5	176.3	6.2	1380	40.4	2.1E-07	21	0.976	2.0E-07

PERMEABILITY AT 20° C: 2.1 x 10^{-7} cm/sec (@ 10 psi effective stress)

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Babylon Former MGP ISS		
PROJECT No.:	SH0727		
SAMPLE No.:	0727-008 (28 day)		
TESTING DATE:	6-Jan-20	LOADING RATE:	0.0400 in./min
TESTED BY:	ISM	TRACKING CODE:	D919

MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	114.28	g
3. WT WET SOIL + TARE	286.44	g
4. WT DRY SOIL + TARE	263.07	g
5. WT WATER, Ww	23.37	g
6. WT DRY SOIL, Ws	148.79	g
7. MOISTURE CONTENT, W	**15.71**	**%**

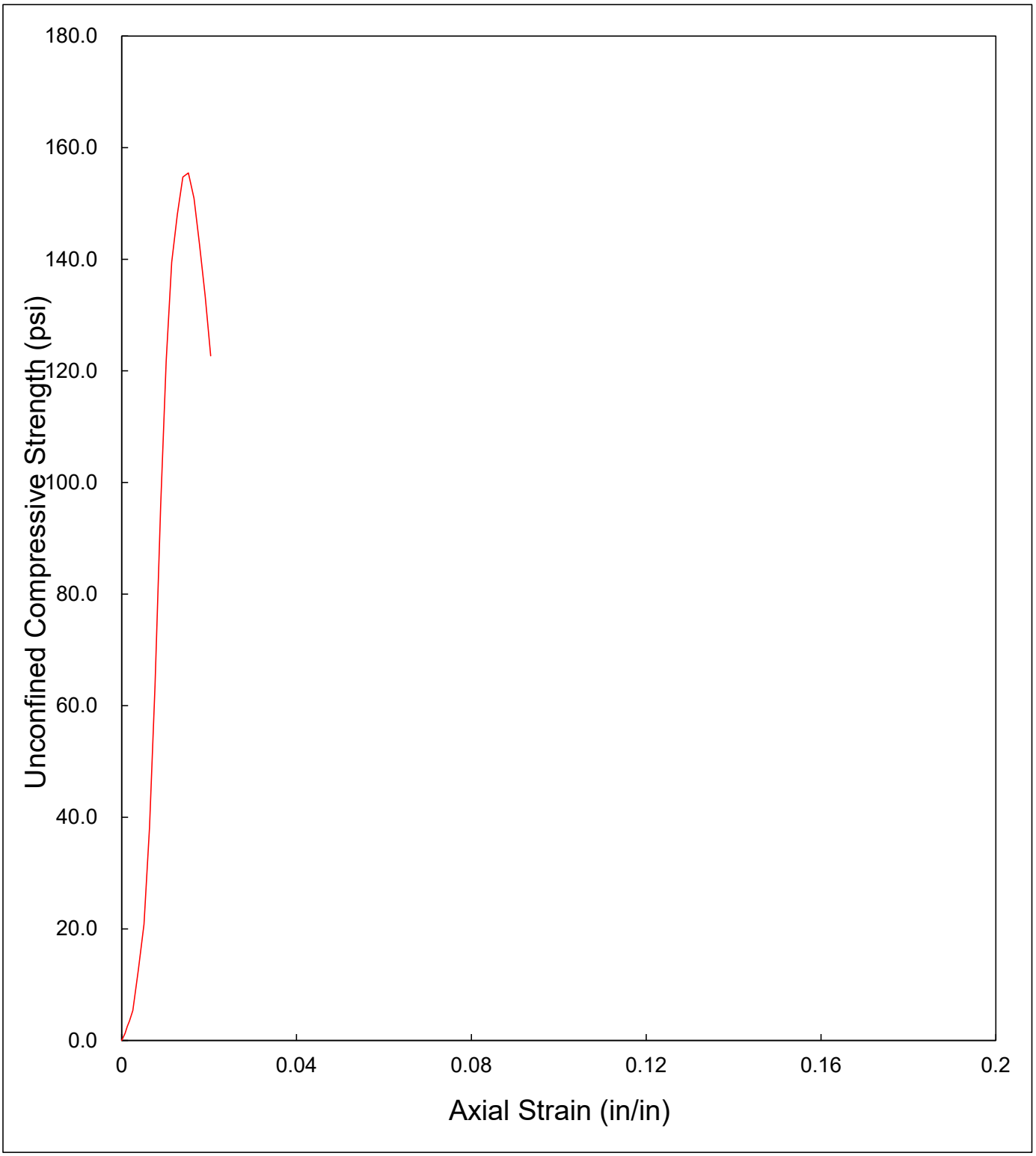
SOIL SPECIMEN DIMENSIONS				
	DIAMETER		***LENGTH***	
No. 1	2.01	in.	3.93	in.
No. 2	2.01	in.	3.92	in.
No. 3	1.99	in.	3.94	in.
Average	**2.00**	**in.**	**3.93**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***425.86***	***g***
Initial Area, Ao	3.15	in^2
Initial Volume, Vo	12.39	in^3
Initial Bulk Unit Weight,	130.9	lb/ft^3
Initial Dry Unit Weight	113.1	lb/ft^3
15 % Strain (0.15 Lo)	0.59	in.
UCS	155.5	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.154	0.0000	0.0
4	0.003	0.003	3.157	0.0008	1.3
8	0.005	0.005	3.158	0.0013	2.5
11	0.007	0.007	3.160	0.0018	3.5
17	0.010	0.010	3.162	0.0025	5.4
40	0.015	0.015	3.166	0.0038	12.6
66	0.020	0.020	3.170	0.0051	20.8
121	0.025	0.025	3.174	0.0064	38.1
202	0.030	0.030	3.178	0.0076	63.6
305	0.035	0.035	3.183	0.0089	95.8
388	0.040	0.040	3.187	0.0102	121.8
445	0.045	0.045	3.191	0.0115	139.5
473	0.050	0.050	3.195	0.0127	148.1
495	0.055	0.055	3.199	0.0140	154.7
498	0.060	0.060	3.203	0.0153	155.5
484	0.065	0.065	3.207	0.0165	150.9
458	0.070	0.070	3.211	0.0178	142.6
429	0.075	0.075	3.216	0.0191	133.4
395	0.080	0.080	3.220	0.0204	122.7

UNCONFINED COMPRESSION TESTING

Sample No. 0727-008 (28 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Babylon Former MGP ISS		
PROJECT No.:	SH0727		
SAMPLE No.:	0727-008 (28 day)		
TESTING DATE:	6-Jan-20	LOADING RATE:	0.0400 in./min
TESTED BY:	ISM	TRACKING CODE:	D919

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	15.7	**%**
BULK UNIT WEIGHT	130.9	lb/ft³
DRY UNIT WEIGHT	113.1	lb/ft³
UCS *	155.5	lb/in²

* UCS - UNCONFINED COMPRESSIVE STRENGTH

Client:	Kemron Environmental Services		
Project Name:	Babylon Former MGP ISS		
Project Location:	---		
GTX #:	311209		
Start Date:	1/6/2020	Tested By:	jm
End Date:	1/8/2020	Checked By:	mcm
Boring	---	Test #:	K2
Sample #:	0727-008		
Depth:	---		
Visual Description:	Moist, pale brown solidified soil		

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter by ASTM D5084 Increasing Tailwater

Sample Type:	Core	Permeant Fluid:	de-aired tap water
Orientation:	Vertical	Cell #:	P3

Sample Preparation: Core weighed and dimensioned, then placed in permeameter at the "as-received" moisture content.

Parameter	Initial	Final
Height, in	1.71	1.71
Diameter, in	2.96	2.96
Area, in^2	6.88	6.88
Volume, in^3	11.8	11.8
Mass, g	398	403
Bulk Density, pcf	129	130
Moisture Content, %	15.4	16.7
Dry Density, pcf	111.4	111.4
Degree of Saturation, %	---	95

B COEFFICIENT DETERMINATION

Cell Pressure, psi:	90	Pressure Increment, psi:	9.6
Sample Pressure, psi:	80	B Coefficient:	0.96

FLOW DATA

Date	Trial #	Pressure, psi		Head readings			Elapsed Time, sec	Gradient	Permeability K, cm/sec	Temp, °C	R_t	Permeability K @ 20 °C, cm/sec
		Cell	Sample	H_1	H_2	H_1-H_2						
1/21	2	90	80	193.2	188.6	4.6	480	44.5	4.0E-07	21	0.976	3.9E-07
1/21	3	90	80	188.6	184.4	4.2	480	43.4	3.7E-07	21	0.976	3.6E-07
1/21	4	90	80	184.4	176.6	7.8	960	42.5	3.6E-07	21	0.976	3.5E-07
1/21	5	90	80	176.6	166.3	10.3	1440	40.7	3.3E-07	21	0.976	3.2E-07

PERMEABILITY AT 20° C: 3.6 x 10^{-7} cm/sec (@ 10 psi effective stress)

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Babylon Former MGP ISS		
PROJECT No.:	SH0727		
SAMPLE No.:	0727-009 (28 day)		
TESTING DATE:	6-Jan-20	LOADING RATE:	0.0400 in./min
TESTED BY:	ISM	TRACKING CODE:	D920

MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	116.07	g
3. WT WET SOIL + TARE	239.02	g
4. WT DRY SOIL + TARE	223.51	g
5. WT WATER, Ww	15.51	g
6. WT DRY SOIL, Ws	107.44	g
7. MOISTURE CONTENT, W	**14.44**	**%**

