February 4, 2019
Project 1801687

Consulting
Engineers and
Scientists

Mr. William Wu
New York State Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway, Floor 11
Albany, NY 12233-7014

Re: National Fuel Gas Hornell 50% Remedial Design
Former Hornell MGP Site
Hornell, New York
Order No. A8-0634-02-10
Site No. 851032

Dear Mr. Wu:

On behalf of National Fuel Gas Distribution Company (NFG), GEI Consultants, Inc., P.C. (GEI) is providing the 50% Remedial Design for the Former Hornell Manufactured Gas Plant (MGP) site (Site) located in Hornell, Steuben County, New York. This 50% Remedial Design document presents a remedy consistent with the March 2018 Record of Decision (ROD), issued by the New York State Department of Environmental Conservation (NYSDEC), Division of Environmental Remediation.

Summary of Selected Remedy

As presented in the March 2018 ROD, the following is a summary of the selected remedy:

- Approximately 6,500 cubic yards of soil meeting the following criteria will be excavated for off-site disposal:
    - An average depth of 10 feet of on-site soils to allow sufficient space for soils that undergo in-situ solidification (ISS) to be below the frost line.
    - Off-site soils that exceed 500 ppm of polycyclic aromatic hydrocarbons (PAHs) beneath a portion of Franklin Street.
    - The upper one foot of soil exceeding 500 ppm total PAHs on the off-site Gas Regulator parcel.

GEI Consultants, Inc., P.C.
1301 Trumansburg Road, Suite N, Ithaca, NY 14850
607.216.8955 fax: 607.274.7577

- Underground piping or other structures associated with a source of contamination, such as the foundation of the original former MGP building, will be excavated and removed.
- The foundation and contents of Gas Holder A will be removed by a 14-ft deep excavation. Any other obstructions or debris that would inhibit ISS would be removed and disposed of off-site.
- In-situ solidification will be implemented for contaminant source areas on the site within the top 15 feet of soil where total PAHs exceed 500 ppm, as well as grossly contaminated soil 15 feet below ground surface. The treatment zone will generally extend 21 feet below ground surface, and, in some locations, up to 26 feet below ground surface to address areas of deeper contaminant sources.
- A site cover will be maintained to allow for commercial use of the site and on the off-site Gas Regulator parcel in areas where the upper one foot of exposed surface soil will exceed the applicable Soil Cleanup Objectives (SCOs). The cover may consist of buildings, pavement, sidewalks, or a soil cover of minimum thickness of one foot placed over a demarcation layer. For soil cover over the ISS treatment area, a minimum of four feet of soil will be used.
- On-site soil which does not exceed the minimum ISS treatment criteria may be used below the cover system to backfill the excavation. Clean fill meeting the site use requirements will be brought in to complete the backfilling of the excavation and establish designed grades, which will accommodate the installation of the cover system, at the site and off-site areas.
- Any groundwater contamination remaining after active remediation will be assessed for monitored natural attenuation (MNA) indicators at 5 and 10 years. If it appears that the MNA process alone will not address the contamination, active remediation will be proposed, which may be In-situ Chemical Oxidation (ISCO), depending on the results found.
- Imposition of an institutional control in the form of an environmental easement for the property to restrict development to commercial and industrial use, and to restrict the use of groundwater as a source of potable or process water.
- Implementation of a Site Management Plan, including Institutional and Engineering Control Plan, Monitoring Plan, and Operation and Maintenance Plan.
- Consideration of green remediation principles and techniques, to the extent practicable.

50% Remedial Design Submittal

This 50% Remedial Design document includes the following:

50% Pre-Design Investigation Results Report (Attachment 1)

This summary report includes pre-design investigation data collected to date by GEI and supporting reports, evaluations, and documents.

50% Specification Outline and Remedial Design Drawings (Attachment 2)

SHEET	DESCRIPTION
1	TITLE SHEET
2	CONSTRUCTION NOTES
3	EXISTING CONDITIONS AND EXPLORATIONS PLAN
4	HISTORICAL CONDITIONS
5	REMEDIATION OVERVIEW
6	REMEDIATION PHASING PLAN
7	MATERIALS MANAGEMENT PLAN
8	TRANSPORTATION PLAN
9	DEMOLITION AND PROTECTION PLAN
10	EROSION CONTROL AND SITE MANAGEMENT PLAN
11	PRE-ISS EXCAVATION PLAN
12	EXCAVATION SUPPORT PLAN
13	EXCAVATION SUPPORT DETAILS
14	ISS PLAN
15	ISS SECTIONS
16	RESTORATION PLAN
17	RESTORATION DETAILS
18	SITE MANAGEMENT DETAILS

Future Submittal: Draft Final Design (95%)

In accordance with the May 11, 2018 NYSDEC email approval of our proposed remedial approach, following NYSDEC approval of this 50% Remedial Design, a Remediation Contractor will be procured. Subsequently, a Draft Final Design (95%) of the Remedial Design will be submitted to NYSDEC for review and approval. The Draft Final Design will address NYSDEC comments on the 50% Remedial Design submittal, plus the following additions/modifications:

- Final Draft Technical Plans and Specifications for the implementation of the remedial action.
- A working schedule for completion of the remedial action.

If you have any questions regarding the information presented, please call me at (607) 216-8976 or email me at dkopcow@geiconsultants.com.

Sincerely,

GEI CONSULTANTS, INC., P.C.

Daniel Kopcow, P.E., PMP
Project Manager and Senior Engineer

Jeffrey Holden, P.E.
Senior Engineer

DK:mlr

Attachments: Attachment 1 – Pre-Design Investigation Results Report
Attachment 2 – 50% Specification Outline and Remedial Design Drawings

ec/c: Wendy S. Kuehner – NYSDOH
Tanya Alexander – National Fuel Gas
Brad Walker – National Fuel Gas

Attachment 1

Pre-Design Investigation Results Report

Introduction

On behalf of National Fuel Gas Distribution Corporation, GEI Consultants, Inc., P.C. (GEI) conducted a Pre-Design Investigation (PDI) at the former Hornell Manufactured Gas Plant (MGP) site from September 24 to October 2, 2018 and on November 20, 2018 in order to obtain data for the remedial design and to generate New York State Department of Environmental Conservation (NYSDEC)-requested data. Four main design elements were addressed by the investigation:

1. Verification of the delineation of remedial areas;
2. Geotechnical design supporting information;
3. Treatability testing for in-situ solidification (ISS); and
4. An updated site survey.

The PDI investigation was performed by advancing 26 soil borings on and adjacent to the site, excavating two additional test pits to collect soil samples for ISS treatability testing, and excavating one utility test pit in Franklin Street. The locations of the soil borings and the test pits are shown in Figure 1.

Delineation of Remedial Areas

Soil borings and analytical samples were obtained from the areas described below and compared with Commercial Soil Cleanup Objectives (SCOs), including the 500 ppm total polycyclic aromatic hydrocarbon (PAH) cleanup objective for on-site soils and adjacent commercial/industrial property to more precisely define the limits for remediation, and to Residential SCOs for off-site impacted areas to determine if shallow soils on residential properties are impacted from historic MGP operations. Soil borings were visually logged. Borelogs are provided in Appendix A. The analytical data were validated through the Data Usability Summary Report (DUSR) process. Samples obtained for design were not required to be validated.

Franklin Street Delineation

Borings B101, SB45, and SB46 were advanced to delineate the zone between the edge of the MGP at TP1 (and to the south side of the gas line) and the previously collected line of clean borings in the street (SB27 through SB29). No visual or olfactory impacts were observed at B101, and only slight hydrocarbon-like odors were observed in SB46 in the 4 to 16 feet below ground surface (bgs) range. Slight visual impacts along with odors were observed in SB45 at 12 to 16 feet bgs. Samples were analyzed from the bottom of borings B101, SB45, and SB46 and all PAHs were found to be below the detection limits. The results are shown in Table 1.

Additionally, a utility test pit was excavated to approximately 3.5 feet bgs to determine the exact location of the utility lines in Franklin Street. A sample was collected at the bottom of this test pit and

analyzed for PAHs at the request of the NYSDEC. While two PAH compounds (Benzo[a]pyrene and Dibenz[a,h]anthracene) exceeded Commercial SCOs, overall, total PAHs did not exceed the cleanup criterion in the test pit sample. The results are shown in Table 1.

Southern Area Off-site Delineation

The delineation investigation along the southern side of the site had two objectives:

1) To assess whether shallow soils exceeding Residential Soil Cleanup Objectives were present; and
2) To assess whether off-site subsurface migration of MGP contamination had occurred at depth.

Shallow Soil Delineation

During the Feasibility Study (FS), GEI proposed including an area of shallow soil excavation at the residential properties to the south of the site under the presumption that MGP operations may have impacted surface soil with PAHs. The Remedial Investigation (RI), however, did not provide surface or shallow soil data to define an excavation limit. Therefore, the NYSDEC requested that excavation in this area be removed from the remedy, with the understanding that the PDI would examine this issue and adjust the limit of remediation if necessary.

Soil borings SB32 to SB36, and SB47 and SB48, were advanced on hotel property. Shallow soil samples were collected at 2 to 4 feet bgs from SB32 through SB36. Due to the presence of fill material containing coal and brick fragments in the shallow soil at SB32 and SB33, additional borings were performed to the south to assess the extent of this material. This fill material was observed to be thinner in shallow soils at SB48 (less than 1.5 feet thick), and not present at SB47.

The depths and results of the analysis are provided in Table 2. Samples from SB32 and SB33 had exceedances of the Commercial SCOs for several PAH compounds, however, the total PAH concentrations in these samples were only 48 ppm and 51 ppm, respectively. This is well below the 500 ppm total PAH cleanup level for commercial properties such that additional delineation or remediation was not identified for this parcel.

Soil borings SB37 through SB44 were advanced in the back yards of residences along Albion Street bordering the southern side of the site. Results of the analysis of these samples are presented in Table 3. Shallow soil samples (2 to 4 feet bgs) at SB39, SB40, and SB41 had exceedances of Residential SCOs for one or more PAH compounds. Shallow soil samples (2 to 4 feet bgs) at SB39 and SB40 had slight exceedances for arsenic, but no other metals. Thus, these borings were used to define a shallow excavation zone in the backyards to the south of the site. On one property (19 Albion), a clean sample to the south was not collected to define the southern extent of impact, but it is expected to extend about 5 to 10 additional feet south of sample location SB40. The actual limit for excavation in this location will be determined by shallow soil sample collection and analysis during the Supplemental PDI (if requested by the Remediation Contractor) conducted prior to the 95% Remedial Design or during mobilization or pre-excavation for the ISS remedy (further discussed below). The estimated additional shallow excavation area is reflected in the 50% Remedial Design Drawings.

During the PDI, SB44 was drilled slightly east of its intended location on 21 Albion Street, rather than on 23 Albion Street. Note, however, that samples from SB42, SB43, and SB44 were in compliance with the Residential SCOs. Because the data do not indicate that shallow soil impacts extend onto 21 Albion Street, they are not suspected at 23 Albion Street, which is located further from the former MGP. A shallow soil sample will be collected for analysis at 23 Albion Street during the Supplemental PDI (if requested by the Remediation Contractor) conducted prior to the 95% Remedial Design or during mobilization or pre-excavation for the ISS remedy (further discussed below).

Deep Soil Delineation

Borings SB32 through SB35, SB47, and SB48 were drilled on the hotel property to determine the limits of ISS outside of the former MGP production area. Borings SB47 and SB48 were contingent step-out locations approximately 30 feet south of SB33; these additional borings were drilled due to observations of brick and coal fragments in fill in SB32 and SB33, as well as a possible hydrocarbon odor at the base of SB33. No visual indications of subsurface MGP contaminant migration was observed in the soil borings. A slight hydrocarbon-like odor was observed at the base of borings SB47 and SB48. Corresponding soil samples (19.5 to 20.0 feet bgs) found no PAHs in SB47, and total PAHs less than 1 ppm in SB48. In fact, no constituents were detected above Commercial SCOs in any of the deep samples on the commercial property (Table 4). The odor and PAHs found in the borings is likely due to migration of impacted groundwater from the site. Based on the data and soil boring observations, the limits of ISS will be north of this line of borings SB32 through SB35; the estimated limits in this area are indicated on Figure 1 and reflected in the 50% Remedial Design Drawings. However, to more tightly constrain the limits of soil excavation and ISS, test pits will be excavated to further characterize soil in this area, in accordance with the ROD treatment criteria, prior to the 95% Remedial Design (further discussed below).

Three deep soil samples were also collected on the residential properties to the south side of the site (SB37, SB39, and SB41); results are presented in Table 5. As indicated, certain PAHs exceeded Residential SCOs in two of the deep residential samples (SB37 and SB41), and arsenic also exceeded the Residential SCO at SB41. Deeper impacts on the residential properties had previously been identified during the RI (SB24 and SB25) at the 21 Albion Street property. SB24 is the location of the deep impact at 29 to 30 feet bgs. The NYSDEC is not requiring remediation of this deep impact. Therefore, the approach will be to address the deep impacts with deed restrictions. Only 19 and 21 Albion Street will require deed restrictions to address subsurface impacts. (The northwest corner of 19 Albion Street was mapped during the RI to be part of the migration pathway for the deep impact at SB24; identification of this area for deed restrictions has not been modified based on the PDI results.)

Additional RI Borings

The locations of RI borings SB12 and SB18 were re-drilled (SB12R and SB18R) to 40 feet bgs as part of the PDI to confirm the depth of non-aqueous phase liquid (NAPL) impacts observed in the original RI borings. Soil sample collection began at 20 feet bgs in SB12R and SB18R to confirm the previously-observed impacts. The borings were sampled continuously using split spoon samplers to the base of the borings at 40 feet bgs. Field logging was performed, with one sample collected for PAH analysis per boring. No visual impacts were observed in SB12R. Hydrocarbon-like odors were

noted at 18 to 22 feet bgs, and at 30 to 32 feet bgs in boring SB18R. Odors were observed at SB18R at 20 to 22 feet bgs, and a thin (0.3 ft thick) tar stringer was encountered at 34 feet deep. All PAHs at 39 to 40 feet bgs in both borings were below the Commercial SCOs. The results of samples taken from SB12R and SB18R are provided in Table 6.

Geotechnical SOW

Borings B101 through B105 were advanced on site to collect geotechnical data to help design the excavation support system. Split spoon samples were collected using continuous sampling for SPT N-values using a 2-inch-diameter split spoon. One Shelby tube was obtained from each geotechnical boring to perform Atterberg limits and triaxial tests. The geotechnical borings were visually logged. Slight hydrocarbon-like odors were typically encountered between 10 and 30 feet. Sheens, blebs, and tar-like coated soil grains were found in B104 at depths of approximately 15 and 23 feet bgs. Particle size distribution reports, liquid and plastic limits test reports, and unconsolidated undrained triaxial compression results are provided in Appendix B.

ISS Treatability

Material Collection

The results of the geotechnical exploration program indicated that the sand and gravel layer, in which the majority of the ISS would be performed, is comprised of a homogenous material with little vertical or horizontal variation across the site. To collect the Treatability Study (TS) sample material, a test pit (TP-ISS-A) excavation was initially commenced between B102 and SB18R. However, the test pit could not be extended beyond 6 feet bgs due to water infiltration that occurred between 2.5 and 3 feet bgs. A second test pit (TP-ISS-B) was then excavated between SB2R and SB12R to a depth of approximately 15 feet. The logs for these test pits are provided in Appendix C. Sufficient sample was collected from the bottom of the second test pit to fill five 5-gallon buckets. Because larger pieces of gravel are typically excluded from treatability study testing, gravel pieces greater than 2 inches in diameter were removed from the sample using a rake prior to filling the buckets. The fraction of material larger than 2 inches in diameter constituted approximately 18 percent of the mass of the sample and their absence is not considered to affect the results of the study.

The buckets of TS material were shipped to JLT Laboratories in Canonsburg, PA. The original lab reports (mix preparation records, unconfined strength test results, and flex wall permeability test results) documenting the work described in this section are included in Appendix D. All the buckets contained water and oily liquid. These liquids were decanted and removed from the sample material to increase the solids content. The moisture content of the soil post-decanting was measured to be 18%, reported on a dry soil weight basis.

JLT performed sieve tests on material from each bucket which indicated that the particle size distribution was consistent across all the samples. The sieve analyses also indicated the fraction of the soil material larger than the ¾-inch sieve openings to be 12-13%. Given these results, GEI directed JLT to use 3-inch diameter cylinders for the TS testing.

The coarse gravel and cobble-sized fraction of the subsurface material that was not included in the TS testing will not diminish the performance of the ISS remedy. In the field application, these components will readily be incorporated into the solidified monolith and should actually strengthen the monolith as aggregate does concrete.

Initial Mix Design Testing

GEI designed a "proof of concept" mix design to assure that the decanted and highly impacted material would still set properly. This mix contained a relatively high cementitious content and no bentonite. This mixture provided samples that gained strength very quickly and exceeded the required 50 psi unconfined compressive strength (UCS) criterion established for the project. Therefore, UCS data was not collected for this mix at the 28-day period. The strength testing results for this mixture at 7 and 14 days are shown below.

As the proof mixture was curing and early results indicated a satisfactory material, GEI directed the lab to produce seven cylinders for each of the four different mixtures to compare the effects of different constituents on the performance of the solidified material. For this study, a ratio of half Portland cement (PC) and half ground, granulated blast-furnace slag (GGBFS) was used in each of the mixtures for the cementitious component. All contents of the mixture components are reported on a dry weight basis.

In addition to the UCS criterion, a criterion for a threshold hydraulic conductivity at 28 days was established for the solidified material in the TS. This study threshold is 6 $x10^{-7}$ cm/sec for the hydraulic conductivity tested on molded cylinders cured for 28 days using ASTM D 5084. To be conservative, the actual ISS construction will incorporate performance standards that are less stringent than the TS criteria. This is to account for the more idealized conditions under which the TS was performed.

Mix Design

With the high cementitious "proof" mix exceeding strength requirements prior to 7 days, the remaining TS mixes used a reduced cement content. Two of the mixtures (1A and 1B) use a total of 8% cementitious additives. Mix 1A incorporates 0.25% hydrated bentonite, while Mix 1B incorporates 0.75% hydrated bentonite. The other two mixtures (1C and 1D) use a total of 15% cementitious additives, with Mix 1C and 1D incorporating 0.25% and 0.75% hydrated bentonite, respectively.

The following table provides a summary of the mix design details for the TS.

Mix Design Details for the Hornell Former MGP Treatability Study

Mix Number	Total Cementitious Percentage	PC (percent)	GGBFS (percent)	Bentonite (percent)
Proof of concept	20%	20%	0%	0%
Mix 1A	8%	4%	4%	0.25%
Mix 1B	8%	4%	4%	0.75%
Mix 1C	15%	7.5%	7.5%	0.25%
Mix 1D	15%	7.5%	7.5%	0.75%

Notes:
Mixture components are determined on a dry weight basis.
PC = Portland Cement

GGBFS = ground, granulated blast-furnace slag
Bentonite is added in a hydrated form to the dry mixture

Test Results

The following table presents the test results for UCS at 7, 14, and 28 days, as well as the hydraulic conductivity, tested at 14 and 28 days. The hydraulic conductivity of the materials can be expected to continue to reduce over time, as the GGBFS component of the mixture cures more slowly than PC and exhibits continuing reductions in permeability past the 28 days nominal curing time.