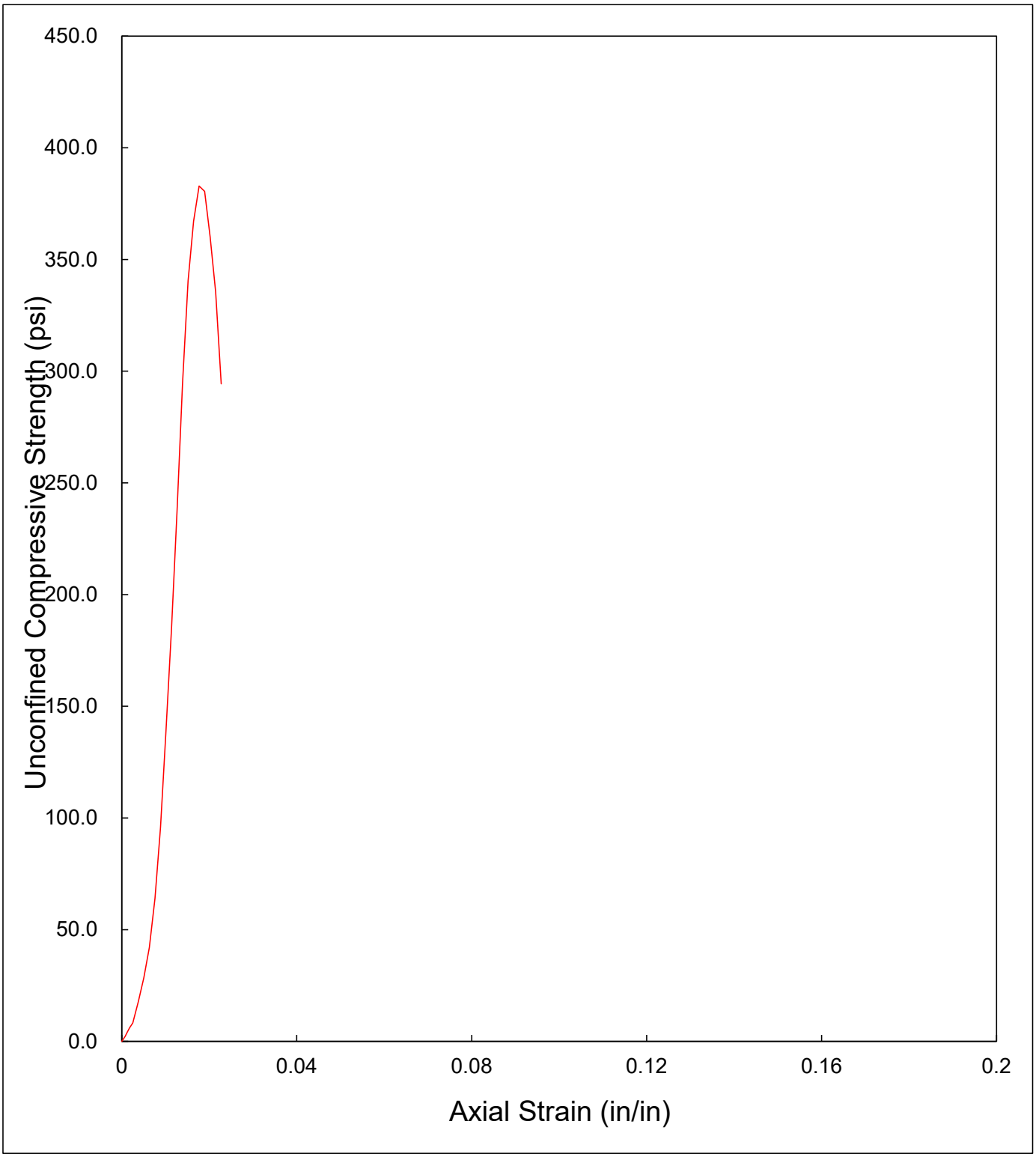
SOIL SPECIMEN DIMENSIONS				
	DIAMETER		*LENGTH*	
No. 1	2.01	in.	3.95	in.
No. 2	2.00	in.	3.96	in.
No. 3	1.99	in.	3.96	in.
Average	**2.00**	**in.**	**3.96**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***430.10***	***g***
Initial Area, Ao	3.15	in^2
Initial Volume, Vo	12.46	in^3
Initial Bulk Unit Weight,	131.5	lb/ft^3
Initial Dry Unit Weight	114.9	lb/ft^3
15 % Strain (0.15 Lo)	0.59	in.
UCS	382.9	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.148	0.0000	0.0
7	0.003	0.003	3.150	0.0008	2.2
13	0.005	0.005	3.152	0.0013	4.1
19	0.007	0.007	3.153	0.0018	6.0
26	0.010	0.010	3.156	0.0025	8.2
56	0.015	0.015	3.160	0.0038	17.7
90	0.020	0.020	3.164	0.0051	28.4
133	0.025	0.025	3.168	0.0063	42.0
203	0.030	0.030	3.172	0.0076	64.0
304	0.035	0.035	3.176	0.0088	95.7
443	0.040	0.040	3.180	0.0101	139.3
589	0.045	0.045	3.184	0.0114	185.0
757	0.050	0.050	3.188	0.0126	237.4
941	0.055	0.055	3.192	0.0139	294.8
1088	0.060	0.060	3.196	0.0152	340.4
1175	0.065	0.065	3.200	0.0164	367.1
1227	0.070	0.070	3.205	0.0177	382.9
1221	0.075	0.075	3.209	0.0189	380.5
1157	0.080	0.080	3.213	0.0202	360.1
1079	0.085	0.085	3.217	0.0215	335.4
948	0.090	0.090	3.221	0.0227	294.3

UNCONFINED COMPRESSION TESTING

Sample No. 0727-009 (28 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Babylon Former MGP ISS		
PROJECT No.:	SH0727		
SAMPLE No.:	0727-009 (28 day)		
TESTING DATE:	6-Jan-20	LOADING RATE:	0.0400 in./min
TESTED BY:	ISM	TRACKING CODE:	D920

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	14.4	**%**
BULK UNIT WEIGHT	131.5	lb/ft³
DRY UNIT WEIGHT	114.9	lb/ft³
UCS *	382.9	lb/in²

* UCS - UNCONFINED COMPRESSIVE STRENGTH

Client:	Kemron Environmental Services		
Project Name:	Babylon Former MGP ISS		
Project Location:	---		
GTX #:	311209		
Start Date:	1/6/2020	Tested By:	jm
End Date:	1/8/2020	Checked By:	mcm
Boring	---	Test #:	K3
Sample #:	0727-009		
Depth:	---		
Visual Description:	Moist, pale brown solidified soil		

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter by ASTM D5084 Increasing Tailwater

Sample Type:	Core	Permeant Fluid:	de-aired tap water
Orientation:	Vertical	Cell #:	P2

Sample Preparation: Core weighed and dimensioned, then placed in permeameter at the "as-received" moisture content.

Parameter	Initial	Final
Height, in	2.13	2.13
Diameter, in	2.97	2.97
Area, in^2	6.93	6.93
Volume, in^3	14.8	14.8
Mass, g	508	514
Bulk Density, pcf	131	132
Moisture Content, %	14.7	16.0
Dry Density, pcf	114.2	114.2
Degree of Saturation, %	---	99

B COEFFICIENT DETERMINATION

Cell Pressure, psi:	90	Pressure Increment, psi:	9.6
Sample Pressure, psi:	80	B Coefficient:	0.96

FLOW DATA

Date	Trial #	Pressure, psi		Head readings			Elapsed Time, sec	Gradient	Permeability K, cm/sec	Temp, °C	R_t	Permeability K @ 20 °C, cm/sec
		Cell	Sample	H_1	H_2	H_1-H_2						
1/21	5	90	80	190.6	189.6	1.0	8580	35.2	6.0E-09	21	0.976	5.9E-09
1/21	6	90	80	189.6	188.3	1.3	12240	35.0	5.5E-09	21	0.976	5.4E-09
1/21	7	90	80	188.3	186.1	2.2	21300	34.8	5.4E-09	21	0.976	5.3E-09
1/22	8	90	80	186.1	182.2	3.9	38460	34.4	5.4E-09	21	0.976	5.3E-09

PERMEABILITY AT 20° C: 5.5 x 10^{-9} cm/sec (@ 10 psi effective stress)

UNCONFINED COMPRESSION TEST

ASTM D 2166

PROJECT:	Babylon Former MGP ISS		
PROJECT No.:	SH0727		
SAMPLE No.:	0727-010 (28 day)		
TESTING DATE:	6-Jan-20	LOADING RATE:	0.0400 in./min
TESTED BY:	ISM	TRACKING CODE:	D921

MOISTURE CONTENT (Dry Basis)		
1. MOISTURE TIN NO.		
2. WT MOISTURE TIN (tare weight)	114.49	g
3. WT WET SOIL + TARE	266.30	g
4. WT DRY SOIL + TARE	243.45	g
5. WT WATER, Ww	22.85	g
6. WT DRY SOIL, Ws	128.96	g
7. MOISTURE CONTENT, W	**17.72**	**%**