Mix Design Details for the Hornell Former MGP Treatability Study							
Mix Number	Total Cementitious Percentage	Bentonite (percentage)	UCS – 7 day (psi)	UCS – 14 day (psi)	UCS – 28 day (psi)	K – 14 day (cm/sec)	K – 28 day (cm/sec)
Proof of concept	20%	0	288	341	NA	1.12E-07	NA
Mix 1A	8%	0.25	160	193	220	5.37E-07	2.48E-08
Mix 1B	8%	0.75	123	197	224	2.10E-07	8.46E-08
Mix 1C	15%	0.25	285	313	374	4.07E-07	3.47E-08
Mix 1D	15%	0.75	253	264	405	1.05E-07	2.96E-08

Notes:
Mixture components are determined on a dry weight basis.
UCS = unconfined compressive strength (ASTM D 1633)
K = saturated hydraulic conductivity (ASTM D5084)
NA = data not available

Conclusions

All of the mixes tested in this TS have surpassed the minimum UCS and permeability requirements established for this study prior to 14-days of curing. In general, the recommended mixture is generally that which requires the minimum amount of material added as a grout to the subsurface during ISS implementation. The TS indicates that Mix 1A, with 8% total cementitious additive and 0.25% bentonite will perform acceptably for the Hornell Former MGP site.

Given the volume of water and cobbles in the TS samples and to ensure that the TS results are reflective of actual field conditions, the 95% Remedial Design will consider the soil consistency, permeability and in situ conditions of the subsurface material. The design will specify an appropriate envelope of water/cement ratios that the Remedial Contractor shall use in the grout mixture during construction. The design will also consider whether to allow bucket mixing for ISS or require an auger mixing approach.

Surveying

A licensed surveyor surveyed and mapped the following:

- The marked locations of the subsurface utility lines at the site and under Franklin Street.
- The approximate locations of the soil borings.
- The property lines for the site and adjacent properties that will be affected by the remediation.

The survey is given in Figure 1, showing the above items.

Supplemental PDI

The investigation summary presented above identifies limited additional investigations to confirm or refine the limits of soil removal and ISS. Such additional investigations would be combined with any additional Supplemental PDI investigation activities that may be requested by the Remediation Contractor. Based on the additional sample collections indicated above, Table 7 provides a preliminary summary of remaining samples to be collected as part of the Supplemental PDI. Depending on the timing, the results of this sampling will be provided to NYSDEC as an attachment to the 95% Remedial Design or as a separate letter-report.

Tables

Table 1. Franklin Street Off-Site Delineation - Commercial PAH Results
National Fuel Gas - Hornell MGP

	Commercial SCOs (ppm)	Above 15' bgs	Below 15' bgs		
		Utility Test Pit (3'-3.5') 9/26/2018	B101 (39'-40') 9/27/2018	SB45 (19'-20') 9/27/2018	SB46 (19'-20') 9/27/2018
PAH (ppm)					
1-Methylnaphthalene	NE	0.15 J	U	U	U
2-Methylnaphthalene	NE	0.19J	U	U	U
Acenaphthene	500	1.3	U	U	U
Acenaphthylene	500	0.39 J	U	U	U
Anthracene	500	1.2	U	U	U
Benz[a]anthracene	5.6	2.8	U	U	U
Benzo[a]pyrene	1	3.9	U	U	U
Benzo[b]fluoranthene	5.6	3.5	U	U	U
Benzo[g,h,i]perylene	500	2.6	U	U	U
Benzo[k]fluoranthene	56	1.3	U	U	U
Chrysene	56	2.6	U	U	U
Dibenz[a,h]anthracene	0.56	0.58	U	U	U
Fluoranthene	500	3.5	U	U	U
Fluorene	500	0.98	U	U	U
Indeno[1,2,3-cd]pyrene	5.6	2.4	U	U	U
Naphthalene	500	0.79	U	U	U
Phenanthrene	500	1.4	U	U	U
Pyrene	500	4.4	U	U	U
Total PAH	500	33.98	U	U	U

Notes:

For commercial areas, soil results are compared to commercial SCOs for individual PAH constituents, but are not considered exceedances as long as the total PAH concentration is below the 500 ppm total PAH concentration established for non-residential properties under this project.
bgs - below ground surface
SCOs - Soil Cleanup Objectives
NE - Not Established
U - Analyte was analyzed for but not detected.
J - Estimated value due to the concentration being between the MRL and the MDL.
MRL - Method Reporting Limit. The lowest concentration at which the method analyte may be reliably quantified under the method conditions.
MDL - Method Detection Limit. A statistical value derived from a study designed to provide the lowest concentration that will be detected 99% of the time. Values between the MDL and MRL are estimated (see J qualifier).

Table 2. Southern Area Off-Site Delineation - Commercial Above 15 feet
PAH, BTEX, Metals, and Total Cyanide Results
National Fuel Gas - Hornell MGP

	Commercial SCOs	Above 15' bgs Commercial Area				
		SB32 (2'-4') 10/1/2018	SB33 (2'-4') 10/1/2018	SB34 (2'-4') 10/1/2018	SB35 (2'-4') 10/1/2018	SB36 (2'-4') 10/1/2018
PAH (ppm)						
1-Methylnaphthalene	NE	U	U	U	U	U
2-Methylnaphthalene	NE	U	U	U	U	U
Acenaphthene	500	0.34 J	U	U	U	U
Acenaphthylene	500	U	0.43 J	U	U	U
Anthracene	500	1.2	0.31 J	U	U	U
Benz[a]anthracene	5.6	5.5	4.9	U	0.079 J	U
Benzo[a]pyrene	1	6.4	6.9	U	0.093 J	0.083 J
Benzo[b]fluoranthene	5.6	6.5	7.6	U	0.099 J	0.090 J
Benzo[g,h,i]perylene	500	3.3	4.6	U	U	U
Benzo[k]fluoranthene	56	2.3	2.9	U	U	U
Chrysene	56	4.9	4.4	U	U	U
Dibenz[a,h]anthracene	0.56	1.1 J	1.2	U	U	U
Fluoranthene	500	5.2	5.8	U	0.092 J	U
Fluorene	500	U	U	U	U	U
Indeno[1,2,3-cd]pyrene	5.6	4	5.4	U	U	U
Naphthalene	500	U	U	U	U	U
Phenanthrene	500	2.4	0.540 J	U	U	U
Pyrene	500	5.2	6.1	U	0.086 J	U
Total PAH	500	48.34	51.08	U	0.449	0.173
BTEX (ppm)						
Benzene	44	U	NA	NA	U	U
Ethylbenzene	390	U	NA	NA	U	U
Toluene	500	U	NA	NA	U	U
Total Xylene	500	U	NA	NA	U	U
Metals (ppm)						
Arsenic	16	5.9	NA	NA	9.6	9.9
Barium	400	30.4	NA	NA	165	88.2
Beryllium	590	U	NA	NA	0.74	U
Cadmium	9.3	0.15 BJ	NA	NA	0.16 BJ	0.07 BJ
Chromium	1900	5.6	NA	NA	15.2	13.4
Lead	1000	6.5 J	NA	NA	44.0	13.4
Mercury	2.8	U	NA	NA	0.171	0.037
Nickel	310	U	NA	NA	20.4	U
Selenium	1500	U	NA	NA	1.4 B	1.2 B
Silver	1500	U	NA	NA	U	U
Thallium	NE	U	NA	NA	U	U
Vanadium	NE	U	NA	NA	18.5	U
Zinc	10000	U	NA	NA	86.2	U
Total Cyanide (ppm)	27	U	NA	NA	0.33	0.18 J

Notes:
For commercial areas, soil results are compared to commercial SCOs for individual PAH constituents, but are not considered exceedances as long as the total PAH concentration is below the 500 ppm total PAH concentration established for non-residential properties under this project.
bgs - below ground surface
SCOs - Soil Cleanup Objectives
NA - Not Analyzed
NE - Not Established
U - Analyte was analyzed for but not detected.
J - Estimated value due to the concentration being between the MRL and the MDL.
B - Analyte was also detected in the associated method blank at a concentration that may have contributed to the sample result.
MRL - Method Reporting Limit. The lowest concentration at which the method analyte may be reliably quantified under the method conditions.
MDL - Method Detection Limit. A statistical value derived from a study designed to provide the lowest concentration that will be detected 99% of the time. Values between the MDL and MRL are estimated (see J qualifier).

Table 3. Southern Area Off-Site Delineation - Residential Above 15 feet PAH, BTEX, Metals, and Total Cyanide Results
National Fuel Gas - Hornell MGP

	Residential SCOs	Above 15' bgs Residential Area							
		SB37 (2'-4') 10/1/2018	SB38 (2'-4') 10/1/ 2018	SB39 (2'-4') 10/1/2018	SB40 (2'-4') 10/1/ 2018	SB41 (2'-4') 10/2/2018	SB42 (2'-4') 10/2/2018	SB43 (2'-4') 10/2/2018	SB44 (2'-4') 10/2/2018
PAH (ppm)									
1-Methylnaphthalene	NE	U	U	U	U	U	U	U	U
2-Methylnaphthalene	NE	U	U	U	U	U	U	U	U
Acenaphthene	100	U	U	U	U	U	U	U	U
Acenaphthylene	100	U	U	3.4 J	0.14 J	0.09 J	U	U	U
Anthracene	100	U	U	16	0.42	0.2 J	U	U	U
Benz[a]anthracene	1	U	U	22	1.2	0.86	U	U	U
Benzo[a]pyrene	1	U	U	17	1.1	0.89	U	U	U
Benzo[b]fluoranthene	1	U	U	19	1.3	0.98	0.086 J	U	U
Benzo[g,h,i]perylene	100	U	U	8.5	0.69	0.58	U	U	U
Benzo[k]fluoranthene	1	U	U	8	0.51	0.35 J	U	U	U
Chrysene	1	U	U	18	1.1	0.9	U	U	U
Dibenz[a,h]anthracene	0.33	U	U	2.9 J	0.19 J	0.150 J	U	U	U
Fluoranthene	100	U	U	44	2.5	1.5	0.099 J	U	U
Fluorene	100	U	U	4.2	0.170 J	U	U	U	U
Indeno[1,2,3-cd]pyrene	0.5	U	U	10	0.75	0.61	U	U	U
Naphthalene	100	U	U	U	U	U	U	U	U
Phenanthrene	100	U	U	29	1.7	0.45	U	U	U
Pyrene	100	U	U	34	2	1.3	0.094 J	U	U
Total PAH	500	U	U	236	13.77	8.86	0.279	U	U
BTEX (ppm)									
Benzene	2.9	U	U	U	0.00032 J	U	U	U	U
Ethylbenzene	30	U	U	U	0.00023 J	0.00018 J	0.00025 J	U	0.00037 J
Toluene	100	U	U	U	U	U	U	U	U
Total Xylene	100	U	U	U	U	U	0.00171 J	U	0.00246 J
Metals (ppm)									
Arsenic	16	14.7	12.4	18	16.5	10.2	8.2	8.3	10
Barium	350	110	102	82.9	243	92	73.6	69.1	64.7
Beryllium	14	U	U	U	U	U	U	U	U
Cadmium	2.5	0.19 BJ	0.1 BJ	0.37 J	0.56 J	0.11 BJ	0.16 BJ	0.15 BJ	0.13 BJ
Chromium	58	13.5	14.4	15.4	16.7	13.6	13.4	11.7	13
Lead	400	47.5	32.2	12	257	14.9	18.9	18.3	24.1
Mercury	0.81	0.066	0.032 J	0.506	0.781	0.015 J	0.01 J	0.041	0.024 J
Nickel	140	U	U	U	U	U	U	U	U
Selenium	36	1.2 B	1.1 BJ	1.1 BJ	1.8 B	U	0.9 BJ	U	1 BJ
Silver	36	U	U	U	0.3 J	U	U	U	U
Thallium	NE	U	U	U	U	U	U	U	U
Vanadium	NE	U	U	U	U	U	U	U	U
Zinc	2200	U	U	U	U	U	U	U	U
Total Cyanide (ppm)	27	0.14 J	0.06 J	0.4	0.23 J	0.06 J	U	0.02 J	U

Notes:
bgs - below ground surface
SCOs - Soil Cleanup Objectives
NE - Not Established
U - Analyte was analyzed for but not detected.
J - Estimated value due to the concentration being between the MRL and the MDL.
B - Analyte was also detected in the associated method blank at a concentration that may have contributed to the sample result.
MRL - Method Reporting Limit. The lowest concentration at which the method analyte may be reliably quantified under the method conditions.
MDL - Method Detection Limit. A statistical value derived from a study designed to provide the lowest concentration that will be detected 99% of the time. Values between the MDL and MRL are estimated (see J qualifier).

Table 4. Southern Area Off-Site Delineation - Commercial Below 15 feet PAH, BTEX, Metals, and Total Cyanide Results
National Fuel Gas - Hornell MGP

		Below 15' bgs					
		Commercial Area					
	Commercial SCOs	SB32 (19'-20') 10/1/2018	SB33 (19'-20') 10/1/2018	SB34 (19'-20') 10/1/ 2018	SB35 (19'-20') 10/1/2018	SB47 (19.5'-20') 10/2/2018	SB48 (19.5'-20') 10/2/2018
PAH (ppm)							
1-Methylnaphthalene	NE	0.11 J	U	0.25 J	U	U	U
2-Methylnaphthalene	NE	U	U	0.23 J	U	U	U
Acenaphthene	500	0.22 J	0.48	0.36 J	U	U	0.28
Acenaphthylene	500	0.098 J	U	U	U	U	U
Anthracene	500	U	U	U	U	U	U
Benz[a]anthracene	5.6	U	U	U	U	U	U
Benzo[a]pyrene	1	U	U	U	U	U	U
Benzo[b]fluoranthene	5.6	U	U	U	U	U	U
Benzo[g,h,i]perylene	500	U	U	U	U	U	U
Benzo[k]fluoranthene	56	U	U	U	U	U	U
Chrysene	56	U	U	U	U	U	U
Dibenz[a,h]anthracene	0.56	U	U	U	U	U	U
Fluoranthene	500	U	U	U	U	U	U
Fluorene	500	0.26 J	0.23 J	0.55	U	U	U
Indeno[1,2,3-cd]pyrene	5.6	U	U	U	U	U	U
Naphthalene	500	U	U	2.4	0.84	U	U
Phenanthrene	500	0.46	U	0.51	0.93	U	0.22
Pyrene	500	U	U	U	U	U	U
Total PAH	500	1.148	0.71	4.85	1.77	U	0.5
BTEX (ppm)							
Benzene	44	NA	NA	NA	1.6 D	NA	NA
Ethylbenzene	390	NA	NA	NA	0.460 DJ	NA	NA
Toluene	500	NA	NA	NA	0.410 DJ	NA	NA
Total Xylene	500	NA	NA	NA	1.15 DJ	NA	NA
Metals (ppm)							
Arsenic	16	NA	NA	NA	5.9	NA	NA
Barium	400	NA	NA	NA	30.4	NA	NA
Beryllium	590	NA	NA	NA	U	NA	NA
Cadmium	9.3	NA	NA	NA	0.15 BJ	NA	NA
Chromium	1900	NA	NA	NA	5.6	NA	NA
Lead	1000	NA	NA	NA	6.5 J	NA	NA
Mercury	2.8	NA	NA	NA	U	NA	NA
Nickel	310	NA	NA	NA	U	NA	NA
Selenium	1500	NA	NA	NA	U	NA	NA
Silver	1500	NA	NA	NA	U	NA	NA
Thallium	NE	NA	NA	NA	U	NA	NA
Vanadium	NE	NA	NA	NA	U	NA	NA
Zinc	10000	NA	NA	NA	U	NA	NA
Total Cyanide (ppm)	27	NA	NA	NA	0.16 J	NA	NA

Notes:
For commercial areas, soil results are compared to commercial SCOs for individual PAH constituents, but are not considered exceedances as long as the total PAH concentration is below the 500 ppm total PAH concentration established for non-residential properties under this project.
bgs - below ground surface
SCOs - Soil Cleanup Objectives
NA - Not Analyzed
NE - Not Established
U - Analyte was analyzed for but not detected.
J - Estimated value due to the concentration being between the MRL and the MDL.
B - Analyte was also detected in the associated method blank at a concentration that may have contributed to the sample result.
D - Concentration is the result of a dilution, typically a secondary analysis of the sample due to exceeding the calibration range or that a surrogate has been diluted out of the sample and cannot be assessed.
MRL - Method Reporting Limit. The lowest concentration at which the method analyte may be reliably quantified under the method conditions.
MDL - Method Detection Limit. A statistical value derived from a study designed to provide the lowest concentration that will be detected 99% of the time. Values between the MDL and MRL are estimated (see J qualifier).

Table 5. Southern Area Off-Site Delineation - Residential Below 15 feet PAH, BTEX, Metals, and Total Cyanide Results
National Fuel Gas - Hornell MGP

	Residential SCOs	Below 15' bgs		
		Residential Area		
		SB37 (19'-20') 10/1/2018	SB39 (19'-20') 10/1/2018	SB41 (19'-20') 10/2/2018
PAH (ppm)				
1-Methylnaphthalene	NE	1.4	0.61 J	8.6
2-Methylnaphthalene	NE	0.18 J	0.36 J	15
Acenaphthene	100	0.48 J	1.1	2.9 J
Acenaphthylene	100	2	0.3 J	17
Anthracene	100	3.1	4.4	17
Benz[a]anthracene	1	2.1	U	17
Benzo[a]pyrene	1	1.5	U	14
Benzo[b]fluoranthene	1	1.4	U	15
Benzo[g,h,i]perylene	100	0.61 J	U	6.6
Benzo[k]fluoranthene	1	0.62 J	U	5.5
Chrysene	1	1.7	U	12
Dibenz[a,h]anthracene	0.33	0.2 J	U	2 J
Fluoranthene	100	4.3	1.8	42
Fluorene	100	3	7.1	20
Indeno[1,2,3-cd]pyrene	0.5	0.68 J	U	7.7
Naphthalene	100	1.1	6.8	14
Phenanthrene	100	6.5	4.1	61
Pyrene	100	3.6	1.1	31
Total PAH	500	34.47	27.67	308.3
BTEX (ppm)				
Benzene	2.9	0.017	0.094	0.00027 J
Ethylbenzene	30	0.011	0.1	0.00053 J
Toluene	100	0.0017 J	0.0099	0.00098 J
Total Xylene	100	0.0126 J	0.105	0.01 J
Metals (ppm)				
Arsenic	16	6.3	4	30.5
Barium	350	43.8	22.4	24
Beryllium	14	U	U	U
Cadmium	2.5	0.16 BJ	0.08 BJ	0.12 BJ
Chromium	58	7.1	5.4	6.2
Lead	400	7.8	5.8	7
Mercury	0.81	U	U	U
Nickel	140	U	U	U
Selenium	36	0.5 BJ	U	0.6 BJ
Silver	36	U	U	0.09 J
Thallium	NE	U	U	U
Vanadium	NE	U	U	U
Zinc	2200	U	U	U
Total Cyanide (ppm)	27	2.53	0.6	0.47

Notes:
bgs - below ground surface
SCOs - Soil Cleanup Objectives
NE - Not Established
U - Analyte was analyzed for but not detected.
J - Estimated value due to the concentration being between the MRL and the MDL.
B - Analyte was also detected in the associated method blank at a concentration that may have contributed to the sample result.
MRL - Method Reporting Limit. The lowest concentration at which the method analyte may be reliably quantified under the method conditions.
MDL - Method Detection Limit. A statistical value derived from a study designed to provide the lowest concentration that will be detected 99% of the time. Values between the MDL and MRL are estimated (see J qualifier).