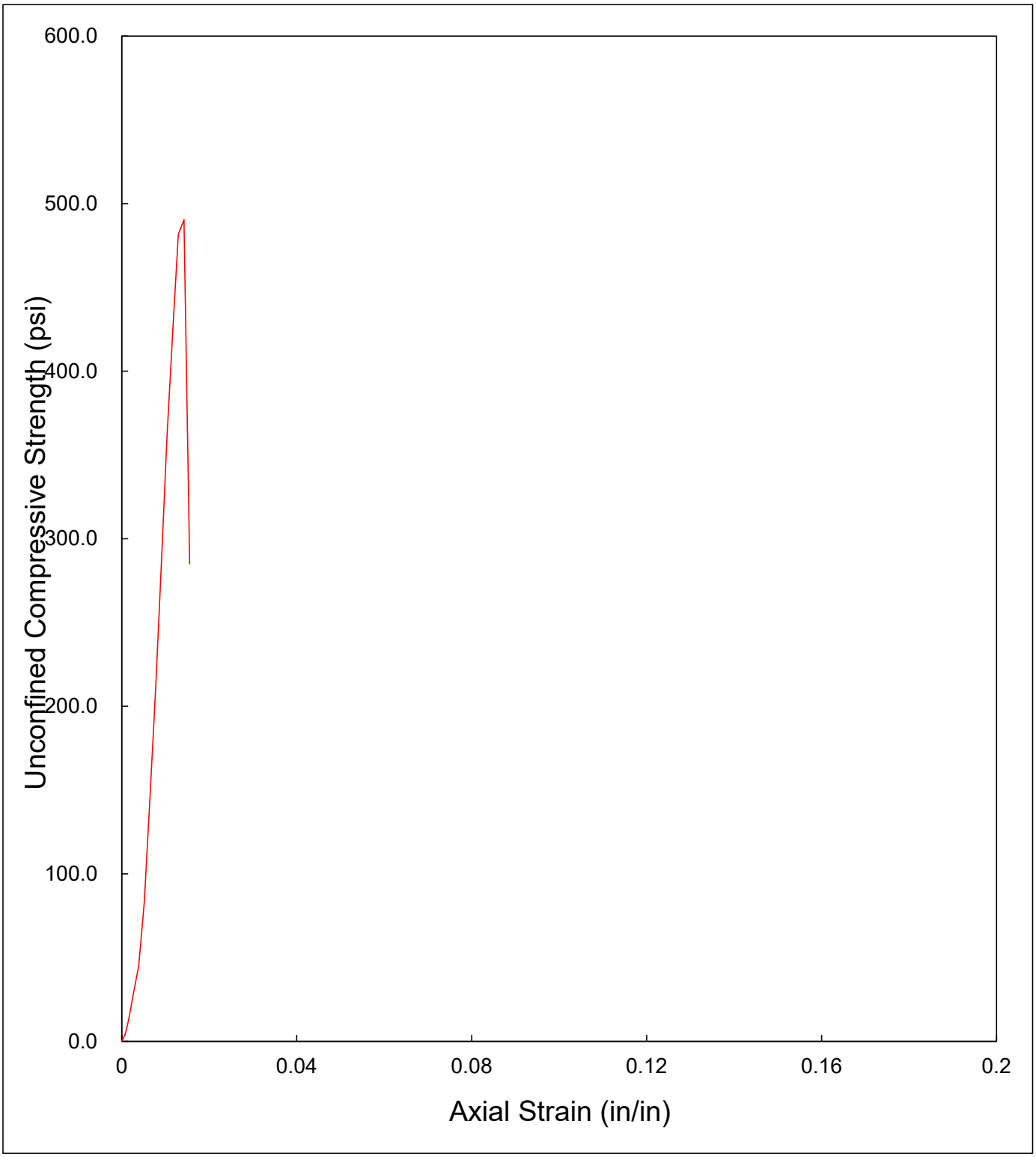
SOIL SPECIMEN DIMENSIONS				
	DIAMETER		*LENGTH*	
No. 1	2.00	in.	3.85	in.
No. 2	2.00	in.	3.89	in.
No. 3	1.99	in.	3.86	in.
Average	**2.00**	**in.**	**3.87**	**in.**

SPECIMEN CONDITIONS		
Initial Specimen WT, Wo	***418.15***	***g***
Initial Area, Ao	3.14	in^2
Initial Volume, Vo	12.12	in^3
Initial Bulk Unit Weight,	131.4	lb/ft^3
Initial Dry Unit Weight	111.6	lb/ft^3
15 % Strain (0.15 Lo)	0.58	in.
UCS	490.4	lb/in^2

COMPRESSIVE LOAD (lbs.)	DIAL GAGE READING (in.)	SPECIMEN DEFORMATION (in.)	CORRECTED AREA (in^2)	AXIAL STRAIN (in/in)	UNCONFINED COMPRESSIVE STRENGTH (lb/in^2)
0	0.000	0.000	3.136	0.0000	0.0
13	0.003	0.003	3.138	0.0008	4.1
30	0.005	0.005	3.140	0.0013	9.6
51	0.007	0.007	3.142	0.0018	16.2
86	0.010	0.010	3.144	0.0026	27.4
142	0.015	0.015	3.148	0.0039	45.1
264	0.020	0.020	3.152	0.0052	83.8
462	0.025	0.025	3.156	0.0065	146.4
667	0.030	0.030	3.160	0.0078	211.1
901	0.035	0.035	3.164	0.0091	284.7
1144	0.040	0.040	3.169	0.0103	361.0
1342	0.045	0.045	3.173	0.0116	423.0
1530	0.050	0.050	3.177	0.0129	481.6
1560	0.055	0.055	3.181	0.0142	490.4
908	0.060	0.060	3.185	0.0155	285.1

UNCONFINED COMPRESSION TESTING

Sample No. 0727-010 (28 day)



UNCONFINED COMPRESSION TEST

ASTM D 2166
SUMMARY OF RESULTS

PROJECT:	Babylon Former MGP ISS		
PROJECT No.:	SH0727		
SAMPLE No.:	0727-010 (28 day)		
TESTING DATE:	6-Jan-20	LOADING RATE:	0.0400 in./min
TESTED BY:	ISM	TRACKING CODE:	D921

TESTING PARAMETER AND RESULTS		
MOISTURE CONTENT	17.7	**%**
BULK UNIT WEIGHT	131.4	lb/ft³
DRY UNIT WEIGHT	111.6	lb/ft³
UCS *	490.4	lb/in²

* UCS - UNCONFINED COMPRESSIVE STRENGTH

Client:	Kemron Environmental Services		
Project Name:	Babylon Former MGP ISS		
Project Location:	---		
GTX #:	311209		
Start Date:	1/6/2020	Tested By:	jm
End Date:	1/8/2020	Checked By:	mcm
Boring	---	Test #:	K4
Sample #:	0727-010		
Depth:	---		
Visual Description:	Moist, pale brown solidified soil		

Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter by ASTM D5084 Increasing Tailwater

Sample Type:	Core	Permeant Fluid:	de-aired tap water
Orientation:	Vertical	Cell #:	P2

Sample Preparation: Core weighed and dimensioned, then placed in permeameter at the "as-received" moisture content.

Parameter	Initial	Final
Height, in	1.93	1.93
Diameter, in	2.97	2.97
Area, in^2	6.93	6.93
Volume, in^3	13.4	13.4
Mass, g	462	464
Bulk Density, pcf	131	132
Moisture Content, %	15.7	16.4
Dry Density, pcf	113.4	113.4
Degree of Saturation, %	---	99

B COEFFICIENT DETERMINATION

Cell Pressure, psi:	90	Pressure Increment, psi:	9.6
Sample Pressure, psi:	80	B Coefficient:	0.96

FLOW DATA

Date	Trial #	Pressure, psi		Head readings			Elapsed Time, sec	Gradient	Permeability K, cm/sec	Temp, °C	R_t	Permeability K @ 20 °C, cm/sec
		Cell	Sample	H_1	H_2	H_1-H_2						
1/21	3	90	80	187.8	187.4	0.4	4920	38.3	3.9E-09	21	0.976	3.8E-09
1/21	4	90	80	187.4	186.8	0.6	6660	38.2	4.3E-09	21	0.976	4.2E-09
1/21	5	90	80	186.8	180.5	6.3	66780	38.1	4.6E-09	21	0.976	4.5E-09
1/22	6	90	80	180.5	178.4	2.1	23640	36.8	4.4E-09	21	0.976	4.3E-09

PERMEABILITY AT 20° C: 4.2 x 10^{-9} cm/sec (@ 10 psi effective stress)

Appendix E Generic CAMP

Appendix 1A
New York State Department of Health
Generic Community Air Monitoring Plan

Overview

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical- specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for VOCs and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate DEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. “Periodic” monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or

overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

2. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion 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 over background for the 15-minute average.

3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

4. All 15-minute readings must be recorded and be available for State (DEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind 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 PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

3. All readings must be recorded and be available for State (DEC and NYSDOH) and County Health personnel to review.

December 2009

Appendix 1B
Fugitive Dust and Particulate Monitoring

A program for suppressing fugitive dust and particulate matter monitoring at hazardous waste sites is a responsibility on the remedial party performing the work. These procedures must be incorporated into appropriate intrusive work plans. The following fugitive dust suppression and particulate monitoring program should be employed at sites during construction and other intrusive activities which warrant its use:

1. Reasonable fugitive dust suppression techniques must be employed during all site activities which may generate fugitive dust.

2. Particulate monitoring must be employed during the handling of waste or contaminated soil or when activities on site may generate fugitive dust from exposed waste or contaminated soil. Remedial activities may also include the excavation, grading, or placement of clean fill. These control measures should not be considered necessary for these activities.

3. Particulate monitoring must be performed using real-time particulate monitors and shall monitor particulate matter less than ten microns (PM10) with the following minimum performance standards:

(a) Objects to be measured: Dust, mists or aerosols;
(b) Measurement Ranges: 0.001 to 400 mg/m3 (1 to 400,000 :ug/m3);
(c) Precision (2-sigma) at constant temperature: +/- 10 :g/m3 for one second averaging; and +/- 1.5 g/m3 for sixty second averaging;
(d) Accuracy: +/- 5% of reading +/- precision (Referred to gravimetric calibration with SAE fine test dust (mmd= 2 to 3 :m, g= 2.5, as aerosolized);
(e) Resolution: 0.1% of reading or 1g/m3, whichever is larger;
(f) Particle Size Range of Maximum Response: 0.1-10;
(g) Total Number of Data Points in Memory: 10,000;
(h) Logged Data: Each data point with average concentration, time/date and data point number
(i) Run Summary: overall average, maximum concentrations, time/date of maximum, total number of logged points, start time/date, total elapsed time (run duration), STEL concentration and time/date occurrence, averaging (logging) period, calibration factor, and tag number;
(j) Alarm Averaging Time (user selectable): real-time (1-60 seconds) or STEL (15 minutes), alarms required;
(k) Operating Time: 48 hours (fully charged NiCd battery); continuously with charger;
(l) Operating Temperature: -10 to 50^{o} C (14 to 122^{o} F);
(m) Particulate levels will be monitored upwind and immediately downwind at the working site and integrated over a period not to exceed 15 minutes.

4. In order to ensure the validity of the fugitive dust measurements performed, there must be appropriate Quality Assurance/Quality Control (QA/QC). It is the responsibility of the remedial party to adequately supplement QA/QC Plans to include the following critical features: periodic instrument calibration, operator training, daily instrument performance (span) checks, and a record keeping plan.

5. The action level will be established at 150 ug/m3 (15 minutes average). While conservative,

this short-term interval will provide a real-time assessment of on-site air quality to assure both health and safety. If particulate levels are detected in excess of 150 ug/m3, the upwind background level must be confirmed immediately. If the working site particulate measurement is greater than 100 ug/m3 above the background level, additional dust suppression techniques must be implemented to reduce the generation of fugitive dust and corrective action taken to protect site personnel and reduce the potential for contaminant migration. Corrective measures may include increasing the level of personal protection for on-site personnel and implementing additional dust suppression techniques (see paragraph 7). Should the action level of 150 ug/m3 continue to be exceeded work must stop and DER must be notified as provided in the site design or remedial work plan. The notification shall include a description of the control measures implemented to prevent further exceedances.