Table 6. Additional RI Boring (On Site) PAH Results
National Fuel Gas - Hornell MGP

	Commercial SCOs (ppm)	SB12R (39'-40') 9/25/2018	SB18R (39'-40') 9/25/2018
PAH (ppm)			
1-Methylnaphthalene	NE	U	0.11 J
2-Methylnaphthalene	NE	U	0.2 J
Acenaphthene	500	U	U
Acenaphthylene	500	U	0.17 J
Anthracene	500	U	0.29 J
Benz[a]anthracene	5.6	U	0.25 J
Benzo[a]pyrene	1	U	0.18 J
Benzo[b]fluoranthene	5.6	U	0.18 J
Benzo[g,h,i]perylene	500	U	U
Benzo[k]fluoranthene	56	U	U
Chrysene	56	U	0.19 J
Dibenz[a,h]anthracene	0.56	U	U
Fluoranthene	500	0.099 J	0.52
Fluorene	500	U	0.21 J
Indeno[1,2,3-cd]pyrene	5.6	U	0.094 J
Naphthalene	500	U	0.46
Phenanthrene	500	0.130 J	0.74
Pyrene	500	0.087 J	0.43
Total PAH	500	0.316	4.024

Notes:

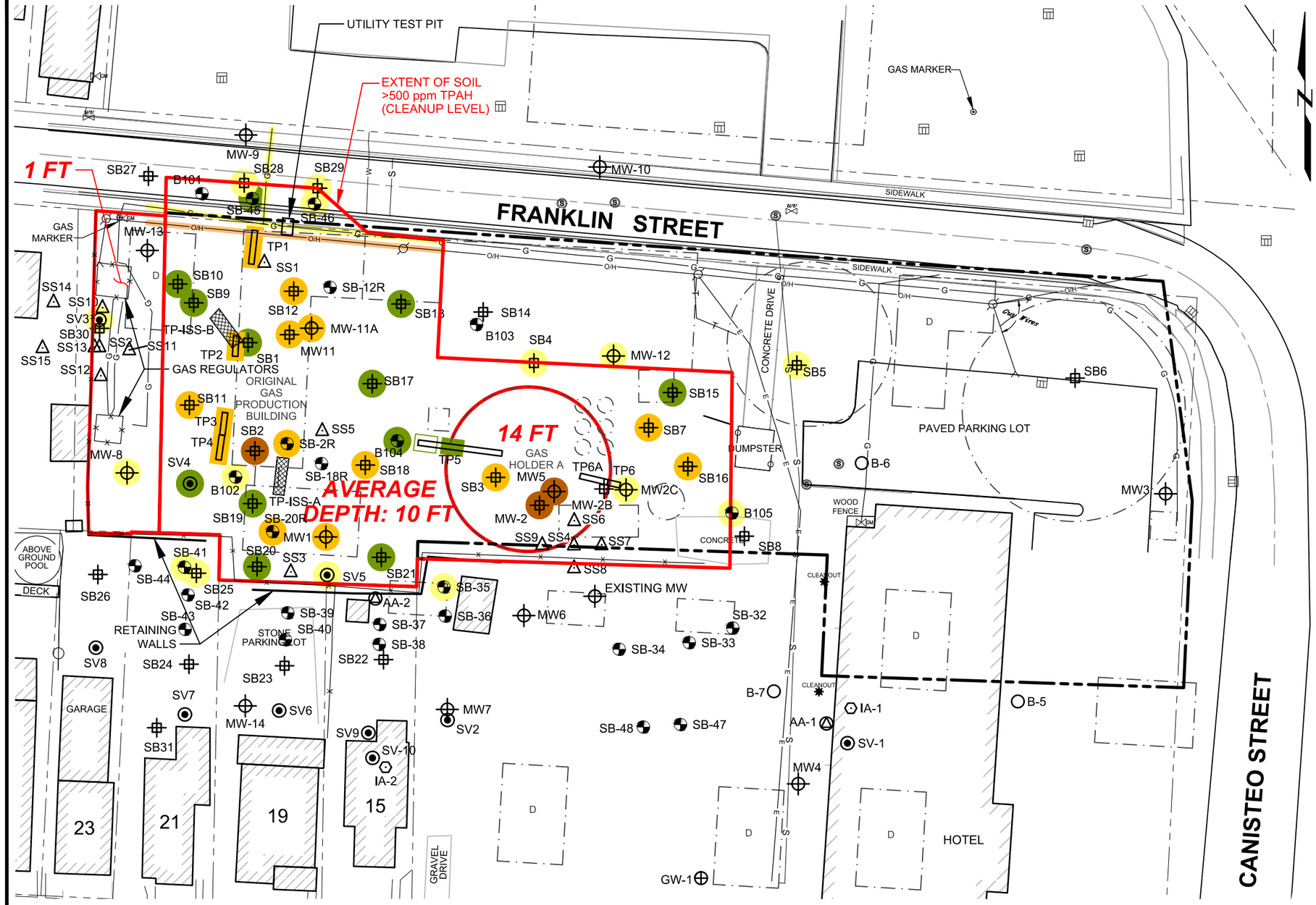
For commercial areas, soil results are compared to commercial SCOs for individual PAH constituents, but are not considered exceedances as long as the total PAH concentration is below the 500 ppm total PAH concentration established for non-residential properties under this project.
SCOs - Soil Cleanup Objectives
U - Analyte was analyzed for but not detected.
J - Estimated value due to the concentration being between the MRL and the MDL.
MRL - Method Reporting Limit. The lowest concentration at which the method analyte may be reliably quantified under the method conditions.
MDL - Method Detection Limit. A statistical value derived from a study designed to provide the lowest concentration that will be detected 99% of the time. Values between the MDL and MRL are estimated (see J qualifier).

Table 7
Hornell MGP
Preliminary Summary of Remaining Samples to Be Collected as Part of the Supplemental PDI

Area Requiring Delineation Refinement	Goal of Delineation	Method of Delineation
Hotel Property	Refine the extent of soil requiring removal and/or ISS	Three test pit excavations from southern edge of former MGP operations toward the line of borings SB-32 through SB-35. Soils will be evaluated as follows: A) Soils from 0 to 15 feet bgs observed to have potential MGP impacts will have soil samples collected and analyzed for comparison to the tPAH 500 ppm remediation requirement. B) Soils greater than 15 feet bgs will be visually characterized for gross contamination. If gross contamination is observed, the location will be included in the ISS remedy.
19 Albion Street	More closely define the limit of shallow soil exceeding Residential SCOs	Shallow soil sample to be collected five to ten feet south of sample location SB-40 by soil boring at 2-4 feet bgs to be analyzed for comparison to Residential SCOs (PAHs, BTEX, metals, total cyanide).
23 Albion Street	Confirm shallow soils meet Residential SCOs	Existing data from samples on 21 Albion suggest MGP impacts do not extend to 23 Albion. This will be confirmed by collecting a shallow soil sample to be collected sample (2-4 feet bgs) near the 21 Albion Street property line to be analyzed for comparison to Residential SCOs (PAHs, BTEX, metals, total cyanide).

Note: These samples will be collected during the Supplemental PDI (if requested by the Remediation Contractor) conducted prior to the 95% Remedial Design or during mobilization or pre-excavation for the ISS remedy.

Figure



LEGEND

- APPROXIMATE SITE BOUNDARY (FROM NYSDEC)
- APPROXIMATE PROPERTY BOUNDARIES
- CHAIN-LINK FENCE
- EXISTING STRUCTURE
- APPROXIMATE LOCATION OF HISTORICAL STRUCTURES
- INDICATES DWELLING
- ELECTRIC OVERHEAD WIRE TO BE RELOCATED
- UNDERGROUND ELECTRIC LINE TO BE RELOCATED
- UNDERGROUND GAS LINE TO BE RELOCATED
- TELEPHONE LINE
- SANITARY SEWER LINE
- WATER LINE
- UTILITY POLE
- LIGHT POLE
- GAS METER
- WATER VALVE
- MANHOLE
- FIRE HYDRANT
- DROP INLET

REMEDIAL INVESTIGATION SAMPLE LOCATIONS

- MW1 — MONITORING WELL LOCATION
- SB1 — SOIL BORING LOCATION
- TP1 — TEST PIT LOCATION
- TP-ISS-A — PRE-DESIGN INVESTIGATION TEST PIT LOCATION
- IA-1 — INDOOR AIR SAMPLE LOCATION
- AA-1 — AMBIENT AIR SAMPLE LOCATION
- SV-1 — SOIL VAPOR SAMPLE LOCATION
- GW-1 — FORMER MONITORING WELL LOCATION
- B-1 — FORMER SOIL BORING LOCATION
- SS1 — SURFACE SOIL SAMPLE LOCATION
- SB36 — PRE-DESIGN INVESTIGATION BORING LOCATION

VISUAL IMPACTS (0'-15' BGS)

- NO IMPACTS
- MGP-LIKE ODORS
- TAR STAINING OR SHEEN
- TAR BLEBS, GLOBS, LENSES, STRINGERS, COATINGS
- TAR SATURATED

ALTERNATIVE 4:

- Relocate gas and electric lines
- Excavate soil/debris exceeding 500 ppm TPAH in Franklin Street and gas regulator parcel. Pre-excavation of soils for ISS areas on Former MGP Parcel, .
- 1-ft soil on MGP Parcel and Gas Regulator Parcel
- Groundwater Monitoring & IC/ECs
- ISS of soils >15 ft with tar or NAPL on MGP Parcel.

SOURCES:

1. Survey prepared for GEI Consultants, Inc. by William J Tucker, II PLS #50369, Clear Creek Land Surveying, L.L.C., Springville, N.Y. dated February 11, 2011.
2. City of Hornell, Steuben County, NY Tax Map No. 166.06 dated Oct. 18, 2008.
3. *Modification to Order on Consent and Administrative Settlement, Attachment 1* between New York State Department of Environmental Conservation, Office of General Counsel, and National Fuel Gas dated Oct. 21, 2010.
4. Sanborn Fire Insurance Maps from 1888 to 1961.
5. Survey prepared for GEI Consultants, Inc. by William J Tucker, II PLS #50369, Clear Creek Land Surveying, L.L.C., 7449 Mill Street, Caneadea, N.Y., dated November 26, 2018.

Pre-Design Investigation Report
Hornell Former MGP Site
Hornell, New York

National Fuel Gas Distribution Company

GEI Consultants

ALTERNATIVE 4 -
PRE-ISS SOIL REMOVAL

Project 1412830 | January 2019 | Fig. 1

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Appendix A

Borelogs

GEI Consultants

GEI Consultants, Inc., P.C.
1301 Trumansburg Road
Ithaca, NY 14850
(607) 216-8955

CLIENT: National Fuel Gas
PROJECT: NFG Hornell MGP PDI
CITY/STATE: Hornell, NY
GEI PROJECT NUMBER: 1801687

BORING LOG

PAGE 1 of 2

B101

GROUND SURFACE ELEVATION (FT): _____ **LOCATION:** Hornell, NY
NORTHING: _____ **EASTING:** _____ **TOTAL DEPTH (FT):** 40.00
DRILLED BY: Nothangle Drilling **DATUM VERT. / HORZ.:** NAVD 88 / NAD 83
LOGGED BY: Garrett Schmidt **DATE START / END:** 9/27/2018 - 9/27/2018
DRILLING DETAILS: Hollow Stem Auger
WATER LEVEL DEPTHS (FT): _____

DEPTH FT.	SAMPLE INFORMATION TYPE and NO.	PEN FT.	REC FT.	Blows (/6 in.)	PID (ppm)	STRATA	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
0		0.5	0					(0'- 0.5') ASPHALT.
	S1	2.0	1.3	0-2-4-6	0.1 0.0			(0.5'- 3') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; moist, dark brown.
	S2	2.0	1.8	4-4-3-3	0.0 0.0			(3'- 4') LEAN CLAY WITH SAND (CL); medium plasticity, ~5% sand, fine; ~95% clay, moist, dark brown.
5	S3	2.0	1.5	NA	NA NA		B101(4'-6')	(4'- 6') Shelby tube collected R=18".
	S4	2.0	1.3	4-4-4-4	0.0 0.0			(6'- 12') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~15% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, brown.
	S5	2.0	0.8	5-5-5-4	0.1 0.1			
10	S6	2.0	1.1	4-4-3-4	0.0 0.0			
	S7	2.0	1.2	4-7-13-20	0.0 0.0			(12'- 16') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, brown.
15	S8	2.0	0.9	13-14-19-20	0.0 0.0			
	S9	2.0	1.8	17-17-20-20	0.0 0.0			(16'- 20') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~25% gravel, fine to coarse, subangular, ~5% fines, low plasticity; wet, brown.
	S10	2.0	1.6	5-11-15-22	0.0 0.0			
20	S11	2.0	1.3	10-19-20-20	0.0 0.0			(20'- 28') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, brown.
	S12	2.0	1.4	8-10-12-14	0.0 0.0			
25	S13	2.0	1.4	10-15-18-20	0.0			

NOTES:

PEN = PENETRATION LENGTH OF SAMPLER
REC = RECOVERY LENGTH OF SAMPLE
PID = PHOTOIONIZATION DETECTOR READING (JAR HEADSPACE)

ppm = PARTS PER MILLION
IN. = INCHES
FT. = FEET

NLO = NAPHTHALENE LIKE ODOR
PLO = PETROLEUM LIKE ODOR
TLO = TAR LIKE ODOR
CLO = CHEMICAL LIKE ODOR
ALO = ASPHALT LIKE ODOR

CrLO= CREOSOTE LIKE ODOR
OLO = ORGANIC LIKE ODOR
SLO = SULFUR LIKE ODOR
MLO = MUSTY LIKE ODOR
HLO = HYDROCARBON LIKE ODOR
GLO = GASOLINE LIKE ODOR

ENVIRONMENTAL BORING LOG NFG HORNELL BORELOGS.GPJ GEI CONSULTANTS.GDT 10/18/18

GEI Consultants

GEI Consultants, Inc., P.C.
1301 Trumansburg Road
Ithaca, NY 14850
(607) 216-8955

CLIENT: National Fuel Gas
PROJECT: NFG Hornell MGP PDI
CITY/STATE: Hornell, NY
GEI PROJECT NUMBER: 1801687

BORING LOG

B101

DEPTH FT.	SAMPLE INFORMATION TYPE and NO.	PEN FT.	REC FT.	Blows (/6 in.)	PID (ppm)	STRATA	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
25					0.0			
	S14	2.0	1.6	16-17-19-20	1.5 0.0			
	S15	2.0	1.3	4-16-15-22	0.0 0.0			(28'- 34') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~15% gravel, fine to coarse, subangular, ~15% fines, low plasticity; wet, brown.
30	S16	2.0	1.3	18-22-24-21	0.0 0.2			
	S17	2.0	1.8	2-21-16-20	0.0 0.0			
	S18	2.0	1.5	24-24-31-20	0.0 0.0			(34'- 40') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~15% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, brown.
35	S19	2.0	2	20-22-25-26	0.0 0.0			
	S20	2.0	1.3	9-17-20-20	0.0 0.0		B101(39'-40')	
40								Bottom of borehole at 40.0 feet.

NOTES:

PEN = PENETRATION LENGTH OF SAMPLER
REC = RECOVERY LENGTH OF SAMPLE
PID = PHOTOIONIZATION DETECTOR READING (JAR HEADSPACE)

ppm = PARTS PER MILLION
IN. = INCHES
FT. = FEET

NLO = NAPHTHALENE LIKE ODOR
PLO = PETROLEUM LIKE ODOR
TLO = TAR LIKE ODOR
CLO = CHEMICAL LIKE ODOR
ALO = ASPHALT LIKE ODOR

CrLO= CREOSOTE LIKE ODOR
OLO = ORGANIC LIKE ODOR
SLO = SULFUR LIKE ODOR
MLO = MUSTY LIKE ODOR
HLO = HYDROCARBON LIKE ODOR
GLO = GASOLINE LIKE ODOR

ENVIRONMENTAL BORING LOG NFG HORNELL BORELOGS.GPJ GEI CONSULTANTS.GDT 10/18/18

GEI Consultants, Inc., P.C.
1301 Trumansburg Road
Ithaca, NY 14850
(607) 216-8955

CLIENT: National Fuel Gas
PROJECT: NFG Hornell MGP PDI
CITY/STATE: Hornell, NY
GEI PROJECT NUMBER: 1801687

BORING LOG
PAGE 1 of 2
B102

GROUND SURFACE ELEVATION (FT): _____ **LOCATION:** Hornell, NY
NORTHING: _____ **EASTING:** _____ **TOTAL DEPTH (FT):** 40.00
DRILLED BY: Nothangle Drilling **DATUM VERT. / HORZ.:** NAVD 88 / NAD 83
LOGGED BY: Garrett Schmidt **DATE START / END:** 9/28/2018 - 9/28/2018
DRILLING DETAILS: Hollow Stem Auger
WATER LEVEL DEPTHS (FT): _____

DEPTH FT.	SAMPLE INFORMATION: TYPE and NO.	PEN FT.	REC FT.	Blows (/6 in.)	PID (ppm)	STRATA	VISUAL IMPACTS	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
0	S1	0.2	0	2-5-9-4	0.6				(0'- 0.2') TOPSOIL.
		2.0	1.4		0.0				(0.2'- 2') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; moist, dark brown.
	S2	2.0	1.3	2-2-2-2	0.0				
					0.0				(2'- 4') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; few coal fragments, moist, dark blackish brown.
	S3	2.0	2	3-3-4-6	0.0				
5					0.0				(4'- 6') SANDY SILT (ML); ~95% fines, low to medium plasticity, ~5% sand, fine; moist, brown.
	S4	2.0	1.2		NA			B102(6'-8')	(6'- 8') Shelby tube collected R=14".
					NA				
	S5	2.0	0	4-4-2-3	NA				(8'- 10') No Recovery.
					NA				
10	S6	2.0	1.8		0.0				(10'- 13.5') LEAN CLAY WITH SAND (CL); ~95% fines, medium plasticity, ~5% sand, fine; moist, grayish brown, very slight hydrocarbon-like odors.
					0.0				
	S7	2.0	1.9	4-4-8-6	0.0				
					0.0				
	S8	2.0	1.6	10-17-19-15	10.0				(13.5'- 18') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~15% gravel, fine to coarse, subangular, ~10% fines, low plasticity; moist, brown.
15					13.1				
	S9	2.0	1.3	14-14-15-13	1.6				
					0.8				
	S10	2.0	0	5-7-20-3	NA				(18'- 20') No Recovery.
					NA				
20	S11	2.0	1.2	13-15-15-11	5.4				(20'- 24') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, brown, very slight hydrocarbon-like odor.
					2.0				
	S12	2.0	1.7	12-26-28-30	3.1				
					1.6				
25	S13	2.0	1.2	4-16-17-20	0.0				(24'- 30') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to

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ENVIRONMENTAL BORING LOG NFG HORNELL BORELOGS.GPJ GEI CONSULTANTS.GDT 10/18/18

GEI Consultants, Inc., P.C.
1301 Trumansburg Road
Ithaca, NY 14850
(607) 216-8955

CLIENT: National Fuel Gas
PROJECT: NFG Hornell MGP PDI
CITY/STATE: Hornell, NY
GEI PROJECT NUMBER: 1801687

BORING LOG

B102

DEPTH FT.	SAMPLE INFORMATION TYPE and NO.	PEN FT.	REC FT.	Blows (/6 in.)	PID (ppm)	STRATA	VISUAL IMPACTS	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
25					0.0				coarse, subangular, ~10% fines, low plasticity; wet, brown.
	S14	2.0	1.6	13-17-25-21	0.0 0.0				
	S15	2.0	1.2	14-21-22-16	0.0 0.0				
30	S16	2.0	1.3	9-18-22-17	0.0 0.0				(30'- 36') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~15% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, brown.
	S17	2.0	2	21-22-25-20	0.0 0.0				
	S18	2.0	1.3	23-21-22-20	0.0 0.0				
35	S19	2.0	1.4	25-15-16-20	0.0 0.0				(36'- 40') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, brown.
	S20	2.0	1.4	16-25-25-28	0.0 0.0				
40									Bottom of borehole at 40.0 feet.