6. It must be recognized that the generation of dust from waste or contaminated soil that migrates off-site, has the potential for transporting contaminants off-site. There may be situations when dust is being generated and leaving the site and the monitoring equipment does not measure PM10 at or above the action level. Since this situation has the potential to allow for the migration of contaminants off-site, it is unacceptable. While it is not practical to quantify total suspended particulates on a real-time basis, it is appropriate to rely on visual observation. If dust is observed leaving the working site, additional dust suppression techniques must be employed. Activities that have a high dusting potential--such as solidification and treatment involving materials like kiln dust and lime--will require the need for special measures to be considered.

7. The following techniques have been shown to be effective for the controlling of the generation and migration of dust during construction activities:

(a) Applying water on haul roads;
(b) Wetting equipment and excavation faces;
(c) Spraying water on buckets during excavation and dumping;
(d) Hauling materials in properly tarped or watertight containers;
(e) Restricting vehicle speeds to 10 mph;
(f) Covering excavated areas and material after excavation activity ceases; and
(g) Reducing the excavation size and/or number of excavations.

Experience has shown that the chance of exceeding the 150ug/m3 action level is remote when the above-mentioned techniques are used. When techniques involving water application are used, care must be taken not to use excess water, which can result in unacceptably wet conditions. Using atomizing sprays will prevent overly wet conditions, conserve water, and provide an effective means of suppressing the fugitive dust.

8. The evaluation of weather conditions is necessary for proper fugitive dust control. When extreme wind conditions make dust control ineffective, as a last resort remedial actions may need to be suspended. There may be situations that require fugitive dust suppression and particulate monitoring requirements with action levels more stringent than those provided above. Under some circumstances, the contaminant concentration and/or toxicity may require additional monitoring to protect site personnel and the public. Additional integrated sampling and chemical analysis of the dust may also be in order. This must be evaluated when a health and safety plan is developed and when appropriate suppression and monitoring requirements are established for protection of health and the environment.

Appendix F National Grid Approved Disposal Facilities

NATIONAL GRID

ENVIRONMENTALLY APPROVED WASTE DISPOSAL FACILITIES

AS OF DECEMBER 11, 2019

(NOTE: FACILITIES ARE APPROVED TO RECEIVE SPECIFIC PERMITTED WASTES. THE RECOMMENDED WASTE STREAMS COLUMN IS NOT ALL INCLUSIVE. PLEASE CONSULT WITH ENVIRONMENTAL PROIR TO DISPOSING OF WASTES)

VENDOR	RECOMMENDED WASTE STREAMS	FACILITY LOCATION	STATE	PHONE	EPA ID NUMBER	DATE OF LAST APPROVAL	DATE OF LAST AUDIT	TYPE OF AUDIT
American Lamp Recycling, LLC	Universal Wastes/ Lamps/Bulbs	55 Riverview Drive Marlboro, NY 12542	New York	(800) 315-6262	NYR000192005	9/13/2017	3/30/2017	CHWMEG audit
Bayshore Soil Mgt. (ESMI of NJ)	Non-Haz. Petroleum Contaminated Soils Coal Tar Contaminated Soils	75 Crows Mill Road Keasbey, NJ 08832	New Jersey	(732) 738-6000		3/13/2019	7/11/2018	CHWMEG audit
Chemical Waste Management (Waste Management Inc.)	All Facility Permitted Waste Streams	Highway 17 North Emelle, AL 35459	Alabama	(205) 652-8086	ALD000622464	6/13/2018	6/13/2018	On-site audit
Chemical Waste Management*	Haz. and Non-Haz. Wastes Asbestos Waste TSCA Waste	1550 Balmer Road Model City, NY 14107	New York	(716) 754-8231	NYD049836679	9/21/2016	8/15/2013	CHWMEG audit
CID (Chafee) Landfill, Inc.	Asbestos Waste	10860 Olean Road Chaffee, NY 14030	New York	(716) 496-5514	NYD000517458	N/A	N/A	Low Risk. No Further Audits
City of Albany Landfill	Petroleum Contaminated Soils Solid Waste	525 Rapp Road Albany, NY 12202	New York	(518) 869-3651	N/A	N/A	N/A	Low Risk. No Further Audits
Fulton County Landfill	Petroleum Contaminated Soils Solid Waste/ C&D	47 Mud Rd, Johnstown, NY 12095	New York	(518) 736-5501	N/A	N/A	N/A	Low Risk. No Further Audits
Clean Earth Connecticut	Non-Haz. Petroleum Contaminated Soils Coal Tar Contaminated Soils	58 North Washington Street Plainville, CT 06062	Connecticut	(860) 747-8888		6/28/2017	5/16/2017	On-site audit
Clean Earth of Carteret Inc.	Petroleum Contaminated Soils Urban Fills	24 Middlesex Avenue Carteret, NJ 07008	New Jersey	(215) 734-1400		4/4/2018	8/8/2017	CHWMEG Audit
Clean Earth Dredging Technologies, LLC – Claremont	Non-Haz Sediments	1 Linden Avenue East Jersey City, NJ 07305	New Jersey	(201) 395-0040			5/4/2015	On-site audit
Clean Earth of New Castle, Inc.	Petroleum Contaminated Soils Urban Fills	94 Pyles Lane New Castle, DE 19720	Delaware	(302) 427-6633		9/21/2016	3/10/2015	On-site audit
Clean Earth of North Jersey	Petroleum Contaminated Soils Urban Fills	115 Jacobus Avenue South Kearny, NJ 07032	New Jersey	(973) 344-4004	NJD991291105		2/12/2014	CHWMEG audit
Clean Earth of Philadelphia	Petroleum/Coal Tar Contaminated Soils for thermal desorption, only	3201 South Street Philadelphia, PA 19153	Pennsylvania	(215) 724-5520		12/10/2019	5/16/2019	CHWMEG audit
Clean Earth of Southeast PA	Petroleum Contaminated Soils Coal Tar Contaminated Soils for thermal desorption only	7 Steel Road East Morrisville, PA 19067	Pennsylvania	(215) 428-1700		6/13/2018	6/13/2018	CHWMEG audit
Clean Earth Dredging Technologies, LLC – Koppers	Non-Haz Sediment	1 Fish House Road Kearney, NJ 07032	New Jersey	(201) 997-2949			5/4/2015	On-site audit
Clean Harbors – Cleveland	Wastewater Treatment	2900 Broadway Cleveland, OH 44115	Ohio	(216) 429-2401	OHD000724153		5/7/2014	CHWMEG audit
Clean Harbors – Kimball	Coal Tar Soils Incineration	HC54 Box 28 Kimball, NE 69145	Nebraska	(308) 235-4012	NED981723513	3/13/2019	6/12/2018	CHWMEG Audit
Clean Harbors – Portland, ME	Waste Oil Non-Haz. WWT	37 Rumery Road South Portland, ME 04106	Maine	(207) 799-8111	MED980672182	9/13/2017	9/13/2017	On-site audit
Clean Harbors – Deer Park (Rollins Environmental Services)	Haz. Waste Incineration per Facility Permits	2027 Battleground Road Deer Park, TX 77536	Texas	(281) 930-2300	TXD055141378	3/13/2019	5/5/2018	CHWMEG Audit

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VENDOR	RECOMMENDED WASTE STREAMS	FACILITY LOCATION	STATE	PHONE	EPA ID NUMBER	DATE OF LAST APPROVAL	DATE OF LAST AUDIT	TYPE OF AUDIT
Clean Harbors Env. Services, Inc.	Incineration	309 American Circle El Dorado, AR 71730	Arkansas	(870) 864-3711	ARD069748192	9/25/2019	6/4/2019	CHWMEG Audit
Clean Harbors (Grassy Mountain)	Landfill –TSCA,RCRA, Asbestos Waste	Grayback Hills Drive Knolls, UT 84083	Utah	(801) 323-8900	UTD991301748		4/2/2014	CHWMEG audit
Clean Harbors of Baltimore	Wastewater Treatment	1910 Russell Street Baltimore, MD 21230	Maryland	(410) 244 8200	MDD980555189	9/26/2018	5/23/2018	CHWMEG audit
Clean Harbors of Braintree	Various Waste Streams per Facility Permits	1 Hill Avenue Braintree, MA 02184	Massachusetts	(781) 849-1807	MAD053452637	3/13/2019	4/13/2018	On-site audit
Clean Harbors of Connecticut	Wastewater Treatment	51 Broderick Road Bristol, CT 06010	Connecticut	(860) 583-8917	CTD000604488		9/11/2014	On-site audit
Clean Water of New York	Waste Oils Waste Waters	3249 Richmond Terrace P.O. Box 030312 Staten Island, NY 10303	New York	(718) 981-4600		5/27/2015	11/12/2014	On-site audit
Colonie Landfill	Petroleum Contaminated Soils Solid Waste/C&D	Memorial Town Hall Newtonville, NY 12128	New York	(518) 783-2827		N/A	N/A	Low Risk. No Further Audits
Complete Recycling Solutions, LLC	Mercury containing wastes Lighting ballasts and small capacitors (both PCB and non-PCB Electronic waste	1075 Airport Road Fall River, MA 02720	Massachusetts	(508) 402-7700	MAD980915755		6/13/2018	On-site audit
County of Franklin Solid Waste Management Authority	Petroleum Contaminated Soils Solid Waste/C&D	828 County Route 20 Constable, NY 12926	New York	(518) 483-8270	NYN008021891		8/1/2008	On-site audit
Covanta Environmental Solutions - Agawam	Treated Wood Utility Poles	188 M Street Agawam, MA 01001	Massachusetts	(413) 785-5120			6/2/2015	On-site Audit
Covanta Environmental Solutions - Niagara (Green Environmental)	Nonhazardous sludge's Solids and liquids	8335 Quarry Road Niagara Falls, NY 14304	New York	(716) 298-5297		9/21/2016	1/25/2016	CHWMEG Audit
Covanta Environmental Solutions - Oriskany (Industrial Oil Tank)	Oily Water Non-haz solids	120 Dry Road Oriskany, NY13424	New York	(315) 736-6080	NYR000005298	4/5/2017	7/7/2016	CHWMEG Audit
Covanta Environmental Solutions - Hempstead (Hempstead Resource Recovery)	Non Hazardous Incinerator	600 Merchants Concourse Westbury, NY 11590	New York	(516) 683-5438	NYD980215511		9/15/2009	On-site audit Low Risk. No Further Audits
Covanta Environmental Solutions - Niagara (American Ref-Fuel Company of Niagara Facility)	MGP Remediation Soils Non-Hazardous Solids (Oil-impacted spill debris)	100 Energy Blvd at 56th St. Niagara Falls, NY 14304	New York	(716) 278-8500	NYD986930543	4/5/2017	1/25/2016	CHWMEG audit
Development Authority of the North Country (DANC) (Rodman Landfill)	Coal Tar/Petroleum Contaminated Soils/C&D	NYS Route 177 Rodman, NY 13682	New York	(315) 785-2593			6/19/2013	On-site audit
Doe Run Company (Buick Resource Recycling)	Lead Battery Recycling	18594 Highway KK Boss, MO 65440	Missouri	(573) 244-5261	MOD059200089	Pending	5/4/2016	CHWMEG audit
Emerald Transformer (Clean Harbors PCB Serv.)	TSCA Waste Materials	1672 East Highland Twinsburg, OH 44087	Ohio	(330) 425-3825	OHD986975399	11/13/2015	5/8/2014	CHWMEG audit
Emerald Transformer (Clean Harbors PPM)	TSCA/Non-TSCA Transformers and Oils	2474 Hwy 169 North Coffeyville, KS 67337	Kansas	(620) 251-6380	KSD981506025	6/28/2017	8/10/2016	CHWMEG audit
EnerSys (GS YUASA)	Battery Recycling (Transfer)	16 Celina Ave. Nashua, NH 03060	New Hampshire	(800) 343-5526		6/13/2018	6/13/2018	Desk Top Audit
Environmental Products & Services of Vermont	Transfer Station to approved facilities only	532 State Fair Blvd Syracuse, NY 13204	New York	(315) 451-6666	NYR000115733	6/28/2017	7/11/2016	CHWMEG audit
Environmental Soil Management, Inc. (ESMI - NY) (Clean Earth)	Coal Tar Contaminated Soils Oily Soils/Urban Fill	304 Towpath Road Fort Edward, NY 12828	New York	(518) 747-5500		4/4/2018	6/20/2017	CHWMEG audit

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VENDOR	RECOMMENDED WASTE STREAMS	FACILITY LOCATION	STATE	PHONE	EPA ID NUMBER	DATE OF LAST APPROVAL	DATE OF LAST AUDIT	TYPE OF AUDIT
Environmental Soil Management, Inc. (ESMI - Loudon) (Clean Earth)	Coal Tar Contaminated Soils Oily Soils, Urban Fill	67 International Drive Loudon, NH 03301	New Hampshire	(603) 783-0228	NH5986485852	12/10/2019	7/30/2019	CHWMEG audit
Evoqua	Carbon Recycling	118 Park Road, Darlington, PA 16115	Pennsylvania	(724) 827-8181	PAD987270725	12/12/2018	7/10/2018	CHWMEG audit
Global Cycle	Non-hazardous waste water treatment (including excavation, decon, and purge water etc.) Specific Facility Acceptance Criteria/Contaminant Concentrations Apply	700 Richmond Street Taunton, MA 02718	Massachusetts	(508) 828-1005		9/13/2017	9/13/2017	On-site audit
G&S Technologies	Non-TSCA Equipment	1800 Harrison Ave. Kearny, NJ 07032	New Jersey	(201) 998-9244	NJD011370525	9/21/2016	8/17/2016	On-site audit
High Acres Landfill (Waste Management)	Non-Haz Waste	425 Perinton Parkway Fairport, NY 14450	New York	(716) 223-6132			12/15/2006	On-site audit
Hydrodec North America LLC	Non-Haz and Hazardous Oils for re-refining	2021 Steinway Blvd S.E Canton OH 44707	Ohio	1 (330) 454 8202	OHR000143263	4/4/2018	8/18/2015	CHWMEG audit
INMETCO	Battery Recycling	One Inmetco Drive Ellwood City, PA 16117	Pennsylvania	(724) 758-5515	PAD087561015		3/20/2014	CHWMEG audit
Lakeview Landfill (Waste Managment)	Asbestos Waste	851 Robinson Road East Erie, PA 16509	Pennsylvania	(814) 825-8588				Low Risk. No Further Audits
Lehigh Cement (ESSROC)	Liquids/Sludge's	3084 West County Road 225 South Logansport, Indiana 46947	Indiana	(574) 753-5121	IND005081542	4/30/2019	8/30/2018	CHWMEG audit
Lewis County Solid Waste Department	Solid Waste	Trinity Avenue Lowville, NY 13367	New York	(315) 376-5394				Low Risk. No Further Audits
Minerva Enterprises	Asbestos Waste	8955 Minerva Road SE Waynesburg, OH 46888	Ohio	(330)866-3435		5/27/2015	3/25/2015	On-site audit
Modern Disposal	Solid Waste	4746 Model City Road Model City, NY 14107	New York	(716) 754-8226	NY0986921237	N/A	N/A	On-site audit
Montgomery County (MOSA)	Solid Waste	P.O. Box 160, Route 7 Howes Cave, NY 12092	New York	(518) 296-8884		N/A	N/A	
Murphy's Waste Oil (Clean Harbors)	Waste Oil Oil Filter Recycling	252 Salem Street Woburn, MA 01801	Massachusetts	(781) 935-9066	MAD066588005		6/13/2019	CHWMEG audit
NovaPb, Inc. (Revolution VSC)	Battery Recycling	1200 Garnier St. & St. Catherine, Quebec J5C1B4	Canada	(781) 849-1807		12/17/2014	3/10/2014	CHWMEG audit
Oneida - Herkimer County Landfill	Solid Waste	7044 State Route 294 Boonville, NY 13309	New York	(315) 733-1224				Low Risk. No Further Audits
Ontario County Sanitary Landfill	Solid Waste	3555 Post Farm Road Stanley, NY 14561	New York	(585) 526-4420			8/17/2004	On-site audit
Revere Smelting & Refining Corporation	Lead Acid Battery Recycler	65 Ballard Road Middletown, NY 10941	New York	(845) 692-4414	NYD030485288	12/14/2016	11/21/2016	Desk-Top audit
Safety-Kleen Systems Inc.	Part Washer Recycling	17 Green Mountain Road Cohoes, NY 12047	New York	(518) 783-8080	NYD986872869	4/5/2017	10/12/2016	On-site audit
Safety-Kleen Systems Inc.	Part Washer Recycling	80 Seabro Ave. North Amityville, NY 11701	New York	(631) 842-6311	NYD000708198	Fall 2010		Low Risk. No Further Audits
Safety-Kleen Systems, Inc.	Oil Filters, Waste Oil, Transfer Facility	167 Mill Street Cranston, RI	Rhode Island	(401) 781-0808	RID084802842	12/12/2018	4/11/2018	CHWMEG audit
Seneca Meadows Landfill (IESI)	Non-haz Waste, Asbestos Waste	1786 Saloman Road Waterloo, NY 13165	New York	(315) 539-5624			1/29/2014	On-site audit

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Superior Greentree Landfill (ADS Greentree)	Landfill-Non Hazardous	635 Toby Road, Kersey, PA 15846	Pennsylvania	(814) 265-1975		N/A	N/A	Low Risk. No Further Audits
Tradebe - Norlite Corporation	Used Oil Coal Tar	628 South Saratoga Street Cohoes, NY 12047	New York	(518) 235-0401	NYD080469935	9/25/2019	2/22/2019	CHWMEG Audit
Tradebe - Bridgeport (Bridgeport United Recycling)	Used Oil Waste Waters	50 Cross Street Bridgeport, CT 06610	Connecticut	(203) 334-4812	CTD002593887	12/12/2018	6/11/2018	CHWMEG Audit
Tradebe - Meriden (United Oil Recovery Inc.)	Used Oils Waste Waters	136 Gracey Avenue Meriden, CT 06450	Connecticut	(203) 238-6745	CTD021816889	12/12/2018	6/12/2018	CHWMEG Audit
Trans-Cycle Industries (TCI)	TSCA Transformer and Lead/PCB Cable Disposal	101 Parkway, East Pell City, AL 35125	Alabama	(205) 338-9997	ALD983167891	9/26/2018	5/11/2017	CHWMEG audit
TCI of New York	Non-TSCA Transformer Disposal Approved for Surplus only-No PILC	Coeymans Industrial Park Lane Coeymans, NY 12045	New York	(518) 828-9997	NYD986899912	6/28/2017	3/14/2016	CHWMEG audit
US Ecology - Michigan Disposal Waste Treatment (MDI)	Hazardous waste solids	49350 North I-94 Service Dr. Belleville, MI 48111	Michigan	(800) 592-5489	MID000724831	8/6/2019	9/18/2018	CHWMEG Audit
US Ecology - Wayne Disposal Inc (WDI)	Solid PCB Waste- Landfill NORM	49350 North I-94 Service Dr. Belleville, MI 48111	Michigan	(800) 592-5489	MID048090633	9/23/2018	9/18/2018	CHWMEG Audit
Veolia ES Technical Solutions – Port Arthur	Incineration: waste solvents, solvent/oil mixtures, organic and inorganic chemical wastes, pesticide wastes, petroleum wastes, aqueous wastes, contaminated soils, sludges, PCBs and capacitors	7665 Highway 73 Port Arthur, TX 77840	Texas	(409) 736-2821	TXD000838896	9/26/2018	3/29/2018	CHWMEG audit
Veolia ES Technical Solutions - Sauget	Incineration: various hazardous wastes	7 Mobile Avenue Sauget, IL 62201	Illinois	(618) 271-2804	ILD098642424	9/21/2016	5/16/2016	On-site audit
Veolia ES Technical Solutions - West Bridgewater (Global Recycling)	Lighting ballasts Small capacitors (PCB and non-PCB) E-waste, Universal Waste	90 Pleasant St, West Bridgewater, MA 02379	Massachusetts	(774) 296-6030	MAC300017498	3/13/2019	8/12/2018	On-site audit
Veolia ES Technical Solutions Flanders	Transfer Facility	1 Eden Lane Flanders, NJ 07836	New Jersey	(973) 347-7111	NJD980536593	12/14/2016	2/12/2016	On-site audit
Veolia ES Technical Solutions - Middlesex (Marisol)	Fuels Blending	125 Factory Lane Middlesex, NJ 08846	New Jersey	(732) 469-5100	NJD002454544	12/14/2016	4/4/2016	On-site audit
Veolia ES Technical Solutions - WI	Mercury, PCB Ballasts, Universal Waste	1275 Mineral Springs Drive Port Washington, WI 53074	Wisconsin	(262) 243-8900	WID988566543	3/16/2016	6/3/2014	On-site audit
Waste Management - Fairless Landfill	Construction & Demolition Debris Non- Hazardous Contaminated Soils Friable & Non-Friable Asbestos	1513 Bordentown Road Morrisville, PA 19067	Pennsylvania	(866) 909-4458		10/9/2019	10/1/2019	CHWMEG Audit
Waste Management - Greenridge RDF	Petroleum Contaminated Soils, C&D Debris, Clean soils	424 Peters Road Ganesvoort, New York 12831	New York	(518) 636-2141		9/26/2018		Low Risk. No Further Audits
Waste Management - Mercury Waste Inc.	Mercury Waste	21211 Durand Avenue Union Grove, WI 53217	Wisconsin	(262) 878-2599	WIR000000356	12/10/2019	9/11/2019	CHWMEG Audit