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BORING LOG
PAGE 1 of 2
B103

GROUND SURFACE ELEVATION (FT): _____ **LOCATION:** Hornell, NY
NORTHING: _____ **EASTING:** _____ **TOTAL DEPTH (FT):** 40.00
DRILLED BY: Nothangle Drilling **DATUM VERT. / HORZ.:** NAVD 88 / NAD 83
LOGGED BY: Garrett Schmidt **DATE START / END:** 9/26/2018 - 9/26/2018
DRILLING DETAILS: Hollow Stem Auger
WATER LEVEL DEPTHS (FT): _____

DEPTH FT.	SAMPLE INFORMATION: TYPE and NO.	PEN FT.	REC FT.	Blows (/6 in.)	PID (ppm)	STRATA	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
0	S1	0.2 2.0	0 1.6	2-3-25-31	0.4 0.6			(0'- 0.2') TOPSOIL. (0.2'- 2') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; few brick, coal, and concrete fragments. (2'- 4') FILL, concrete fragments.
	S2	2.0	1	28-50-3	45.2 12.5			
5	S3	2.0	1.7	1-1-2-2	0.3 0.2		B103(5'-7')	(4'- 8') LEAN CLAY WITH SAND (CL); ~95% fines, medium plasticity, ~5% sand, fine; wet, dark grayish brown.
	S4	2.0	2	3-4-7-14	1.9 0.0			
	S5	2.0	1.2	4-4-4-4	1.1 1.0			(8'- 12') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% fines, low plasticity, ~10% gravel, fine to coarse, subangular; wet, dark brown.
10	S6	2.0	0.8	4-4-4-5	0.0 0.0			
	S7	2.0	0.7	4-4-5-6	0.0 0.0			(12'- 16') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, dark brown.
	S8	2.0	1.2	4-5-7-17	0.0 0.0			
15	S9	2.0	1.3	12-6-6-8	0.0 0.0			(16'- 18') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, brown.
	S10	2.0	1.3	3-12-13-14	0.0 0.0			(18'- 20') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~25% gravel, fine to coarse, subangular, ~5% fines, low plasticity; wet, brown.
20	S11	2.0	1.6	4-5-9-11	0.0 0.0			(20'- 24') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~15% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, brown.
	S12	2.0	1.5	14-16-20-14	0.0 0.0			
25	S13	2.0	1.3	6-5-10-13	0.0			(24'- 30') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~15% fines, low plasticity, ~10%

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ENVIRONMENTAL BORING LOG NFG HORNELL BORELOGS.GPJ GEI CONSULTANTS.GDT 10/18/18

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CLIENT: National Fuel Gas
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BORING LOG
PAGE 2 of 2
B103

DEPTH FT.	SAMPLE INFORMATION: TYPE and NO.	PEN FT.	REC FT.	Blows (/6 in.)	PID (ppm)	STRATA	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
25					0.0			gravel, fine to coarse, subangular; wet, brown.
	S14	2.0	1.8	14-14-15-16	0.2 0.0			
	S15	2.0	1.2	5-12-17-20	0.0 0.0			
30	S16	2.0	0	15-14-10-10	NA NA			(30'- 32') No Recovery.
	S17	2.0	1.6	22-22-16-11	0.0 0.0			(32'- 36') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~15% fines, low plasticity, ~10% gravel, fine to coarse, subangular; wet, brown.
	S18	2.0	0	14-16-23-23	0.0 0.0			
35	S19	2.0	2	27-28-48-50/3	0.0 0.0			(36'- 37') POORLY GRADED SAND WITH GRAVEL (SP); ~85% sand, fine, ~10% fines, low plasticity, ~5% gravel, fine to coarse, subangular; wet, brown. (37'- 39') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, brown. (39'- 40') SANDY SILT (ML); ~95% fines, low plasticity, ~5% sand, fine; wet, brown.
40								Bottom of borehole at 40.0 feet.

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GEI PROJECT NUMBER: 1801687

BORING LOG
PAGE 1 of 2
B104

GROUND SURFACE ELEVATION (FT): _____ **LOCATION:** Hornell, NY
NORTHING: _____ **EASTING:** _____ **TOTAL DEPTH (FT):** 40.00
DRILLED BY: Nothangle Drilling **DATUM VERT. / HORZ.:** NAVD 88 / NAD 83
LOGGED BY: Garrett Schmidt **DATE START / END:** 9/28/2018 - 9/28/2018
DRILLING DETAILS: Hollow Stem Auger
WATER LEVEL DEPTHS (FT): _____

DEPTH FT.	SAMPLE INFO TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
0	S1	0.2	0	0.0				(0'- 0.2') TOPSOIL.
		2.0	0.8	0.0				(0.2'- 2') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~25% fines, low plasticity, ~5% gravel, fine to coarse, subangular; moist, dark brown.
	S2	2.0	1.2	0.0				(2'- 4') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~15% fines, low plasticity, ~10% gravel, fine to coarse, subangular; few bricks and coal fragments, moist, dark blackish brown.
				0.0				
	S3	2.0	1.3	NA			B104(4'-6')	(4'- 6') Shelby tube collected R=15".
5				NA				
	S4	2.0	2	0.0				(6'- 8.5') GRAVELLY SILT WITH SAND (ML); ~90% fines, low to medium plasticity, ~5% gravel, fine to coarse, subangular, ~5% sand, fine; moist, dark brown.
				0.0				
	S5	2.0	1.3	0.0				(8.5'- 10') WELL GRADED GRAVEL WITH SILT AND SAND (GW-GM); ~85% gravel, fine to coarse, subangular, ~10% sand, fine, ~5% fines, low plasticity; few wood and root fragments, wet, dark blackish brown.
				0.0				
10	S6	2.0	0	NA				(10'- 12') No Recovery.
				NA				
	S7	2.0	1.3	0.3				(12'- 14') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; few brick and wood fragments, wet, dark blackish brown, slight hydrocarbon-like odor.
				7.1				
	S8	2.0	1.1	124.6				(14'- 16') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, dark blackish brown, slight hydrocarbon-like odor; sheens, blebs, tar-like coated soil grains.
15				69.4				
	S9	2.0	1.5	51.7				(16'- 18') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; few wood and brick fragments, wet, dark blackish brown, slight hydrocarbon-like odor; sheens.
				24.2				
	S10	2.0	0	NA				(18'- 20') No Recovery.
				NA				
20	S11	2.0	1.3	13.3				(20'- 22') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~15% fines, low plasticity, ~10% gravel, fine to coarse, subangular; wet, dark blackish brown, slight hydrocarbon-like odor.
				5.2				
	S12	2.0	1.5	106.1				(22'- 24') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~15% fines, low plasticity, ~10% gravel, fine to coarse, subangular; wet, dark blackish brown, slight hydrocarbon-like odor; sheens and tar-like coated soil grains from 22.5'-23.0' bgs.
				43.1				
	S13	2.0	1.3	3.3				(24'- 26') POORLY GRADED SAND WITH SILT AND GRAVEL
25								

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ENVIRONMENTAL BORING LOG NFG HORNELL BORELOGS.GPJ GEI CONSULTANTS.GDT 10/18/18

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BORING LOG

B104

DEPTH FT.	SAMPLE INFO TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
25				1.0				(SP-SM); ~75% sand, fine, ~15% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, dark blackish brown, very slight hydrocarbon-like odors.
	S14	2.0	1.1	3.3				(26'- 28') POORLY GRADED SAND WITH SILT AND GRAVEL
				0.5				(SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, dark brown.
	S15	2.0	1.1	0.0				(28'- 34') POORLY GRADED SAND WITH SILT AND GRAVEL
				0.0				(SP-SM); ~75% sand, fine, ~15% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, brown.
30	S16	2.0	1.3	0.0				
				0.0				
	S17	2.0	1.6	1.0				
				0.7				
	S18	2.0	1.2	0.0				(34'- 40') POORLY GRADED SAND WITH SILT AND GRAVEL
35				0.0				(SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, brown.
	S19	2.0	1.5	0.0				
				0.0				
	S20	2.0	1.3	0.0				
				0.0				
40								Bottom of borehole at 40.0 feet.

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BORING LOG
PAGE 1 of 2
B105

GROUND SURFACE ELEVATION (FT): _____ **LOCATION:** Hornell, NY
NORTHING: _____ **EASTING:** _____ **TOTAL DEPTH (FT):** 40.00
DRILLED BY: Nothangle Drilling **DATUM VERT. / HORZ.:** NAVD 88 / NAD 83
LOGGED BY: Garrett Schmidt **DATE START / END:** 9/27/2018 - 9/27/2018
DRILLING DETAILS: Hollow Stem Auger
WATER LEVEL DEPTHS (FT): _____

DEPTH FT.	SAMPLE INFORMATION: TYPE and NO.	PEN FT.	REC FT.	Blows (/6 in.)	PID (ppm)	STRATA	VISUAL IMPACTS	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
0	S1	0.2 2.0	0 1	2-6-6-7	0.1 0.2				(0'- 0') TOPSOIL. (0.2'- 0.2') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~15% gravel, fine to coarse, subangular, ~10% fines, low plasticity; moist, dark brown.
	S2	2.0	1.3	6-5-2-2	0.2 0.1				(2'- 4') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% fines, low plasticity, ~10% gravel, fine to coarse, subangular; few brick fragments, wet, dark brown.
5	S3	2.0	1.8	3-3-3-3	0.1 0.0			B105(5'-7')	(4'- 8') SILT WITH SAND (ML); ~95% fines, low to medium plasticity, ~5% sand, fine; moist, brown.
	S4	2.0	1.5	5-5-7-7	0.2 0.1				
	S5	2.0	1.4	4-4-6-5	0.1 0.2				(8'- 12') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; moist, dark brown.
10	S6	2.0	1.4	2-5-4-3	0.1 0.1				
	S7	2.0	1.7	2-8-11-18	24.1 106.5				(12'- 16') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low to medium plasticity; moist, dark grayish brown, very slight hydrocarbon-like odor.
	S8	2.0	1.6	4-16-17-18	97.3 96.8				
15	S9	2.0	1.8	22-22-15-14	65.3 26.5				(16'- 18') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~15% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, dark grayish brown.
	S10	2.0	1.3	10-11-14-15	1.6 1.4				(18'- 22') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~25% gravel, fine to coarse, subangular, ~5% fines, low plasticity; wet, dark brown.
20	S11	2.0	1.1	3-12-13-17	1.5 1.4				
	S12	2.0	1.7	14-14-11-9	5.7 2.5				(22'- 24') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~15% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, brown.
25	S13	2.0		3-5-7-11	NA				(24'- 26') No Recovery.

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GEI PROJECT NUMBER: 1801687

BORING LOG

B105

DEPTH FT.	SAMPLE INFORMATION: TYPE and NO.	PEN FT.	REC FT.	Blows (/6 in.)	PID (ppm)	STRATA	VISUAL IMPACTS	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
25					NA				
	S14	2.0	1.9	13-13-4-9	0.0 0.0				(26'- 27.5') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~20% fines, low plasticity, ~5% gravel, fine to coarse, subangular; wet, dark brown.
	S15	2.0	1.9	15-15-25-29	0.0 0.0				(27.5'- 32') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, dark brown.
30	S16	2.0	1.2	10-10-23-12	0.0 0.0				
	S17	2.0	2	15-12-12-13	0.0 0.0				(32'- 34') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~15% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, brown.
	S18	2.0	1.8	18-38-43-45	0.0 0.0				(34'- 36') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, brown.
35	S19	2.0	2	50-4	0.0 0.0				(36'- 40') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~15% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, brown.
	S20	2.0	1.7	10-13-30-32	0.0 0.0				
40									Bottom of borehole at 40.0 feet.

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ENVIRONMENTAL BORING LOG NFG HORNELL BORELOGS.GPJ GEI CONSULTANTS.GDT 10/18/18

GEI Consultants

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1301 Trumansburg Road
Ithaca, NY 14850
(607) 216-8955

CLIENT: National Fuel Gas
PROJECT: NFG Hornell MGP PDI
CITY/STATE: Hornell, NY
GEI PROJECT NUMBER: 1801687

BORING LOG
PAGE 1 of 2
SB12R

GROUND SURFACE ELEVATION (FT):
LOCATION: Hornell, NY
NORTHING: **EASTING:**
TOTAL DEPTH (FT): 40.00
DRILLED BY: Nothangle Drilling
DATUM VERT. / HORZ.: NAVD 88 / NAD 83
LOGGED BY: Garrett Schmidt
DATE START / END: 9/25/2018 - 9/25/2018
DRILLING DETAILS: Hollow Stem Auger
WATER LEVEL DEPTHS (FT):

DEPTH FT.	SAMPLE INFO: TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
0		18.0	0					(0'- 18') Re-drill.
5								
10								
15								
20	S1	2.0	1.3	4.6 4.4			SB12R(18'-20')	(18'- 22') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, dark brown, very slight hydrocarbon-like odors.
	S2	2.0	1.9	25.2 12.1				
	S3	2.0	1.7	0.8 0.6				(22'- 24') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~25% gravel, fine to coarse, subangular, ~5% fines, low plasticity; wet, dark brown.
25	S4	2.0	1.6	0.9				(24'- 28') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular,

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BORING LOG
PAGE 2 of 2
SB12R

DEPTH FT.	SAMPLE INFO: TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
25				1.3				~10% fines, low plasticity; wet, dark brown.
	S5	2.0	1.8	0.6				
				0.6				
	S6	2.0	1.4	1.9				(28'- 30') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~15% fines, low plasticity, ~10% gravel, fine to coarse, subangular; wet, dark brown.
				0.7				
30	S7	2.0	1.5	1.6				(30'- 32') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, dark brown, very slight hydrocarbon-like odors.
				0.5				
	S8	2.0	1.3	1.5				(32'- 36') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, dark brown.
				0.9				
	S9	2.0	1.2	1.2				
35				0.6				
	S10	2.0	1.6	0.4				(36'- 38') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~15% fines, low plasticity, ~10% gravel, fine to coarse, subangular; wet, dark brown.
				0.4				
	S11	2.0	1.5	NA				(38'- 40') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, dark brown.
				NA			SB12R(39'-40')	
40								Bottom of borehole at 40.0 feet.

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ENVIRONMENTAL BORING LOG NFG HORNELL BORELOGS.GPJ GEI CONSULTANTS.GDT 10/18/18

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CLIENT: National Fuel Gas
PROJECT: NFG Hornell MGP PDI
CITY/STATE: Hornell, NY
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BORING LOG
PAGE 1 of 2
SB18R

GROUND SURFACE ELEVATION (FT): _____ **LOCATION:** Hornell, NY
NORTHING: _____ **EASTING:** _____ **TOTAL DEPTH (FT):** 40.00
DRILLED BY: Nothangle Drilling **DATUM VERT. / HORZ.:** NAVD 88 / NAD 83
LOGGED BY: Garrett Schmidt **DATE START / END:** 9/25/2018 - 9/25/2018
DRILLING DETAILS: Hollow Stem Auger
WATER LEVEL DEPTHS (FT): _____

DEPTH FT.	SAMPLE INFO: TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
0		20.0	0					(0'- 20') Re-drill.
20	S1	2.0	1.8	33.3 4.8			SB18R(6'-14')	(20'- 22') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~20% fines, low plasticity, ~10% gravel, fine to coarse, subangular; wet, dark brown, very slight hydrocarbon-like odor.
	S2	2.0	2	3.4 1.7				(22'- 32') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, dark brown.
25	S3	2.0	1.4	5.3				

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CITY/STATE: Hornell, NY
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BORING LOG

SB18R

DEPTH FT.	SAMPLE INFO TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
25				2.0				
	S4	2.0	2	2.4				
				0.8				
	S5	2.0	1.6	1.2				
				0.5				
30	S6	2.0	1.3	0.6				
				0.3				
	S7	2.0	1.9	0.9				(32'- 33.5') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~15% fines, low plasticity, ~10% gravel, fine to coarse, subangular; wet, dark brown.
				5.4				(33.5'- 33.8') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~15% fines, low plasticity, ~10% gravel, fine to coarse, subangular; wet, dark brown, tar-like stringers, very slight hydrocarbon-like odors, blackish brown staining.
	S8	2.0	1.8	7.7				(33.8'- 34') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~15% fines, low plasticity, ~10% gravel, fine to coarse, subangular; wet, dark brown.
35				3.3				(34'- 40') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, dark brown.
	S9	2.0	1.6	22.1				
				11.5				
	S10	2.0	1.8	10.4				
				7.8			SB18R(39'-40')	
40								Bottom of borehole at 40.0 feet.

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BORING LOG
PAGE 1 of 2
SB20R

GROUND SURFACE ELEVATION (FT): _____ **LOCATION:** Hornell, NY
NORTHING: _____ **EASTING:** _____ **TOTAL DEPTH (FT):** 22.00
DRILLED BY: Nothangle Drilling **DATUM VERT. / HORZ.:** NAVD 88 / NAD 83
LOGGED BY: Garrett Schmidt **DATE START / END:** 9/24/2018 - 9/24/2018
DRILLING DETAILS: Hollow Stem Auger
WATER LEVEL DEPTHS (FT): _____

DEPTH FT.	SAMPLE INFO TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
0		0.2	0					(0'- 0.2') TOPSOIL.
	S1	2.0	1.5	1.3				(0.2'- 2') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% fines, low plasticity, ~10% gravel, fine to coarse, subangular; many brick and coal fragments, moist, brown, slight hydrocarbon-like odors.
				1.1				
	S2	2.0	1.6	46.6				(2'- 4') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% fines, low plasticity, ~10% gravel, fine to coarse, subangular; few brick, coal, and wood fragments, wet, dark brown, slight hydrocarbon-like odors, tar-like stringers.
				44.8				
	S3	2.0	1.6	32.9				(4'- 6') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~25% fines, low plasticity, ~5% gravel, fine to coarse, subangular; few brick and coal fragments, moist to wet, slight hydrocarbon-like odor.
5				141.2				
	S4	2.0	1.8	511.2				(6'- 9') GRAVELLY LEAN CLAY WITH SAND (CL); medium plasticity, ~5% gravel, fine to coarse, subangular, ~5% sand, fine; ~90% clay, moist, dark blackish brown, dark blackish-brown staining, few blebs, few stringers, moderate hydrocarbon-like odors.
				183.1				
	S5	2.0	1.4	171.9				
				241.6				(9'- 14') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, dark blackish brown, moderate hydrocarbon-like odors, few blebs, tar-like stringers, sheens.
10	S6	2.0	1.2	320.4				
				333.1				
	S7	2.0	1.5	292.9			SB20R(12'-22')	
				562.3				
	S8	2.0	1.8	415.5				(14'- 16') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, dark blackish brown, few blebs, few
15								

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ENVIRONMENTAL BORING LOG NFG HORNELL BORELOGS.GPJ GEI CONSULTANTS.GDT 10/18/18

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CLIENT: National Fuel Gas
PROJECT: NFG Hornell MGP PDI
CITY/STATE: Hornell, NY
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BORING LOG
PAGE 2 of 2
SB20R

DEPTH FT.	SAMPLE INFO: TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
15				226.1				tar-like stringers, sheens, moderate hydrocarbon-like odors, dark blackish-brown staining.
	S9	2.0	1.8	697.6 174.2				(16'- 18') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~15% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, moderate hydrocarbon-like odors, few blebs, few stringers, dark blackish-brown staining, sheens.
	S10	2.0	1.6	62.1 100.3				(18'- 20') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~15% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, dark brown, slight hydrocarbon-like odor, sheens.
20	S11	2.0	1.4	10.0 12.0				(20'- 22') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~15% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, dark brown, slight hydrocarbon-like odor, few sheens.
								Bottom of borehole at 22.0 feet.