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VENDOR	RECOMMENDED WASTE STREAMS	FACILITY LOCATION	STATE	PHONE	EPA ID NUMBER	DATE OF LAST APPROVAL	DATE OF LAST AUDIT	TYPE OF AUDIT
Waste Management – Turnkey	Asbestos Waste, Non- Hazardous	97 Rochester Neck Road Rochester, NH 03867	New Hampshire	(603) 332-2386		12/13/2018	8/8/2017	Desktop Audit
Waste Management Disposal Services of Maine: BDS Waste Disposal Inc.	Asbestos Waste, Non-Hazardous	357 Mercer Road Norridgewock, ME 04957	Maine	(207) 634-2714	MED98254699	3/16/2016	12/18/2015	Desktop Audit
110 Sand & Gravel	C&D Debris Soaked Coal Tar Wrap Pipe	136 Spagnoli Road, Melville, NY	New York	(631) 694-2822				Low Risk. No Further Audits

* = Site has been reported closed

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Appendix G Embankment Stability Documentation

Figure G-1
Babylon Former MGP
Slope Stability Analysis
Existing Conditions - No Surcharge Load

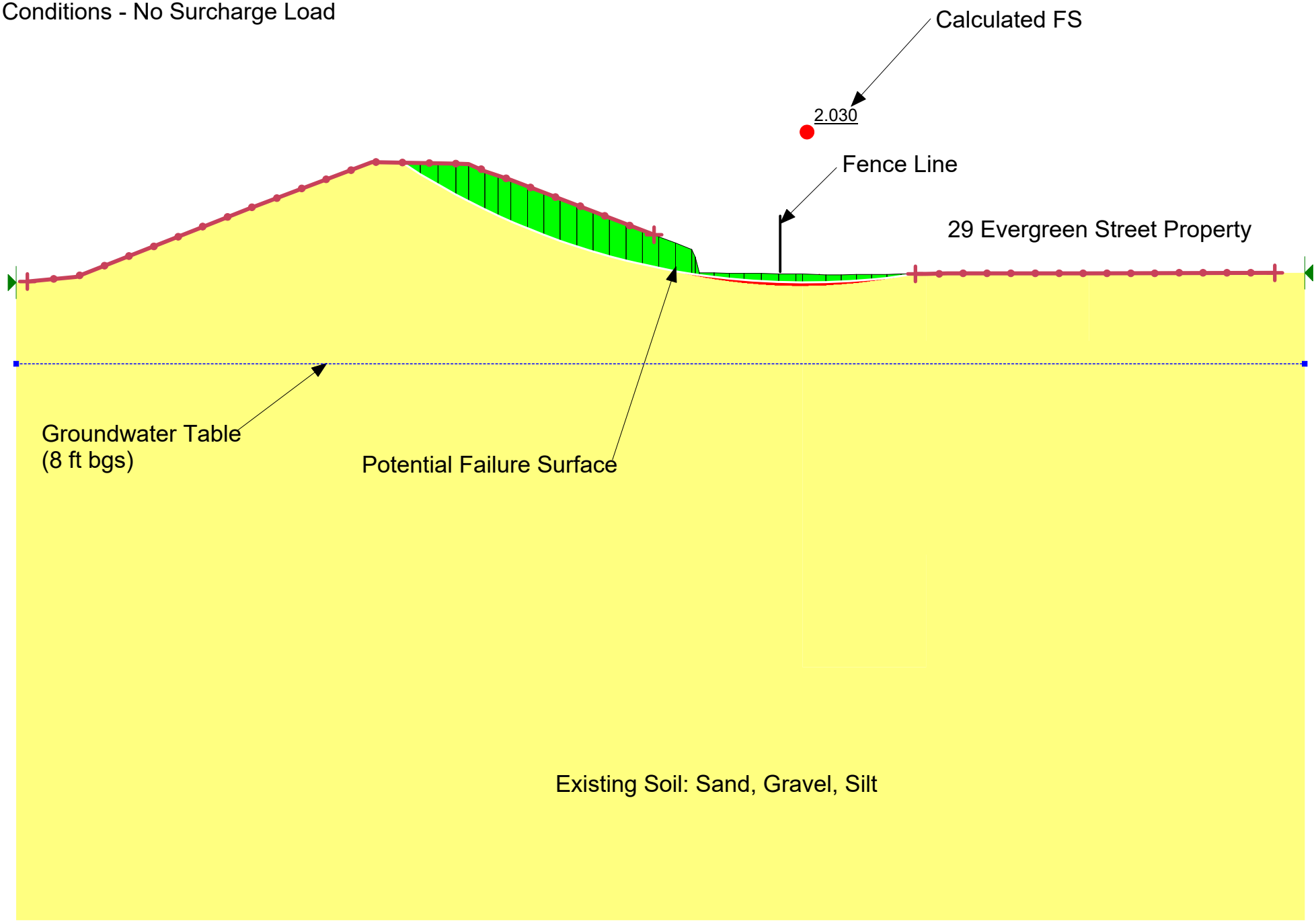

Figure G-2
Babylon Former MGP
Slope Stability Analysis
Existing Conditions - Surcharge Load

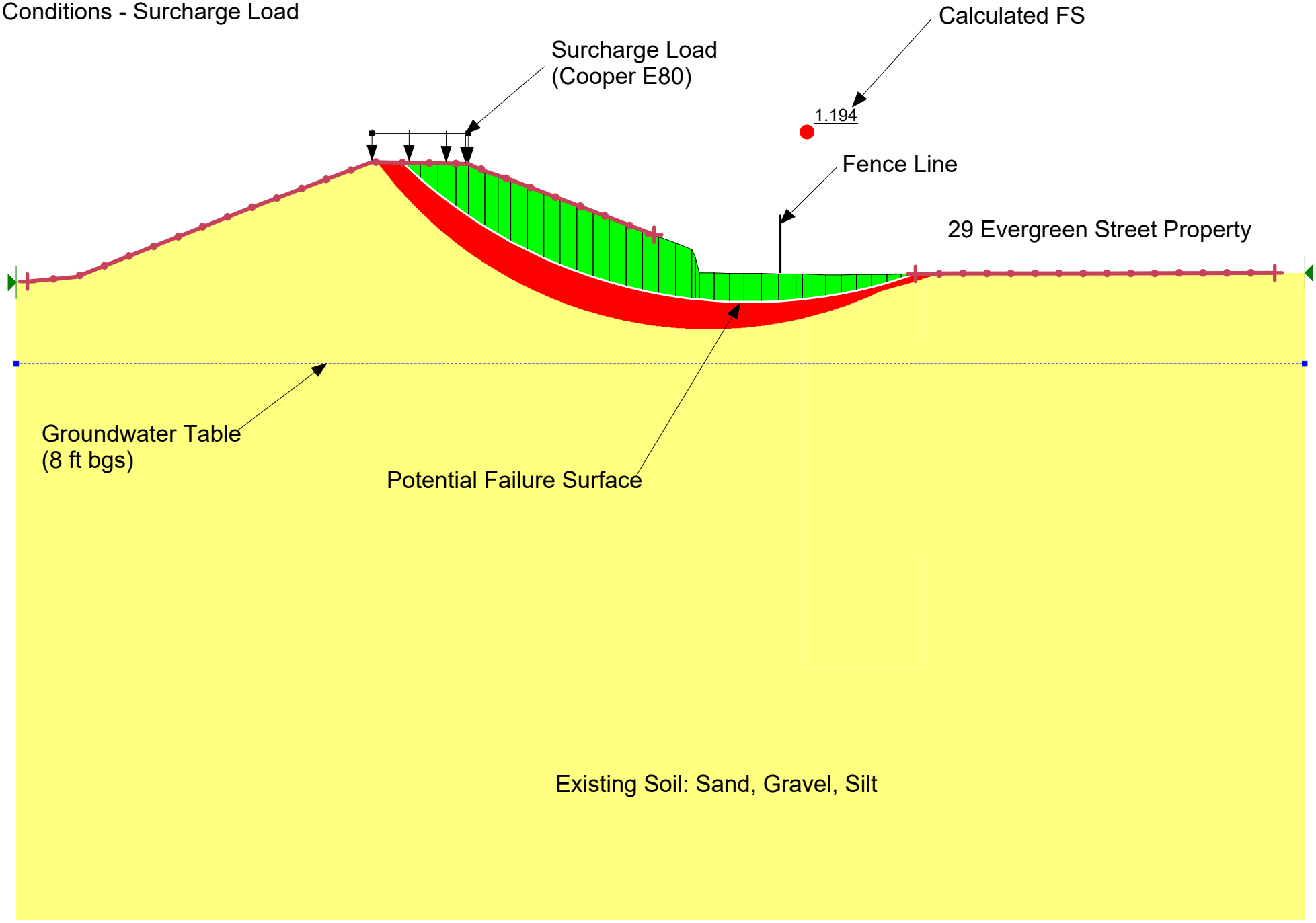

Figure G-3
Babylon Former MGP
Slope Stability Analysis
Uncured Support Columns - No Surcharge Load

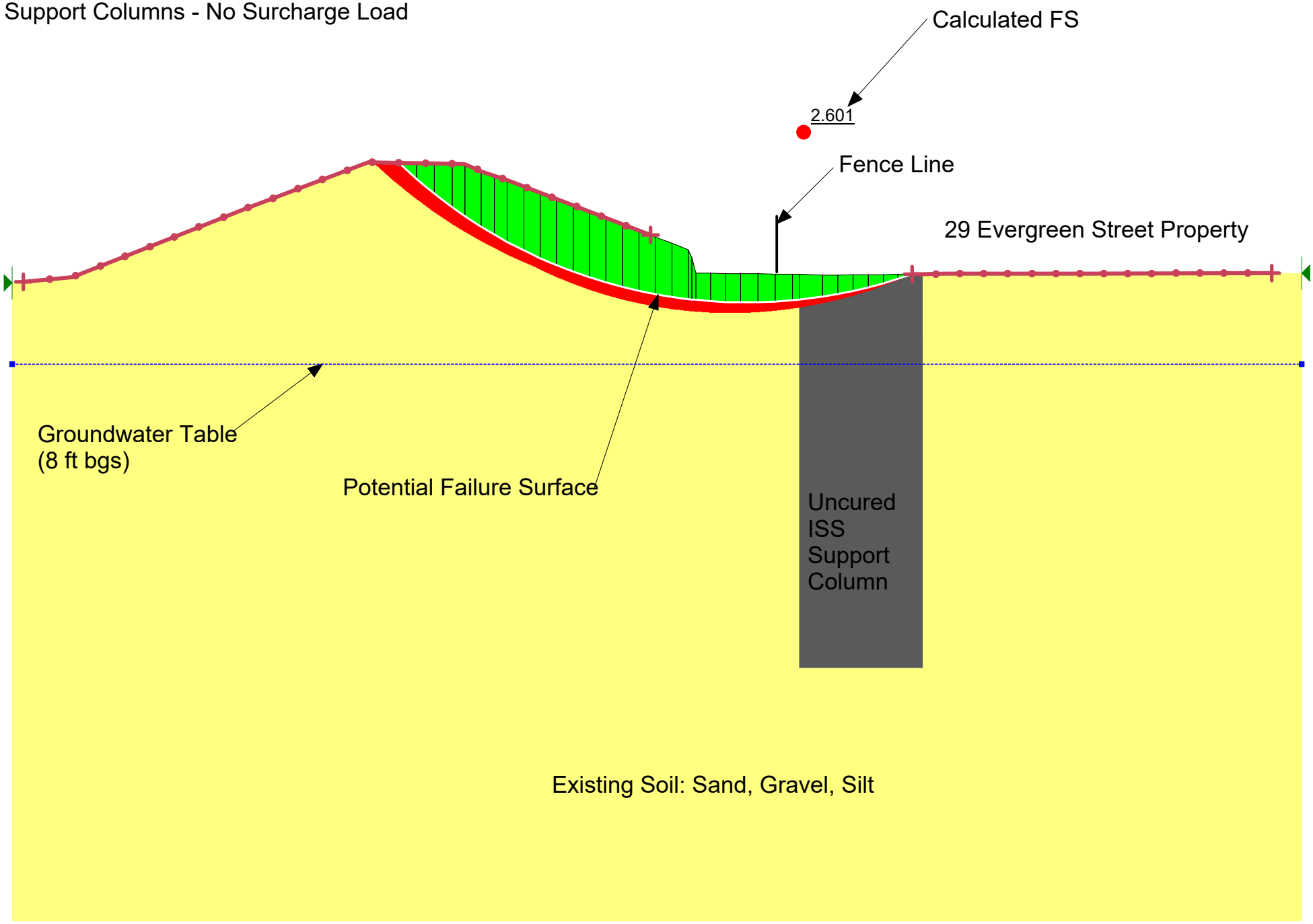

Figure G-4
Babylon Former MGP
Slope Stability Analysis
Uncured Support Columns - Surcharge Load

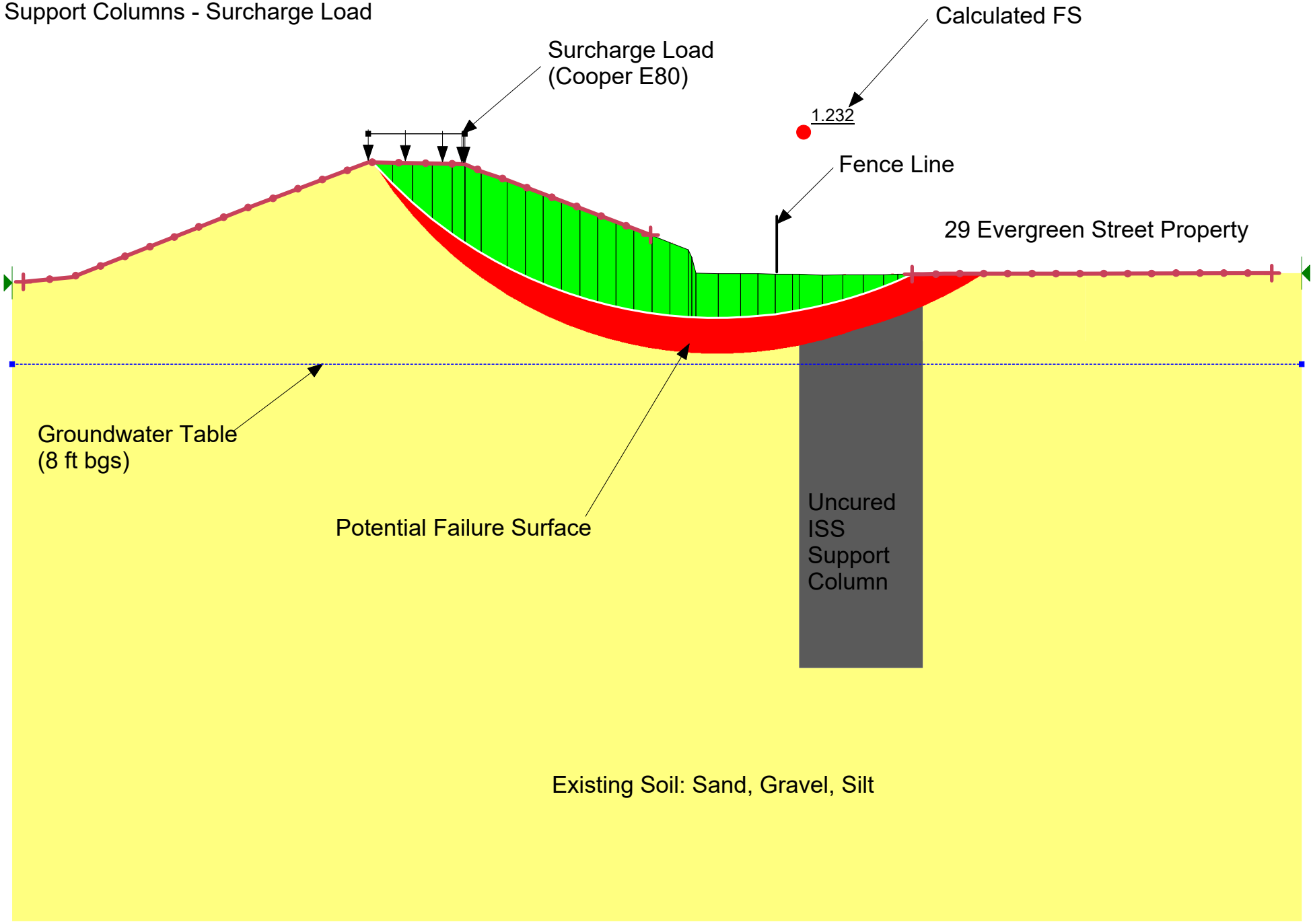

Figure G-5
Babylon Former MGP
Slope Stability Analysis
Cured Support Columns - No Surcharge Load