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BORING LOG
PAGE 1 of 1
SB2R

GROUND SURFACE ELEVATION (FT):
NORTHING: **EASTING:**
DRILLED BY: Nothangle Drilling
LOGGED BY: Garrett Schmidt
DRILLING DETAILS: Hollow Stem Auger
WATER LEVEL DEPTHS (FT):

LOCATION: Hornell, NY
TOTAL DEPTH (FT): 14.00
DATUM VERT. / HORZ.: NAVD 88 / NAD 83
DATE START / END: 9/24/2018 - 9/24/2018

DEPTH FT.	SAMPLE INFO TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
0	S1	0.2 2.0	0 1.5	0.4 1.0				(0'- 0.2') TOPSOIL. (0.2'- 1') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% fines, low plasticity, ~10% gravel, fine to coarse, subangular; moist, brown. (1'- 2') ~70% sand, fine, ~20% gravel, fine to coarse, subangular; 10% brick and coal fragments, moist, dark brown, FILL, very slight hydrocarbon-like odor. (2'- 4') No Recovery.
5	S2	2.0	0	NA NA				(4'- 5') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~25% fines, low plasticity, ~5% gravel, fine to coarse, subangular; moist to wet, dark brown, slight hydrocarbon-like odor.
	S3	2.0	2	19.0 33.0			SB2R(6'-8')	(5'- 6') GRAVELLY LEAN CLAY WITH SAND (CL); medium plasticity, ~5% sand; ~95% clay, moist, dark blackish brown, staining, few NAPL-like blebs. (6'- 9.5') GRAVELLY LEAN CLAY WITH SAND (CL); medium plasticity, ~5% sand, fine; ~95% clay, moist, dark blackish brown, staining, blebs, sheens.
	S4	2.0	1.7	832 61.4				
10	S5	2.0	2	83.8 58.9				(9.5'- 10') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, dark brown, sheens, slight hydrocarbon-like odors, few blebs. (10'- 12') GRAVELLY LEAN CLAY WITH SAND (CL); medium plasticity, ~5% sand, fine; ~95% clay, moist, brown, slight hydrocarbon-like odors.
	S6	2.0	2	106.7 352.6			SB2R(12'-14')	(12'- 14') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, dark brown, hydrocarbon-like odors, sheens, few blebs.
								Bottom of borehole at 14.0 feet.

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PROJECT: NFG Hornell MGP PDI
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GEI PROJECT NUMBER: 1801687

BORING LOG
PAGE 1 of 2
SB32

GROUND SURFACE ELEVATION (FT): _____ **LOCATION:** Hornell, NY
NORTHING: _____ **EASTING:** _____ **TOTAL DEPTH (FT):** 20.00
DRILLED BY: Nothangle Drilling **DATUM VERT. / HORZ.:** NAVD 88 / NAD 83
LOGGED BY: Garrett Schmidt **DATE START / END:** 10/1/2018 - 10/1/2018
DRILLING DETAILS: Geoprobe
WATER LEVEL DEPTHS (FT): _____

DEPTH FT.	SAMPLE INFO: TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
0		0.2	0				(0'- 0.2') TOPSOIL.
	S1	4.0	3	0.0			(0.2'- 1.5') FILL, concrete fragments.
				0.0			
				0.0		SB32(2'-4')	(1.5'- 3.5') POORLY GRADED SAND WITH SILT (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; few coal fragments, moist, dark blackish brown.
				0.0			
							(3.5'- 4') SANDY SILT (ML); ~95% fines, low to medium plasticity, ~5% sand, fine; moist, dark brown.
	S2	4.0	4	0.0			(4'- 8') SANDY SILT (ML); ~95% fines, low to medium plasticity, ~5% sand, fine; moist, dark brown.
5				0.0			
				0.0			
				0.0			
	S3	4.0	4	0.0			(8'- 10') GRAVELLY SILT WITH SAND (ML); ~90% fines, low to medium plasticity, ~5% gravel, fine to coarse, ~5% sand, fine; moist, dark brown.
				0.0			
10				0.0			(10'- 12') SANDY SILT (ML); ~95% fines, low to medium plasticity, ~5% sand, fine; moist, brown.
				0.0			
	S4	4.0	2.7	0.0			(12'- 16') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, brown.
				0.0			
				0.0			
15							

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ppm = PARTS PER MILLION
IN. = INCHES
FT. = FEET

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PLO = PETROLEUM LIKE ODOR
TLO = TAR LIKE ODOR
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ENVIRONMENTAL BORING LOG NFG HORNELL BORELOGS.GPJ GEI CONSULTANTS.GDT 10/18/18

GEI Consultants

GEI Consultants, Inc., P.C.
1301 Trumansburg Road
Ithaca, NY 14850
(607) 216-8955

CLIENT: National Fuel Gas
PROJECT: NFG Hornell MGP PDI
CITY/STATE: Hornell, NY
GEI PROJECT NUMBER: 1801687

BORING LOG

SB32

DEPTH FT.	SAMPLE INFO TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
15				0.0			
	S5	4.0	2.7	0.0			(16'- 18.5') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, brown.
				0.0			
				0.0			
				0.0		SB32(19'-20')	(18.5'- 20') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, dark blackish brown.
20							Bottom of borehole at 20.0 feet.

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ENVIRONMENTAL BORING LOG NFG HORNELL BORELOGS.GPJ GEI CONSULTANTS.GDT 10/18/18

GEI Consultants, Inc., P.C. 1301 Trumansburg Road Ithaca, NY 14850 (607) 216-8955	CLIENT: National Fuel Gas PROJECT: NFG Hornell MGP PDI CITY/STATE: Hornell, NY GEI PROJECT NUMBER: 1801687	BORING LOG PAGE 1 of 2	SB33

GROUND SURFACE ELEVATION (FT): _____ LOCATION: Hornell, NY
NORTHING: _____ EASTING: _____ TOTAL DEPTH (FT): 20.00
DRILLED BY: Nothangle Drilling DATUM VERT. / HORZ.: NAVD 88 / NAD 83
LOGGED BY: Garrett Schmidt DATE START / END: 10/1/2018 - 10/1/2018
DRILLING DETAILS: Geoprobe
WATER LEVEL DEPTHS (FT): _____

DEPTH FT.	SAMPLE INFO TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
0								
	S1	0.2 4.0	0 3.2	0.0				(0'- 0.2') TOPSOIL. (0.2'- 5.5') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~15% gravel, fine to coarse, subangular, ~15% fines, low plasticity; moist, dark brown, few brick and coal fragments from 2.5'-3.0' bgs.
				0.0				
				0.0			SB33(2'-4')	
				0.0				
	S2	4.0	3.8	0.0				
5				0.0				
				0.0				(5.5'- 7.5') SILT WITH SAND (ML); ~95% fines, low to medium plasticity, ~5% sand, fine; moist, brown.
				0.0				
	S3	4.0	2.3	0.0				(7.5'- 18') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~15% gravel, fine to coarse, subangular, ~10% fines, low plasticity; moist, brown.
				0.0				
10				0.0				
				0.0				
	S4	4.0	2.5	0.0				(12'- 16') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~15% gravel, fine to coarse, subangular, ~10% fines, low plasticity; moist to wet, dark brown.
				0.0				
				3.2				
15								

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ENVIRONMENTAL BORING LOG NFG HORNELL BORELOGS.GPJ GEI CONSULTANTS.GDT 10/18/18

GEI Consultants

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CLIENT: National Fuel Gas
PROJECT: NFG Hornell MGP PDI
CITY/STATE: Hornell, NY
GEI PROJECT NUMBER: 1801687

BORING LOG

SB33

DEPTH FT.	SAMPLE INFO: TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
15				2.7				
	S5	4.0	3.8	0.0				(16'- 18') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, dark brown.
				0.0				
				1.1				(18'- 20') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, dark blackish brown, very slight hydrocarbon-like odor.
				0.0			SB33(19'-20')	
20								Bottom of borehole at 20.0 feet.

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PROJECT: NFG Hornell MGP PDI
CITY/STATE: Hornell, NY
GEI PROJECT NUMBER: 1801687

BORING LOG
PAGE 1 of 2
SB34

GROUND SURFACE ELEVATION (FT): | **LOCATION:** Hornell, NY
NORTHING: | **EASTING:** | **TOTAL DEPTH (FT):** 24.00
DRILLED BY: Nothangle Drilling | **DATUM VERT. / HORZ.:** NAVD 88 / NAD 83
LOGGED BY: Garrett Schmidt | **DATE START / END:** 10/1/2018 - 10/1/2018
DRILLING DETAILS: Geoprobe
WATER LEVEL DEPTHS (FT):

DEPTH FT.	SAMPLE INFO: TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
0								
	S1	0.2 / 4.0	0 / 2.9	0.0				(0'- 0.2') TOPSOIL. (0.2'- 2') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~15% gravel, fine to coarse, ~10% fines, low plasticity; moist, brown.
				0.0				
				0.0			SB34(2'-4')	(2'- 9') SILT WITH SAND (ML); ~95% fines, low to medium, ~5% sand, fine; moist, brown.
				0.0				
	S2	4.0	4	0.0				(4'- 9') GRAVELLY SILT WITH SAND (ML); ~90% fines, low to medium, ~5% gravel, fine to coarse, ~5% sand, fine; moist, brown.
5				0.0				
				0.0				
				0.0				
	S3	4.0	3.5	0.0				
				0.0				(9'- 11.5') SILT WITH SAND (ML); ~95% fines, low to medium, ~5% sand, fine; moist, brown.
10				0.0				
				0.0				
	S4	4.0	3.2	0.0				(11.5'- 12') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~20% fines, low plasticity, ~10% gravel, fine to coarse, subangular; moist, brown. (12'- 15') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, dark brown.
				0.0				
				11.8				
15								

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ENVIRONMENTAL BORING LOG NFG HORNELL BORELOGS.GPJ GEI CONSULTANTS.GDT 10/18/18

GEI Consultants

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(607) 216-8955

CLIENT: National Fuel Gas
PROJECT: NFG Hornell MGP PDI
CITY/STATE: Hornell, NY
GEI PROJECT NUMBER: 1801687

BORING LOG
PAGE 2 of 2
SB34

DEPTH FT.	SAMPLE INFO: TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
15				27.2				(15'- 16') POORLY GRADED SAND WITH GRAVEL (SP); ~85% sand, fine, ~15% gravel, fine to coarse, subangular; wet, dark blackish brown, very slight hydrocarbon-like odor.
	S5	4.0	1.7	16.7				(16'- 23.5') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, dark blackish brown, slight hydrocarbon-like odor.
				18.1				
				6.9				
				NA			SB34(19'-20')	
20	S6	4.0	2.9	2.8				(20'- 23.5') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, dark blackish brown, very slight hydrocarbon-like odor.
				0.0				
				0.0				
				0.0				
								(23.5'- 24') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, brown.
								Bottom of borehole at 24.0 feet.

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ENVIRONMENTAL BORING LOG NFG HORNELL BORELOGS.GPJ GEI CONSULTANTS.GDT 10/18/18

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CLIENT: National Fuel Gas
PROJECT: NFG Hornell MGP PDI
CITY/STATE: Hornell, NY
GEI PROJECT NUMBER: 1801687

BORING LOG
PAGE 1 of 2
SB35

GROUND SURFACE ELEVATION (FT): | **LOCATION:** Hornell, NY
NORTHING: | **EASTING:** | **TOTAL DEPTH (FT):** 24.00
DRILLED BY: Nothangle Drilling | **DATUM VERT. / HORZ.:** NAVD 88 / NAD 83
LOGGED BY: Garrett Schmidt | **DATE START / END:** 10/1/2018 - 10/1/2018
DRILLING DETAILS: Geoprobe
WATER LEVEL DEPTHS (FT):

DEPTH FT.	SAMPLE INFO: TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
0	S1	0.2 4.0	0 3.2	0.0				(0'- 0.2') TOPSOIL. (0.2'- 1') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; few coal and brick fragments, moist, dark brown.
				0.0				(1'- 7') SANDY SILT WITH GRAVEL (ML); ~90% fines, low to medium plasticity, ~5% gravel, fine to coarse, subangular, ~5% sand, fine; moist, brown.
				0.0			SB35(2'-4')	
				0.0				
	S2	4.0	3	0.0				
5				0.0				
				0.0				
				0.0				(7'- 9') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~15% fines, low plasticity, ~10% gravel, fine to coarse, subangular; moist, brown.
	S3	4.0	4	0.0				
				0.0				(9'- 11.5') SANDY SILT (ML); ~95% fines, low plasticity, ~5% sand, fine; moist, brown.
10				0.0				
				0.0				
	S4	4.0	3.5	3.9				(11.5'- 12') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~15% fines, low plasticity, ~10% gravel, fine to coarse, subangular; moist, brown. (12'- 13.5') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, brown.
				1.3				
				0.7				(13.5'- 16') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, dark blackish brown, very slight hydrocarbon-like odor.
15								

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ENVIRONMENTAL BORING LOG NFG HORNELL BORELOGS.GPJ GEI CONSULTANTS.GDT 1/18/19

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PROJECT: NFG Hornell MGP PDI
CITY/STATE: Hornell, NY
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BORING LOG

SB35

DEPTH FT.	SAMPLE INFO: TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
15				30.6				
	S5	4.0	4	7.4				(16'- 20') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~15% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, dark blackish brown, very slight hydrocarbon-like odor from 18'-19' bgs.
				21.7				
				24.1				
				22.9			SB35(19'-20')	
20	S6	4.0	0	14.1				(20'- 24') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~15% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, dark brown.
				0.0				
				0.0				
				0.0				

Bottom of borehole at 24.0 feet.

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CITY/STATE: Hornell, NY
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BORING LOG
PAGE 1 of 1
SB36

GROUND SURFACE ELEVATION (FT): _____ **LOCATION:** Hornell, NY
NORTHING: _____ **EASTING:** _____ **TOTAL DEPTH (FT):** 4.00
DRILLED BY: Nothangle Drilling **DATUM VERT. / HORZ.:** NAVD 88 / NAD 83
LOGGED BY: Garrett Schmidt **DATE START / END:** 10/1/2018 - 10/1/2018
DRILLING DETAILS: Geoprobe
WATER LEVEL DEPTHS (FT): _____

DEPTH FT.	SAMPLE INFO: TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
0	S1	0.2 4.0	0 2.5	0.0 0.0 0.0 0.0		SB36(2'-4')	(0'- 0.2') TOPSOIL. (0.2'- 2.5') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~15% gravel, fine to coarse, subangular, ~10% fines, low plasticity; few coal fragments, moist, dark blackish brown. (2.5'- 4') SANDY SILT (ML); ~95% fines, low to medium plasticity, ~5% sand, fine; moist, brown.
							Bottom of borehole at 4.0 feet.

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ENVIRONMENTAL BORING LOG NFG HORNELL BORELOGS.GPJ GEI CONSULTANTS.GDT 10/18/18

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PROJECT: NFG Hornell MGP PDI
CITY/STATE: Hornell, NY
GEI PROJECT NUMBER: 1801687

BORING LOG
PAGE 1 of 2
SB37

GROUND SURFACE ELEVATION (FT): _____ **LOCATION:** Hornell, NY
NORTHING: _____ **EASTING:** _____ **TOTAL DEPTH (FT):** 20.00
DRILLED BY: Nothangle Drilling **DATUM VERT. / HORZ.:** NAVD 88 / NAD 83
LOGGED BY: Garrett Schmidt **DATE START / END:** 10/1/2018 - 10/1/2018
DRILLING DETAILS: Geoprobe
WATER LEVEL DEPTHS (FT): _____

DEPTH FT.	SAMPLE INFO: TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
0								
	S1	0.2 / 4.0	0 / 3.2	0.0				(0'- 0.2') TOPSOIL. (0.2'- 1.5') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~15% gravel, fine to coarse, subangular, ~10% fines, low plasticity; few coal fragments, moist, dark brown.
				0.0				
				0.0			SB37(2'-4')	(1.5'- 4') SANDY SILT (ML); ~95% fines, low to medium plasticity, ~5% sand, fine; moist, brown.
				0.0				
	S2	4.0	3	0.0				(4'- 9.5') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; moist, brown.
5				0.0				
				0.0				
				0.0				
	S3	4.0	2.8	0.0				
				0.0				
10				0.0				(9.5'- 11') SILTY SAND (SM); ~75% sand, fine, ~25% fines, low plasticity; wet, brown.
				0.0				(11'- 12') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~15% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, brown.
	S4	4.0	2.6	0.0				(12'- 16') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, brown.
				0.0				
				0.0				
15								

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ENVIRONMENTAL BORING LOG NFG HORNELL BORELOGS.GPJ GEI CONSULTANTS.GDT 10/18/18

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CLIENT: National Fuel Gas
PROJECT: NFG Hornell MGP PDI
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BORING LOG

SB37

DEPTH FT.	SAMPLE INFO: TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
15				0.0				
	S5	4.0	3.6	0.0				(16'- 19') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, dark brown.
				0.0				
				2.5				
				0.2			SB37(19'-20')	(19'- 20') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, very slight hydrocarbon-like odor.
20								Bottom of borehole at 20.0 feet.

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OLO = ORGANIC LIKE ODOR
SLO = SULFUR LIKE ODOR
MLO = MUSTY LIKE ODOR
HLO = HYDROCARBON LIKE ODOR
GLO = GASOLINE LIKE ODOR

GEI Consultants

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Ithaca, NY 14850
(607) 216-8955

CLIENT: National Fuel Gas
PROJECT: NFG Hornell MGP PDI
CITY/STATE: Hornell, NY
GEI PROJECT NUMBER: 1801687

BORING LOG
PAGE 1 of 1
SB38

GROUND SURFACE ELEVATION (FT): _____ **LOCATION:** Hornell, NY
NORTHING: _____ **EASTING:** _____ **TOTAL DEPTH (FT):** 4.00
DRILLED BY: Nothangle Drilling **DATUM VERT. / HORZ.:** NAVD 88 / NAD 83
LOGGED BY: Garrett Schmidt **DATE START / END:** 10/1/2018 - 10/1/2018
DRILLING DETAILS: Geoprobe
WATER LEVEL DEPTHS (FT): _____

DEPTH FT.	SAMPLE INFO: TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
0	S1	0.2 4.0	0 3.6	0.0 0.0 0.0 0.0		SB38(2'-4')	(0'- 0.2') TOPSOIL. (0.2'- 1.5') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~15% gravel, fine to coarse, subangular, ~10% fines, low plasticity; few coal fragments, moist, dark blackish brown. (1.5'- 4') GRAVELLY SILT WITH SAND (ML); ~90% fines, low to medium plasticity, ~5% gravel, fine to coarse, subangular, ~5% sand, fine; moist, brown.

Bottom of borehole at 4.0 feet.

NOTES:

PEN = PENETRATION LENGTH OF SAMPLER
REC = RECOVERY LENGTH OF SAMPLE
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ppm = PARTS PER MILLION
IN. = INCHES
FT. = FEET

NLO = NAPHTHALENE LIKE ODOR
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TLO = TAR LIKE ODOR
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ENVIRONMENTAL BORING LOG NFG HORNELL BORELOGS.GPJ GEI CONSULTANTS.GDT 10/18/18

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BORING LOG

PAGE 1 of 2

SB39

GROUND SURFACE ELEVATION (FT): _____ **LOCATION:** Hornell, NY
NORTHING: _____ **EASTING:** _____ **TOTAL DEPTH (FT):** 20.00
DRILLED BY: Nothangle Drilling **DATUM VERT. / HORZ.:** NAVD 88 / NAD 83
LOGGED BY: Garrett Schmidt **DATE START / END:** 10/1/2018 - 10/1/2018
DRILLING DETAILS: Geoprobe
WATER LEVEL DEPTHS (FT): _____

DEPTH FT.	SAMPLE INFO: TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
0		0.2	0					
	S1	4.0	3.4	0.0				(0'- 0.2') TOPSOIL.
				0.0				(0.2'- 1') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; moist, dark brown.
				0.0			SB39(2'-4')	(1'- 11.5') GRAVELLY SILT WITH SAND (ML); ~90% fines, low to medium plasticity, ~5% gravel, fine to coarse, subangular, ~5% sand, fine; moist, brown.
				0.0				
	S2	4.0	3.2	0.0				
5				0.0				
				0.0				
				0.0				
	S3	4.0	3.3	0.0				
				0.0				
10				0.0				
				0.0				
	S4	4.0	2.8	0.0				(11.5'- 12') SANDY SILT (ML); ~95% fines, low to medium plasticity, ~5% sand, fine; moist, dark brown.
				0.2				(12'- 15.5') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~15% fines, low plasticity, ~10% gravel, fine to coarse, subangular; wet, brown.
				0.8				
15								

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IN. = INCHES
FT. = FEET

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ENVIRONMENTAL BORING LOG NFG HORNELL BORELOGS.GPJ GEI CONSULTANTS.GDT 10/18/18

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BORING LOG

SB39

DEPTH FT.	SAMPLE INFO: TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
15				1.1				
	S5	4.0	3.3	9.1				(15.5'- 16') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~15% fines, low plasticity, ~10% gravel, fine to coarse, subangular; wet, dark blackish brown, very slight hydrocarbon-like odor.
				12.5				(16'- 20') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, dark blackish brown, slight hydrocarbon-like odor.
				6.2				
				1.4			SB39(19'-20')	
20								Bottom of borehole at 20.0 feet.

NOTES:

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IN. = INCHES
FT. = FEET

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BORING LOG
PAGE 1 of 1
SB40

GROUND SURFACE ELEVATION (FT): _____ **LOCATION:** Hornell, NY
NORTHING: _____ **EASTING:** _____ **TOTAL DEPTH (FT):** 4.00
DRILLED BY: Nothangle Drilling **DATUM VERT. / HORZ.:** NAVD 88 / NAD 83
LOGGED BY: Garrett Schmidt **DATE START / END:** 10/1/2018 - 10/1/2018
DRILLING DETAILS: Geoprobe
WATER LEVEL DEPTHS (FT): _____

DEPTH FT.	SAMPLE INFO: TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
0		0.2	0				(0'- 0.2') TOPSOIL.
	S1	4.0	1.9	0.0			(0.2'- 1.5') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; few coal fragments, moist, dark brown.
				0.0			
				0.0		SB40(2'-4')	(1.5'- 4') GRAVELLY SILT WITH SAND (ML); ~90% fines, low to medium plasticity, ~5% gravel, fine to coarse, subangular, ~5% sand, fine; moist, dark brown.
				0.0			
							Bottom of borehole at 4.0 feet.

NOTES:

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REC = RECOVERY LENGTH OF SAMPLE
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IN. = INCHES
FT. = FEET

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ENVIRONMENTAL BORING LOG NFG HORNELL BORELOGS.GPJ GEI CONSULTANTS.GDT 10/18/18

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BORING LOG
PAGE 1 of 2
SB41

GROUND SURFACE ELEVATION (FT): _____ **LOCATION:** Hornell, NY
NORTHING: _____ **EASTING:** _____ **TOTAL DEPTH (FT):** 20.00
DRILLED BY: Nothangle Drilling **DATUM VERT. / HORZ.:** NAVD 88 / NAD 83
LOGGED BY: Garrett Schmidt **DATE START / END:** 10/2/2018 - 10/2/2018
DRILLING DETAILS: Geoprobe
WATER LEVEL DEPTHS (FT): _____

DEPTH FT.	SAMPLE INFO: TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
0	S1	0.2 4.0	0 3.7	0.0 0.0 0.0 0.0			SB41(2'-4')	(0'- 0.2') TOPSOIL. (0.2'- 1') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% fines, low plasticity, ~10% gravel, fine to coarse, subangular; few coal, brick, and glass fragments, moist, dark brown. (1'- 4') SANDY SILT (ML); ~95% fines, ~5% sand, fine; moist, brown.
5	S2	4.0	2.2	0.0 0.0 0.0 0.0				(4'- 8') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% fines, low plasticity, ~10% gravel, fine to coarse, subangular; moist, dark brown.
10	S3	4.0	2.5	4.5 5.2 6.9 186.7				(8'- 10.5') GRAVELLY SILT WITH SAND (ML); ~90% fines, low to medium plasticity, ~5% gravel, fine to coarse, subangular, ~5% sand, fine; moist, brown. (10.5'- 11.5') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; moist, dark blackish brown.
15	S4	4.0	2.7	64.5 1.7 1.6				(11.5'- 12') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; moist, dark blackish brown, very slight hydrocarbon-like odor. (12'- 16') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~15% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, dark grayish brown, slight hydrocarbon-like odor.

NOTES:

PEN = PENETRATION LENGTH OF SAMPLER
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ENVIRONMENTAL BORING LOG NFG HORNELL BORELOGS.GPJ GEI CONSULTANTS.GDT 10/18/18

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PROJECT: NFG Hornell MGP PDI
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BORING LOG

SB41

DEPTH FT.	SAMPLE INFO: TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
15				0.0				
	S5	4.0	2.8	30.5				(16'- 20') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~15% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, brown, very slight hydrocarbon-like odor.
				9.2				
				1.5				
				0.7			SB41(19'-20')	
20								Bottom of borehole at 20.0 feet.

NOTES:

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CITY/STATE: Hornell, NY
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BORING LOG
PAGE 1 of 1
SB42

GROUND SURFACE ELEVATION (FT): _____ **LOCATION:** Hornell, NY
NORTHING: _____ **EASTING:** _____ **TOTAL DEPTH (FT):** 4.00
DRILLED BY: Nothangle Drilling **DATUM VERT. / HORZ.:** NAVD 88 / NAD 83
LOGGED BY: Garrett Schmidt **DATE START / END:** 10/2/2018 - 10/2/2018
DRILLING DETAILS: Geoprobe
WATER LEVEL DEPTHS (FT): _____

DEPTH FT.	SAMPLE INFO: TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
0		0.2	0				(0'- 0.2') TOPSOIL.
	S1	4.0	3.6	0.0			(0.2'- 1.5') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM).
				0.0			
				0.0		SB42(2'-4')	(1.5'- 4') SANDY SILT (ML); ~95% fines, low to medium plasticity, ~5% sand, fine; moist, brown.
				0.0			
							Bottom of borehole at 4.0 feet.

NOTES:

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ppm = PARTS PER MILLION
IN. = INCHES
FT. = FEET

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CrLO= CREOSOTE LIKE ODOR
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SLO = SULFUR LIKE ODOR
MLO = MUSTY LIKE ODOR
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GLO = GASOLINE LIKE ODOR

ENVIRONMENTAL BORING LOG NFG HORNELL BORELOGS.GPJ GEI CONSULTANTS.GDT 10/18/18

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CLIENT: National Fuel Gas
PROJECT: NFG Hornell MGP PDI
CITY/STATE: Hornell, NY
GEI PROJECT NUMBER: 1801687

BORING LOG
PAGE 1 of 1
SB43

GROUND SURFACE ELEVATION (FT): _____ **LOCATION:** Hornell, NY
NORTHING: _____ **EASTING:** _____ **TOTAL DEPTH (FT):** 4.00
DRILLED BY: Nothangle Drilling **DATUM VERT. / HORZ.:** NAVD 88 / NAD 83
LOGGED BY: Garrett Schmidt **DATE START / END:** 10/2/2018 - 10/2/2018
DRILLING DETAILS: Geoprobe
WATER LEVEL DEPTHS (FT): _____

DEPTH FT.	SAMPLE INFO: TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
0		0.2	0				(0'- 0.2') TOPSOIL.
	S1	4.0	2.7	0.0			(0.2'- 1.5') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~15% fines, low plasticity, ~10% gravel, fine to coarse, subangular; few coal and brick fragments, moist, dark brown.
				0.0			
				0.0		SB43(2'-4')	(1.5'- 4') SANDY SILT (ML); ~95% fines, low to medium plasticity, ~5% sand, fine; moist, brown.
				0.0			
							Bottom of borehole at 4.0 feet.

NOTES:

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IN. = INCHES
FT. = FEET

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ENVIRONMENTAL BORING LOG NFG HORNELL BORELOGS.GPJ GEI CONSULTANTS.GDT 10/18/18

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PROJECT: NFG Hornell MGP PDI
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BORING LOG
PAGE 1 of 1
SB44

GROUND SURFACE ELEVATION (FT): _____ **LOCATION:** Hornell, NY
NORTHING: _____ **EASTING:** _____ **TOTAL DEPTH (FT):** 4.00
DRILLED BY: Nothangle Drilling **DATUM VERT. / HORZ.:** NAVD 88 / NAD 83
LOGGED BY: Garrett Schmidt **DATE START / END:** 10/2/2018 - 10/2/2018
DRILLING DETAILS: Geoprobe
WATER LEVEL DEPTHS (FT): _____

DEPTH FT.	SAMPLE INFO: TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
0		0.2	0				(0'- 0.2') TOPSOIL.
		4.0	2.3	0.5			(0.2'- 1') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~15% fines, low plasticity, ~10% gravel, fine to coarse, subangular; few coal and brick fragments, moist, dark brown.
				0.0			(1'- 4') SANDY SILT (ML); ~95% fines, low to medium plasticity, ~5% sand, fine; brown.
				0.0		SB44(2'-4')	
				0.0			
							Bottom of borehole at 4.0 feet.

NOTES:

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ENVIRONMENTAL BORING LOG NFG HORNELL BORELOGS.GPJ GEI CONSULTANTS.GDT 10/18/18

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BORING LOG

PAGE 1 of 2

SB45

GROUND SURFACE ELEVATION (FT): _____ **LOCATION:** Hornell, NY
NORTHING: _____ **EASTING:** _____ **TOTAL DEPTH (FT):** 20.00
DRILLED BY: Nothangle Drilling **DATUM VERT. / HORZ.:** NAVD 88 / NAD 83
LOGGED BY: Garrett Schmidt **DATE START / END:** 9/27/2018 - 9/27/2018
DRILLING DETAILS: Geoprobe
WATER LEVEL DEPTHS (FT): _____

DEPTH FT.	SAMPLE INFO: TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
0		0.5	0					(0'- 0.5') ASPHALT.
	S1	4.0	2.8	0.0 0.0 0.0 0.0				(0.5'- 3.5') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; few brick and coal fragments, moist, dark blackish brown.
	S2	4.0	3.2	0.0 0.0 0.0 0.0				(3.5'- 7') LEAN CLAY WITH SAND (CL); medium plasticity, ~5% sand, fine; ~95% clay, moist, dark blackish brown.
5								
	S3	4.0	1.3	0.0 3.7 10.1 0.8				(7'- 8') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~20% fines, low plasticity, ~5% gravel, fine to coarse, subangular; wet, dark brown. (8'- 12') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~15% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, dark brown.
10								
	S4	4.0	2.3	87.2 53.6 23.6				(12'- 16') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, dark blackish brown, very slight hydrocarbon-like odors; blackish-brown staining.
15								

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ENVIRONMENTAL BORING LOG NFG HORNELL BORELOGS.GPJ GEI CONSULTANTS.GDT 10/18/18

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BORING LOG

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SB45

DEPTH FT.	SAMPLE INFO: TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
15				9.2				
	S5	4.0	2.4	0.4				(16'- 20') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~25% gravel, fine to coarse, subangular, ~5% fines, low plasticity; wet, brown.
				0.4				
				0.5				
				0.5			SB45(19'-20')	
20								Bottom of borehole at 20.0 feet.

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ALO = ASPHALT LIKE ODOR

CrLO= CREOSOTE LIKE ODOR
OLO = ORGANIC LIKE ODOR
SLO = SULFUR LIKE ODOR
MLO = MUSTY LIKE ODOR
HLO = HYDROCARBON LIKE ODOR
GLO = GASOLINE LIKE ODOR

ENVIRONMENTAL BORING LOG NFG HORNELL BORELOGS.GPJ GEI CONSULTANTS.GDT 10/18/18

GEI Consultants

GEI Consultants, Inc., P.C.
1301 Trumansburg Road
Ithaca, NY 14850
(607) 216-8955

CLIENT: National Fuel Gas
PROJECT: NFG Hornell MGP PDI
CITY/STATE: Hornell, NY
GEI PROJECT NUMBER: 1801687

BORING LOG
PAGE 1 of 2
SB46

GROUND SURFACE ELEVATION (FT): _____ **LOCATION:** Hornell, NY
NORTHING: _____ **EASTING:** _____ **TOTAL DEPTH (FT):** 20.00
DRILLED BY: Nothangle Drilling **DATUM VERT. / HORZ.:** NAVD 88 / NAD 83
LOGGED BY: Garrett Schmidt **DATE START / END:** 9/27/2018 - 9/27/2018
DRILLING DETAILS: Geoprobe
WATER LEVEL DEPTHS (FT): _____

DEPTH FT.	SAMPLE INFO TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
0		0.5	0					(0'- 0.5') ASPHALT.
	S1	3.5	0.5	0.1 0.2 0.1 0.0				(0.5'- 4') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~15% gravel, fine to coarse, subangular, ~10% fines, low plasticity; moist, dark brown.
5	S2	4.0	1.7	14.0 5.0 6.6 3.2				(4'- 8') CLAYEY SAND WITH GRAVEL (SC); medium plasticity, ~70% sand, fine, ~10% gravel, fine to coarse, subangular; ~20% clay, wet, dark grayish brown, slight hydrocarbon-like odor.
10	S3	4.0	1.1	6.2 26.9 71.3 20.3				(8'- 12') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% fines, low plasticity, ~10% gravel, fine to coarse, subangular; wet, dark grayish brown.
	S4	4.0	0.8	6.2 2.9 8.7				(12'- 16') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, dark grayish brown, very slight hydrocarbon-like odors.
15								

NOTES:

PEN = PENETRATION LENGTH OF SAMPLER
REC = RECOVERY LENGTH OF SAMPLE
PID = PHOTOIONIZATION DETECTOR READING (JAR HEADSPACE)

ppm = PARTS PER MILLION
IN. = INCHES
FT. = FEET

NLO = NAPHTHALENE LIKE ODOR
PLO = PETROLEUM LIKE ODOR
TLO = TAR LIKE ODOR
CLO = CHEMICAL LIKE ODOR
ALO = ASPHALT LIKE ODOR

CrLO= CREOSOTE LIKE ODOR
OLO = ORGANIC LIKE ODOR
SLO = SULFUR LIKE ODOR
MLO = MUSTY LIKE ODOR
HLO = HYDROCARBON LIKE ODOR
GLO = GASOLINE LIKE ODOR

ENVIRONMENTAL BORING LOG NFG HORNELL BORELOGS.GPJ GEI CONSULTANTS.GDT 10/18/18

GEI Consultants

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CLIENT: National Fuel Gas
PROJECT: NFG Hornell MGP PDI
CITY/STATE: Hornell, NY
GEI PROJECT NUMBER: 1801687

BORING LOG

SB46

DEPTH FT.	SAMPLE INFO: TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
15				6.0				
	S5	4.0	1.8	0.0				(16'- 20') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~20% fines, low plasticity, ~10% gravel, fine to coarse, subangular; wet, brown.
				0.0				
				0.0				
				0.0			SB46(19'-20')	
20								Bottom of borehole at 20.0 feet.

NOTES:

PEN = PENETRATION LENGTH OF SAMPLER
REC = RECOVERY LENGTH OF SAMPLE
PID = PHOTOIONIZATION DETECTOR READING (JAR HEADSPACE)

ppm = PARTS PER MILLION
IN. = INCHES
FT. = FEET

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ENVIRONMENTAL BORING LOG NFG HORNELL BORELOGS.GPJ GEI CONSULTANTS.GDT 10/18/18

GEI Consultants

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CLIENT: National Fuel Gas
PROJECT: NFG Hornell MGP PDI
CITY/STATE: Hornell, NY
GEI PROJECT NUMBER: 1801687

BORING LOG
PAGE 1 of 2
SB47

GROUND SURFACE ELEVATION (FT): _____ **LOCATION:** Hornell, NY
NORTHING: _____ **EASTING:** _____ **TOTAL DEPTH (FT):** 20.00
DRILLED BY: Nothangle Drilling **DATUM VERT. / HORZ.:** NAVD 88 / NAD 83
LOGGED BY: Garrett Schmidt **DATE START / END:** 10/2/2018 - 10/2/2018
DRILLING DETAILS: Geoprobe
WATER LEVEL DEPTHS (FT): _____

DEPTH FT.	SAMPLE INFO: TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
0		0.2	0					
	S1	4.0	2.7	0.0				(0'- 0.2') TOPSOIL. (0.2'- 1') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~15% fines, low plasticity, ~10% gravel, fine to coarse, subangular; moist, dark brown.
				0.0				(1'- 8') SILT WITH SAND (ML); ~95% fines, low to medium plasticity, ~5% sand, fine; moist, brown.
				0.0				
				0.0				
	S2	4.0	2.8	0.0				
5				0.0				
				0.0				
				0.0				
	S3	4.0	3	0.0				(8'- 11') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; moist to wet, brown.
				0.0				
10				0.0				
				0.0				(11'- 12') SILT WITH SAND (ML); ~95% fines, low to medium plasticity, ~5% sand, fine; moist, brown.
	S4	4.0	0	0.0				(12'- 16') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, brown.
				0.0				
				0.0				
15								

NOTES:

PEN = PENETRATION LENGTH OF SAMPLER
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SLO = SULFUR LIKE ODOR
MLO = MUSTY LIKE ODOR
HLO = HYDROCARBON LIKE ODOR
GLO = GASOLINE LIKE ODOR

ENVIRONMENTAL BORING LOG NFG HORNELL BORELOGS.GPJ GEI CONSULTANTS.GDT 1/17/19

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CLIENT: National Fuel Gas
PROJECT: NFG Hornell MGP PDI
CITY/STATE: Hornell, NY
GEI PROJECT NUMBER: 1801687

BORING LOG

SB47

DEPTH FT.	SAMPLE INFO: TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
15				0.0				
	S5	4.0	2.3	0.0				(16'- 17') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, dark brown.
				0.0				(17'- 19.5') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; wet, dark blackish brown, very slight hydrocarbon-like odor.
				0.0				
				0.0				
20							(SB47 19.5'-20')	(19.5'- 20') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% fines, low plasticity, ~10% gravel, fine to coarse, subangular; wet, brown.
								Bottom of borehole at 20.0 feet.