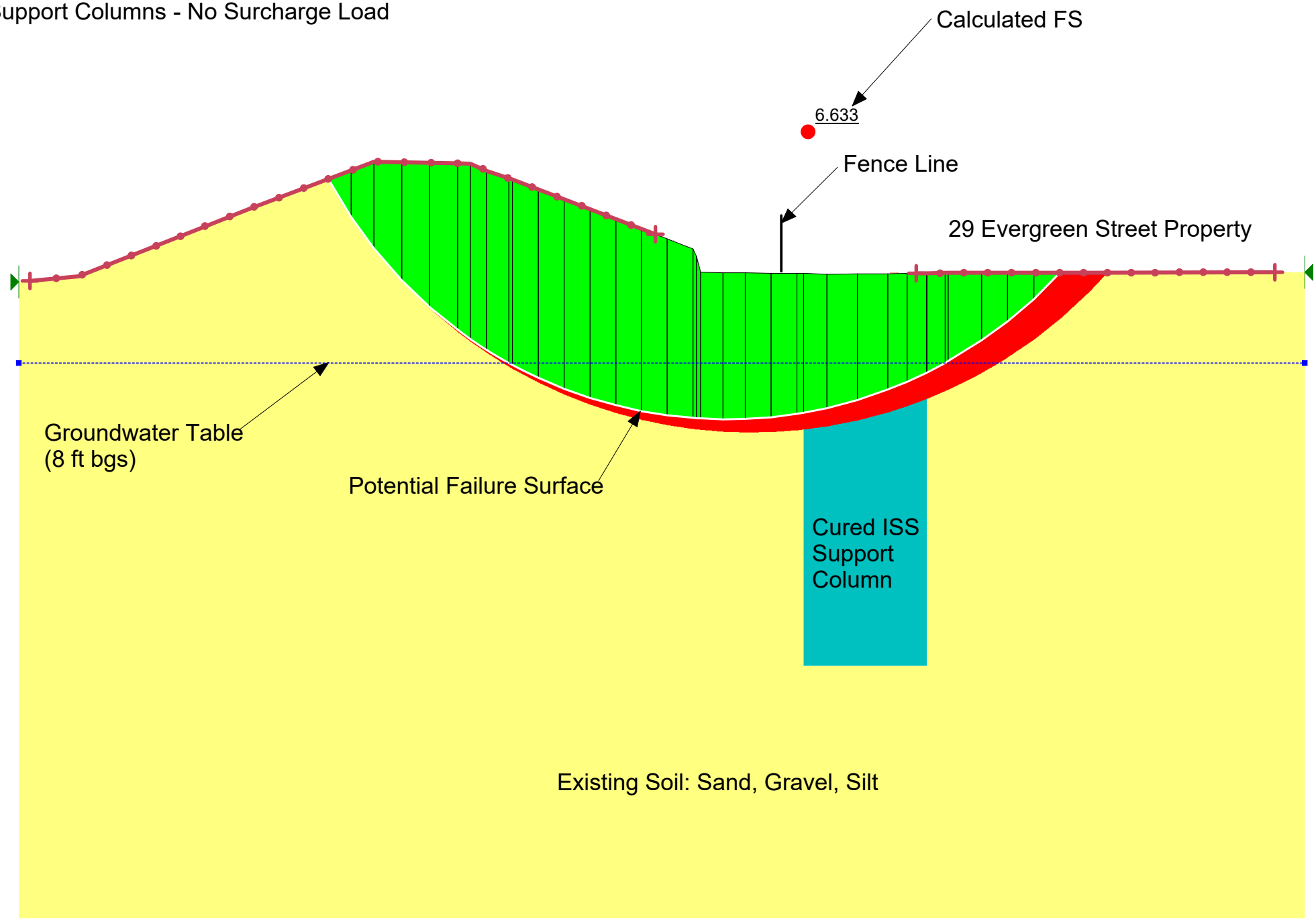

Figure G-6
Babylon Former MGP
Slope Stability Analysis
Cured Support Columns - Surcharge Load

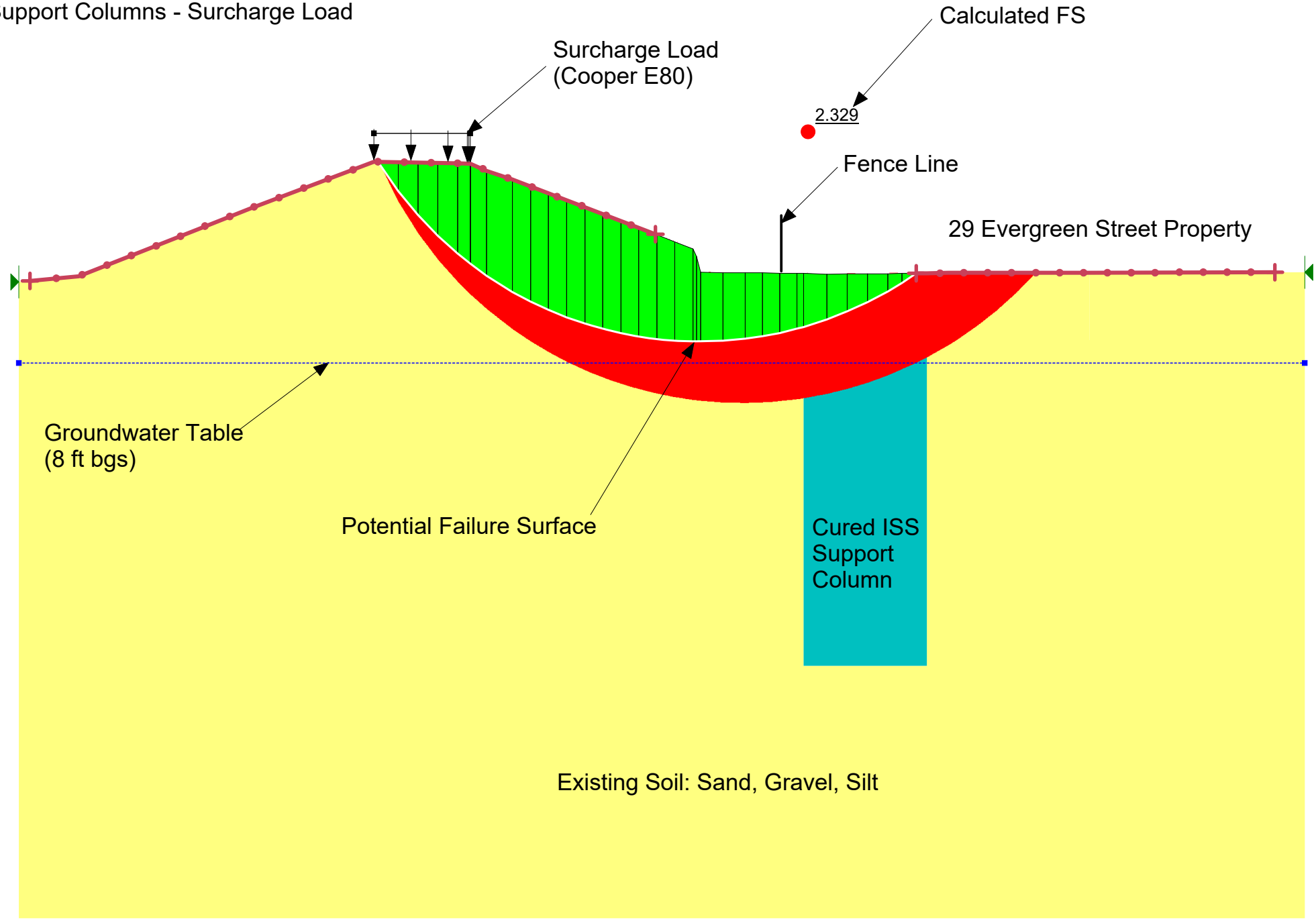

Figure G-7
Babylon Former MGP
Slope Stability Analysis
Cured Support Columns With Excavation - No Surcharge Load

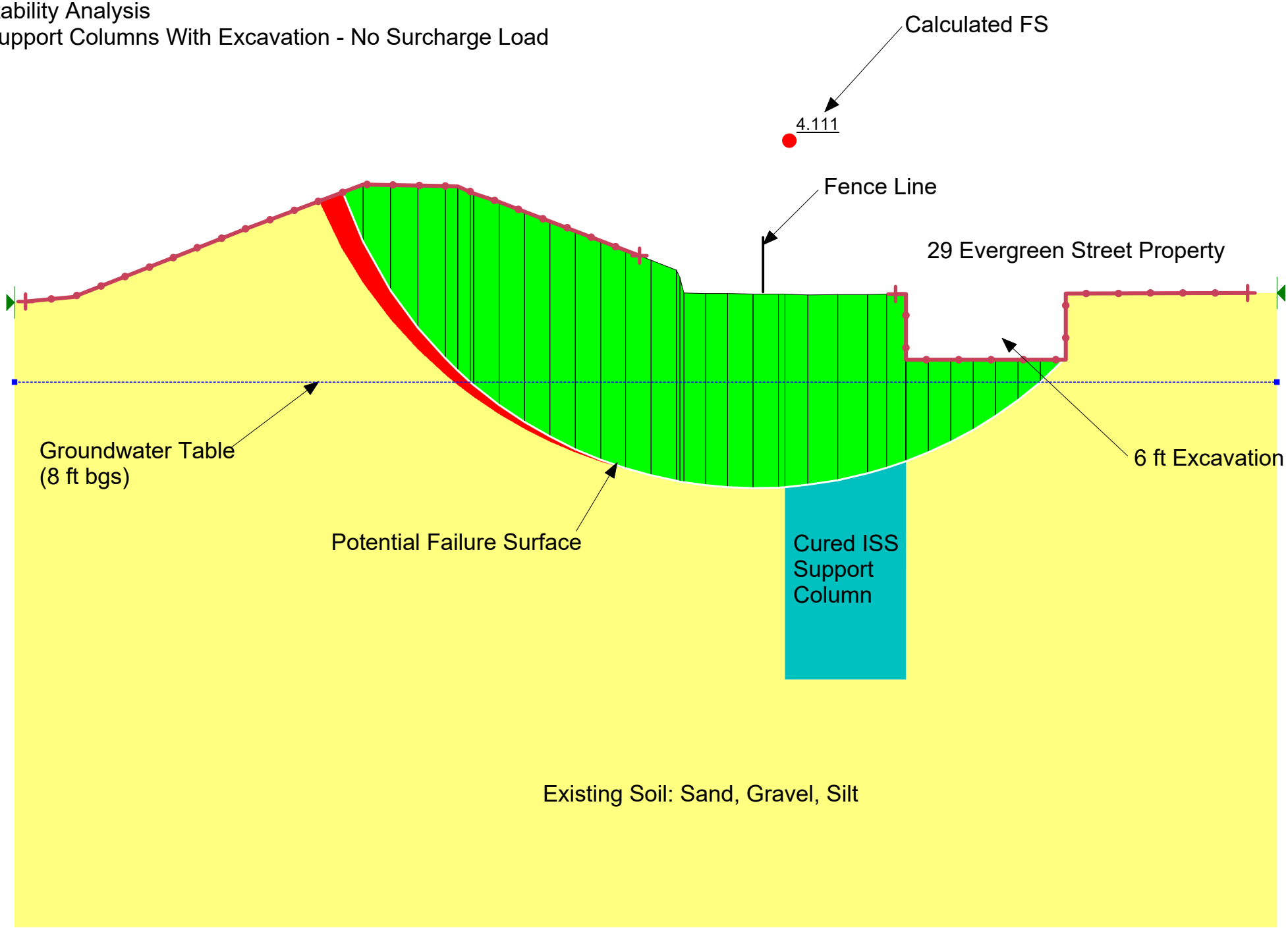

Figure G-8
Babylon Former MGP
Slope Stability Analysis
Cured Support Columns With Excavation - Surcharge Load