NOTES:

PEN = PENETRATION LENGTH OF SAMPLER
REC = RECOVERY LENGTH OF SAMPLE
PID = PHOTOIONIZATION DETECTOR READING (JAR HEADSPACE)

ppm = PARTS PER MILLION
IN. = INCHES
FT. = FEET

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CrLO= CREOSOTE LIKE ODOR
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HLO = HYDROCARBON LIKE ODOR
GLO = GASOLINE LIKE ODOR

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(607) 216-8955

CLIENT: National Fuel Gas
PROJECT: NFG Hornell MGP PDI
CITY/STATE: Hornell, NY
GEI PROJECT NUMBER: 1801687

BORING LOG
PAGE 1 of 2
SB48

GROUND SURFACE ELEVATION (FT):
LOCATION: Hornell, NY
NORTHING: **EASTING:**
TOTAL DEPTH (FT): 20.00
DRILLED BY: Nothangle Drilling
DATUM VERT. / HORZ.: NAVD 88 / NAD 83
LOGGED BY: Garrett Schmidt
DATE START / END: 10/2/2018 - 10/2/2018
DRILLING DETAILS: Geoprobe
WATER LEVEL DEPTHS (FT):

DEPTH FT.	SAMPLE INFO: TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
0		0.2	0					
	S1	4.0	0.8	0.0				(0'- 0.2') TOPSOIL. (0.2'- 1.5') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~15% fines, low plasticity, ~10% gravel, fine to coarse, subangular; few brick and coal fragments, moist, dark brown.
				0.0				
				0.0				(1.5'- 5') SANDY SILT (ML); ~95% fines, low to medium plasticity, ~5% sand, fine; moist, brown.
				0.0				
	S2	4.0	1.3	0.0				
5				0.0				(5'- 8') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~15% fines, low plasticity, ~10% gravel, fine to coarse, subangular; moist, brown.
				0.0				
				0.0				
	S3	4.0	1.6	0.0				(8'- 9') SANDY SILT (ML); ~95% fines, low to medium plasticity, ~5% sand, fine; moist, brown.
				0.0				(9'- 12') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; moist, brown.
10				0.0				
				0.0				
	S4	4.0	1.9	0.0				(12'- 16') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~70% sand, fine, ~20% gravel, fine to coarse, subangular, ~10% fines, low plasticity; moist to wet, brown.
				0.0				
				0.0				
15								

NOTES:

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REC = RECOVERY LENGTH OF SAMPLE
PID = PHOTOIONIZATION DETECTOR READING (JAR HEADSPACE)

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CrLO= CREOSOTE LIKE ODOR
OLO = ORGANIC LIKE ODOR
SLO = SULFUR LIKE ODOR
MLO = MUSTY LIKE ODOR
HLO = HYDROCARBON LIKE ODOR
GLO = GASOLINE LIKE ODOR

ENVIRONMENTAL BORING LOG NFG HORNELL BORELOGS.GPJ GEI CONSULTANTS.GDT 10/18/18

GEI Consultants

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1301 Trumansburg Road
Ithaca, NY 14850
(607) 216-8955

CLIENT: National Fuel Gas
PROJECT: NFG Hornell MGP PDI
CITY/STATE: Hornell, NY
GEI PROJECT NUMBER: 1801687

BORING LOG

SB48

DEPTH FT.	SAMPLE INFO: TYPE and NO.	PEN FT.	REC FT.	PID (ppm)	STRATA	VISUAL IMPACTS	ANALYZED SAMPLE ID	SOIL / BEDROCK DESCRIPTION
15				0.0				
	S5	4.0	0	0.0				(16'- 18') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~15% fines, low plasticity, ~10% gravel, fine to coarse, subangular; wet, brown.
				0.0				
				0.0				(18'- 20') POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM); ~75% sand, fine, ~15% fines, low plasticity, ~10% gravel, fine to coarse, subangular; wet, dark blackish brown, very slight hydrocarbon-like odor.
				0.0				
20							SB48(19.5'-20')	Bottom of borehole at 20.0 feet.

NOTES:

PEN = PENETRATION LENGTH OF SAMPLER
REC = RECOVERY LENGTH OF SAMPLE
PID = PHOTOIONIZATION DETECTOR READING (JAR HEADSPACE)

ppm = PARTS PER MILLION
IN. = INCHES
FT. = FEET

NLO = NAPHTHALENE LIKE ODOR
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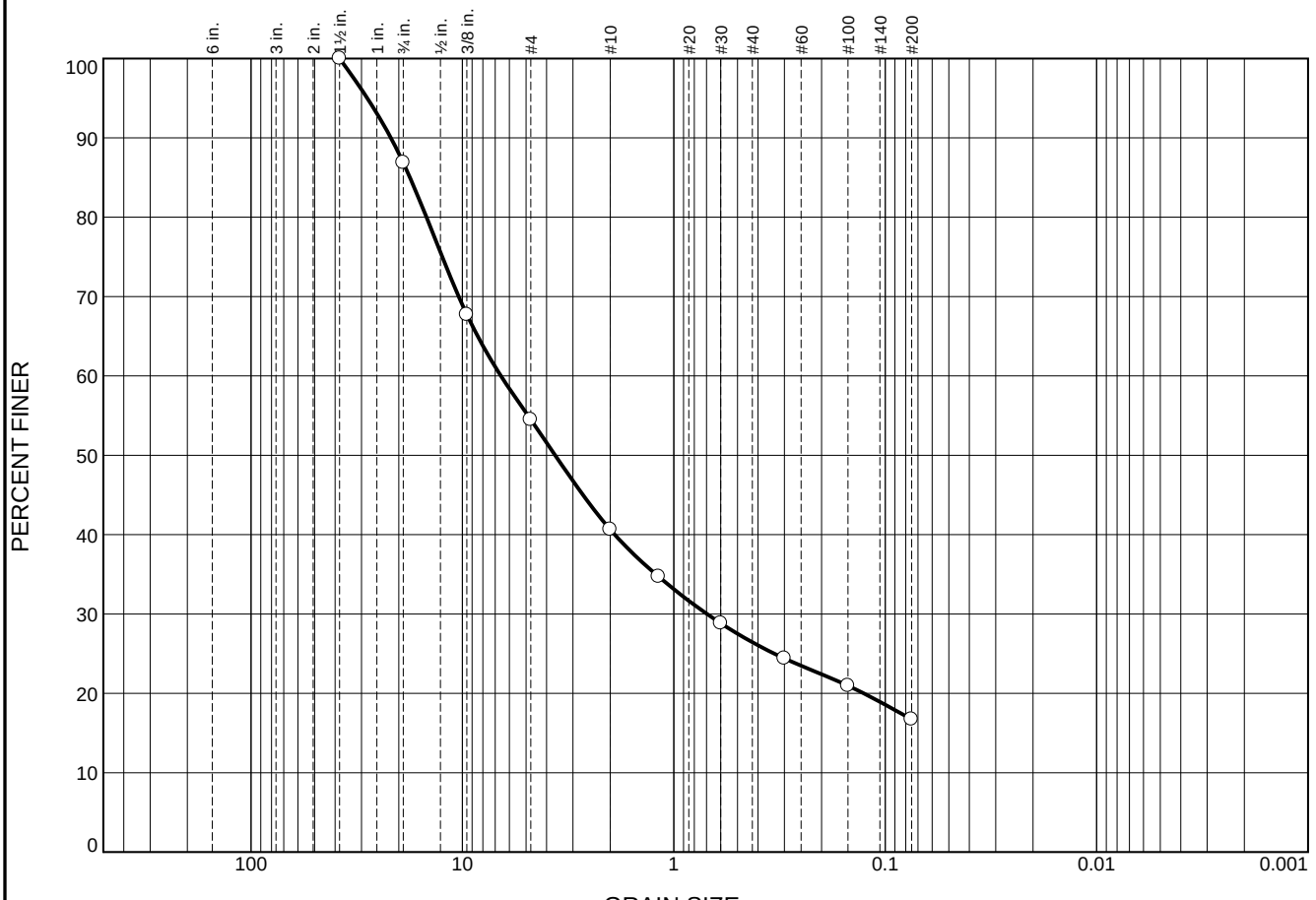
MLO = MUSTY LIKE ODOR
HLO = HYDROCARBON LIKE ODOR
GLO = GASOLINE LIKE ODOR

ENVIRONMENTAL BORING LOG NFG HORNELL BORELOGS.GPJ GEI CONSULTANTS.GDT 10/18/18

Appendix B

Geotechnical Reports

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	13.1	32.4	13.9	14.2	9.7	16.7	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	-	-	17.7109	6.5725	3.6407	0.6963				

Material Description	USCS	AASHTO
○ Silty GRAVEL with Sand	GM	-

Project No. 1801687 **Client:** National Fuel Gas Distribution

Project: Hornell Former MGP

○ **Source of Sample:** B101 **Depth:** 16-18 ft **Sample Number:** S9

Remarks:

○As Rec'd WC = 9.2%

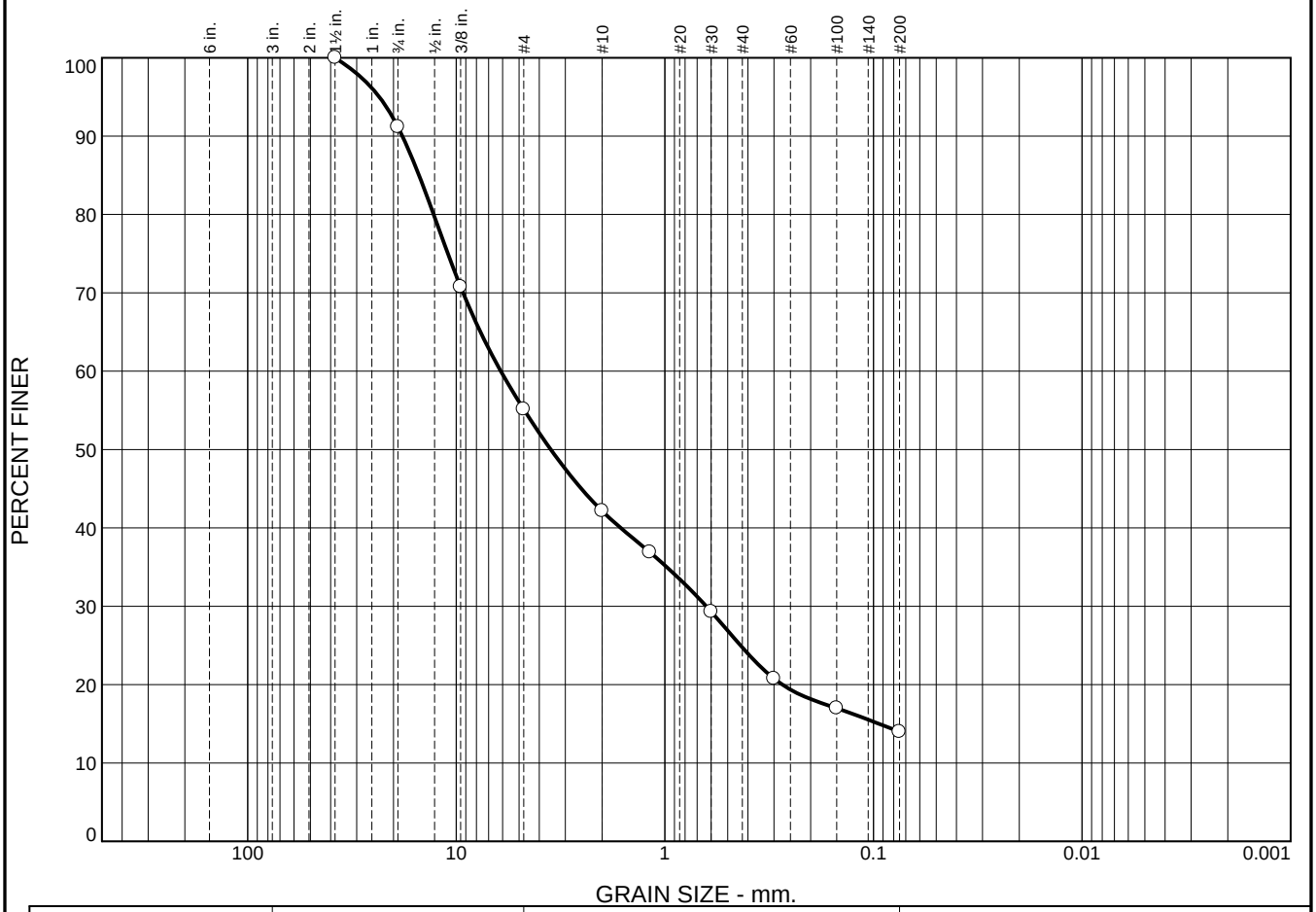
GEI Consultants, Inc.
400 Unicorn Park Drive
Woburn, MA 01801

GEI Consultants

Figure 1

Tested By: EF **Checked By:** NM

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	8.8	36.1	12.9	17.5	10.7	14.0	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_C	C_u
○	-	-	15.0915	6.1167	3.5230	0.6334	0.0941			

Material Description	USCS	AASHTO
○ Silty GRAVEL with Sand	GM	-

Project No. 1801687 **Client:** National Fuel Gas Distribution

Project: Hornell Former MGP

○ **Source of Sample:** B101 **Depth:** 30-32 ft **Sample Number:** S16

Remarks:

○As Rec'd WC = 8.8%

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Woburn, MA 01801

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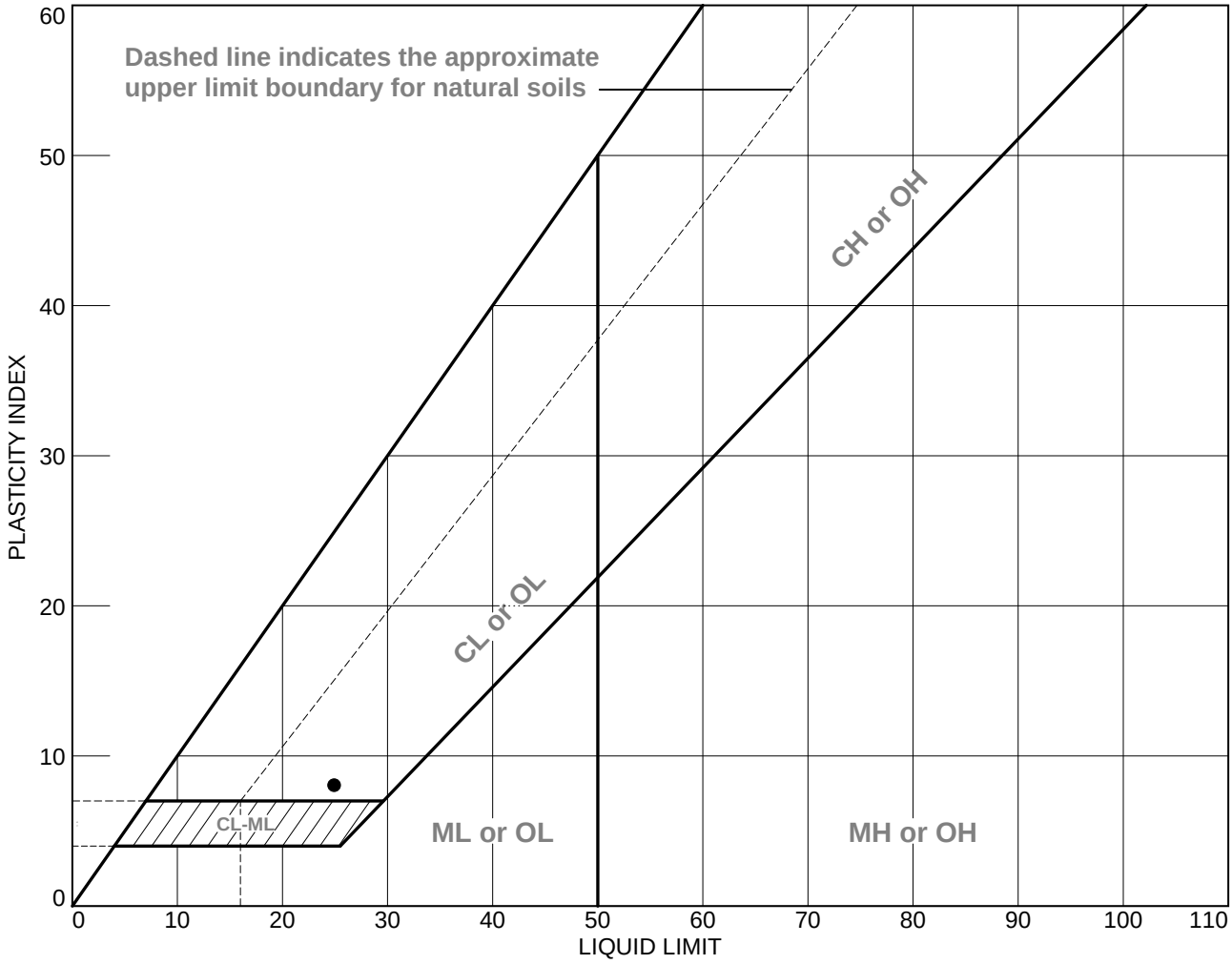
Figure 2

Tested By: EF **Checked By:** KG

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	B101	S3	4-6 ft	17.8	17	25	8	CL

GEI Consultants, Inc.
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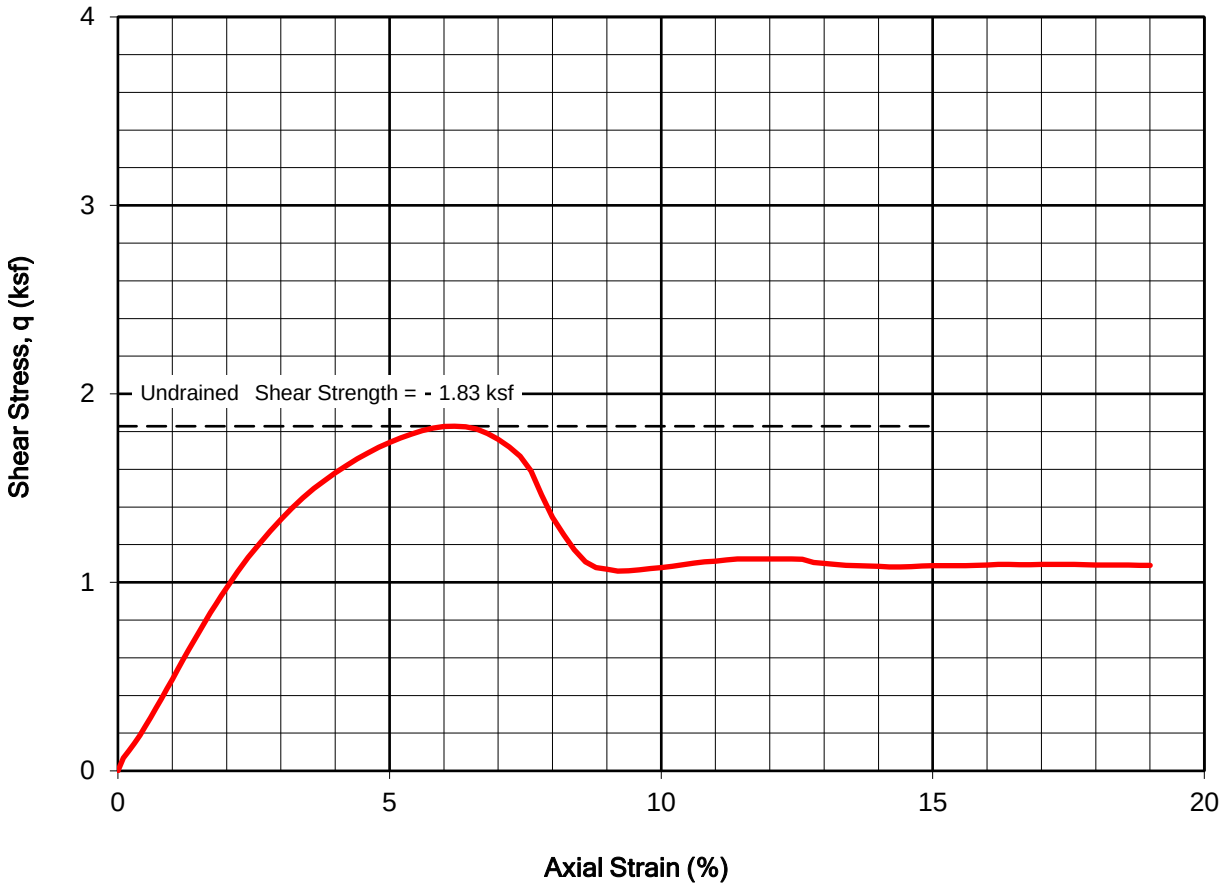
Woburn, MA 01801

Client: National Fuel Gas Distribution
Project: Hornell Former MGP
Project No.: 1801687 **Figure 3**

Tested By: KG **Checked By:** EF



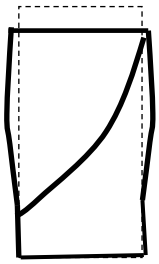
SAMPLE INFORMATION

Boring:	B101
Sample:	S3
Depth:	5.5 feet
Type:	2.8-inch-dia. tube sample

Description: Brown LEAN CLAY with Sand (CL)

SPECIMEN INFORMATION

Height:	5.84	inch	Water Content:	19.0	%
Diameter:	2.88	inch	Total Unit Weight:	130.7	pcf
Area:	6.53	in²	Dry Unit Weight:	109.8	pcf



Failure Sketch

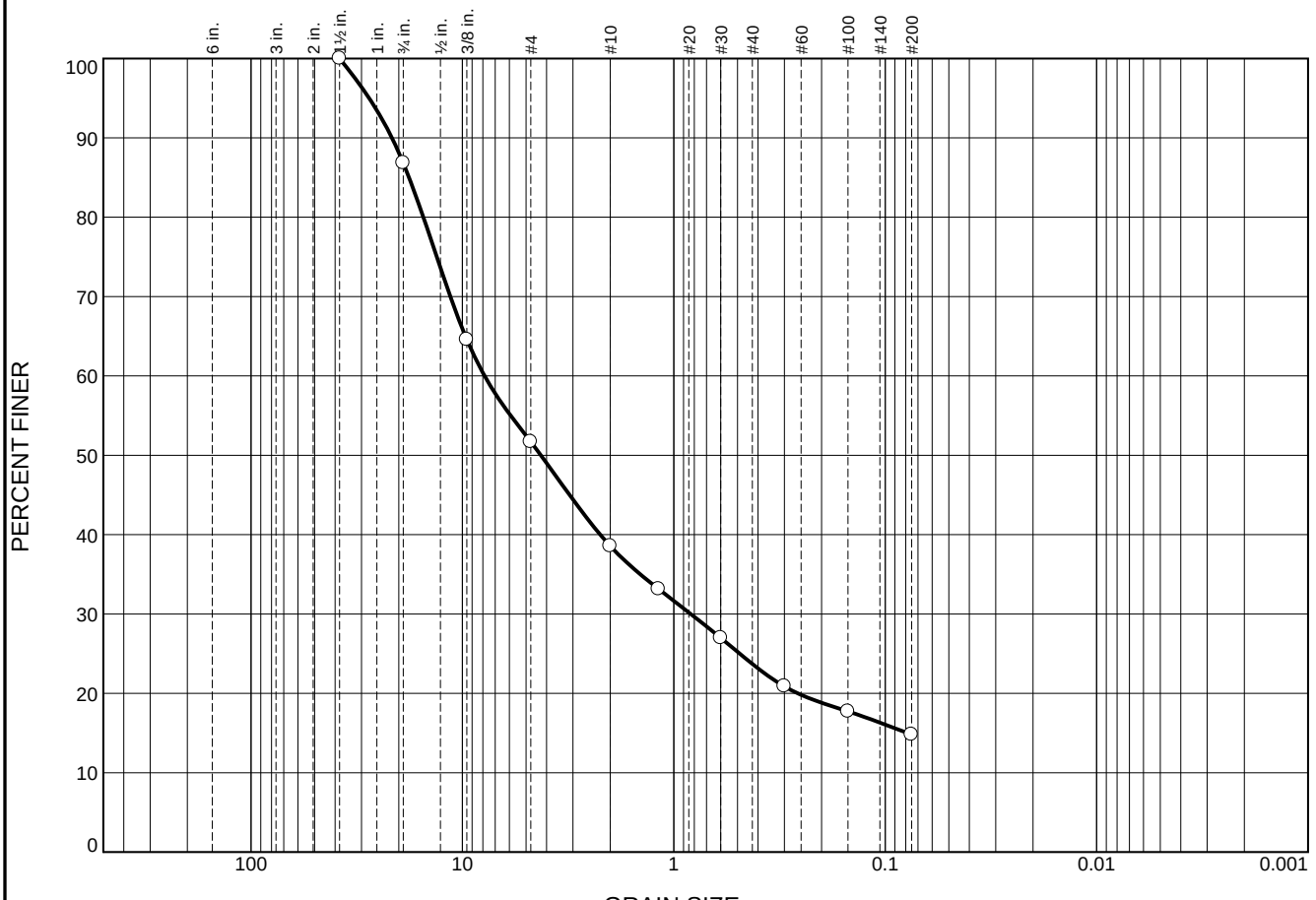
TEST SUMMARY

Cell Pressure:	0.37	ksf	Test Date:	10/24/2018
Strain Rate:	0.98	%/min	Tested By:	E. Fazlic
Shear Strength:	1.83	ksf	Checked By:	D. Aghjayan
Failure Strain:	6.2	%		

REMARKS:

Hornell Former MGP Site Hornell, New York	GEI Consultants	UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION
National Fuel Gas Distribution Company Williamsville, New York	Project 1801687	November 2018 Fig. 4

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	13.2	35.1	13.1	14.9	8.9	14.8	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	-	-	17.8848	7.8570	4.2563	0.8321	0.0785			

Material Description	USCS	AASHTO
○ Silty GRAVEL with Sand	GM	-

Project No. 1801687 **Client:** National Fuel Gas Distribution

Project: Hornell Former MGP

○ **Source of Sample:** B102 **Depth:** 14-16 ft **Sample Number:** S8

Remarks:

○As Rec'd WC = 7.6%

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Woburn, MA 01801

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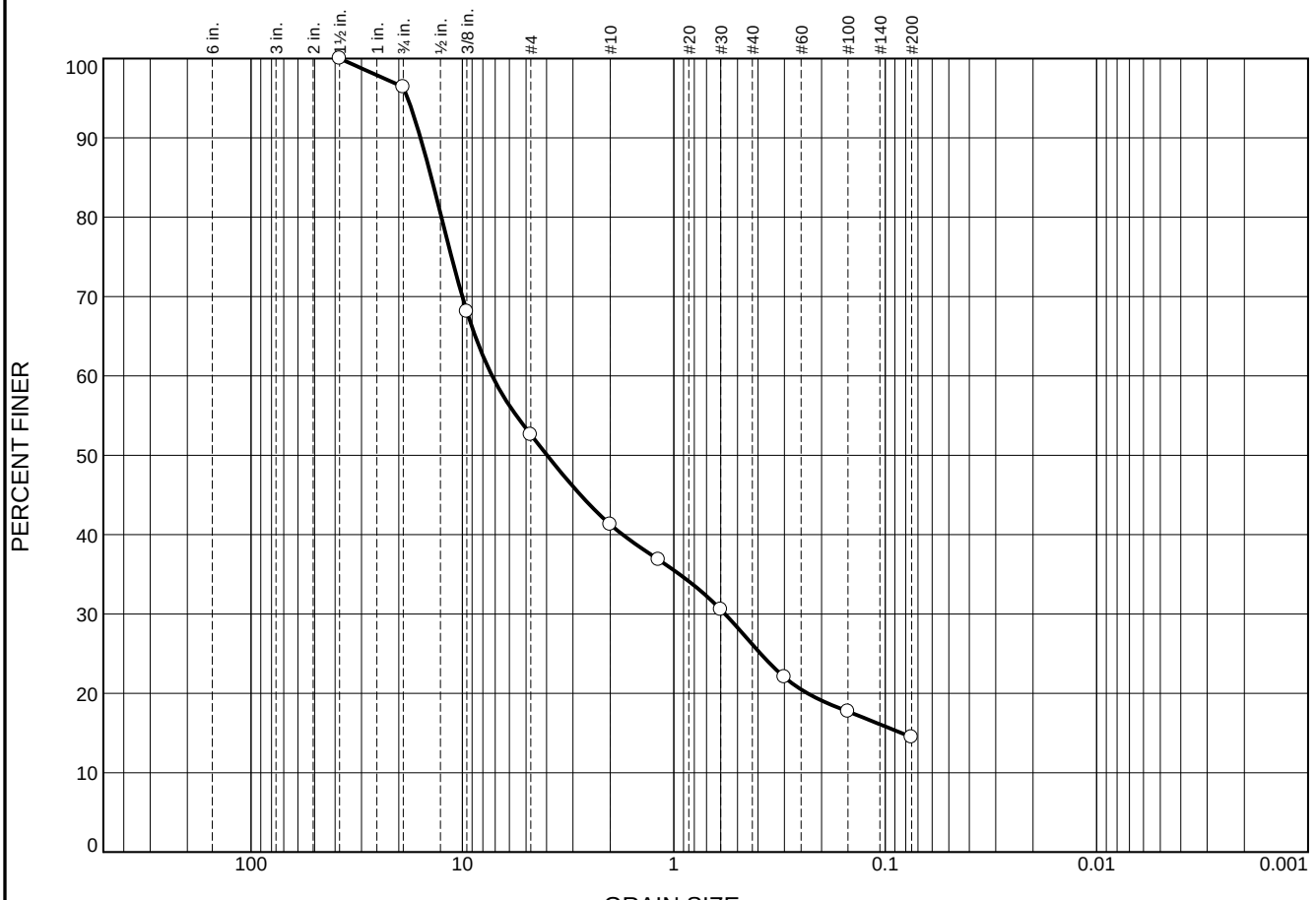
Figure 5

Tested By: EF **Checked By:** NM

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	3.6	43.8	11.3	15.1	11.7	14.5	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	-	-	14.0347	7.2331	3.9751	0.5724	0.0839			

Material Description	USCS	AASHTO
○ Silty GRAVEL with Sand	GM	-

Project No. 1801687 **Client:** National Fuel Gas Distribution

Project: Hornell Former MGP

○ **Source of Sample:** B105 **Depth:** 8-10 ft **Sample Number:** S5

Remarks:

○As Rec'd WC = 10.8%

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Woburn, MA 01801
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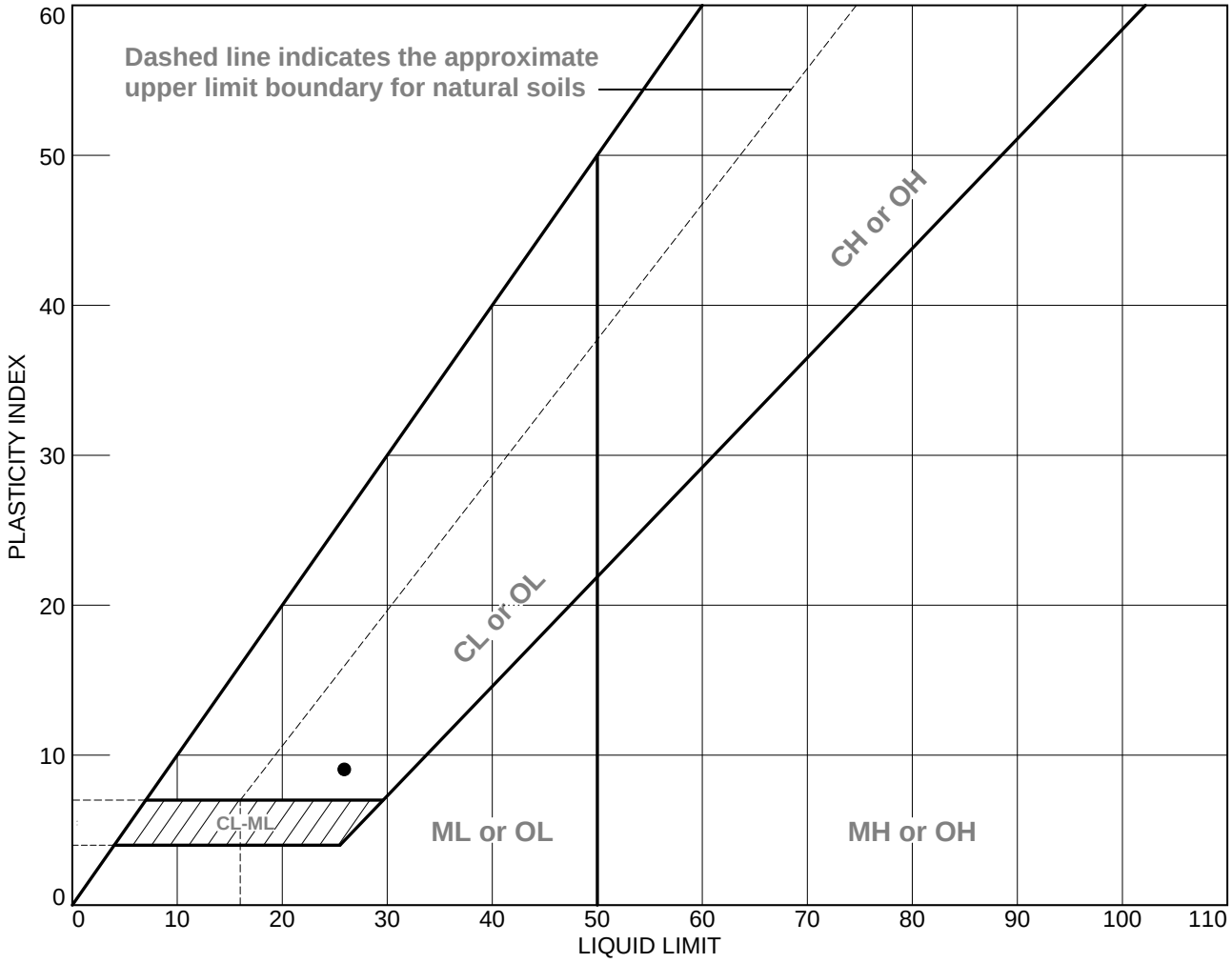
Figure 6

Tested By: EF **Checked By:** NM

LIQUID AND PLASTIC LIMITS TEST REPORT



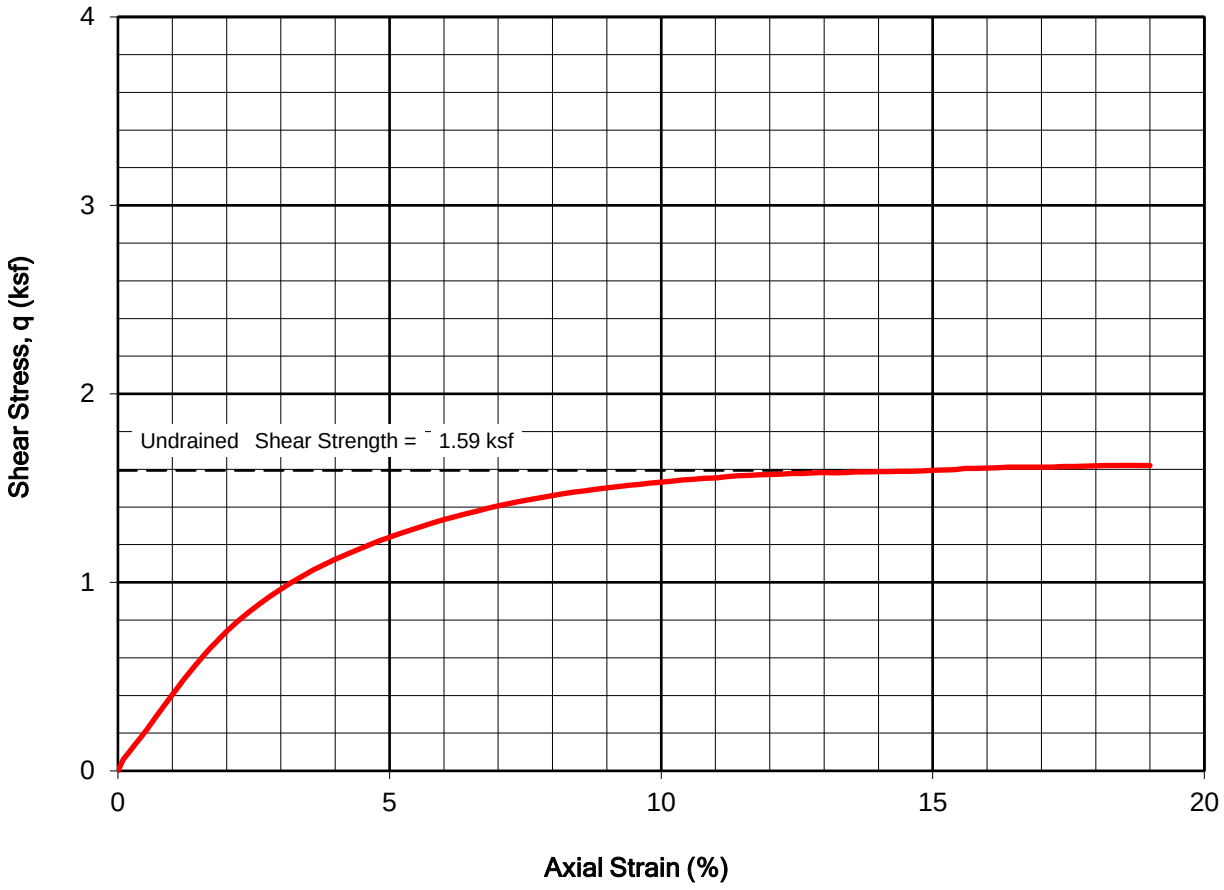
SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	B103	-	5-7 ft	23.3	17	26	9	CL

GEI Consultants, Inc.
400 Unicorn Park Drive
Woburn, MA 01801

Client: National Fuel Gas Distribution
Project: Hornell Former MGP
Project No.: 1801687 **Figure 7**

Tested By: KPG **Checked By:** EF



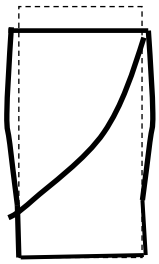
SAMPLE INFORMATION

Boring:	B103
Sample:	--
Depth:	6.5 feet
Type:	2.8-inch-dia. tube sample

Description: Gray LEAN CLAY (CL)

SPECIMEN INFORMATION

Height:	5.84	inch	Water Content:	23.3	%
Diameter:	2.88	inch	Total Unit Weight:	126.9	pcf
Area:	6.51	in²	Dry Unit Weight:	103.0	pcf



Failure Sketch

TEST SUMMARY

Cell Pressure:	0.42	ksf	Test Date:	10/24/2018
Strain Rate:	0.99	%/min	Tested By:	E. Fazlic
Shear Strength:	1.59	ksf	Checked By:	D. Aghjayan
Failure Strain:	15.0	%		

REMARKS:

Hornell Former MGP Site Hornell, New York	GEI Consultants	UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION
National Fuel Gas Distribution Company Williamsville, New York	Project 1801687	November 2018 Fig. 8

Appendix C

Test Pit Logs

GEI Consultants

Test Pit Log

TP-ISS-A

GEI PROJECT NO: 1801687	TEST PIT DESIGNATION: TP-ISS-A	SURFACE ELEVATION END NAVD88:
CLIENT: National Fuel Gas	SITE LOCATION OR AREA:	SURFACE ELEVATION CENTER NAVD88:
SITE NAME: Hornell MGP PDI	EQUIPMENT USED: Excavator	SURFACE ELEVATION END NAVD88:
GEOLOGIST: Garrett Schmidt	EARTHWORK SUBCONTRACTOR: TREC Environmental	NORTHING NAD83:
DEPTH WATER ENCOUNTERED:	OPERATOR:	EASTING NAD83:
START DATE: 11/20/2018	START TIME: 10:00 a.m.	LATITUDE:
FINISH DATE: 11/20/2018	FINISH TIME: 12:00 p.m.	LONGITUDE:

DEPTH (FEET)	PID HEADSPACE (PPM)	LABORATORY SAMPLE (FEET)	VISUAL OBSERVATIONS	SOIL LITHOLOGY USCS	SOIL DESCRIPTION LOG	STRUCTURES ENCOUNTERED OR COMMENTS
1				Topsoil	Topsoil: 0.0-0.2 feet bgs	
2					0.2-6.0 POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM) with ~70% fine sand, ~20% low plasticity fines (silt), with ~10% fine to coarse subangular gravel, many brick and coal fragments; wet; moderate hydrocarbon-like odors	
3					Water infiltration @ 2.5-3.0' bgs	
4				SP-SM		
5						
6					Bottom of Test Pit @ 6.0' bgs	
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18					BOTTOM OF TEST PIT EXCAVATION	

Comments: TEST PIT LENGTH: 18'
TEST PIT WIDTH: 4' ~6.0' deep
TEST PIT BACKFILL: Yes
LABORATORY ANALYSES:

GEI Consultants, Inc.
1301 Trumansburg Road
Suite N
Ithaca, New York 14850

GEI Consultants

Test Pit Log

TP-ISS-B

GEI PROJECT NO: 1801687	TEST PIT DESIGNATION: TP-ISS-B	SURFACE ELEVATION END NAVD88:
CLIENT: National Fuel Gas	SITE LOCATION OR AREA:	SURFACE ELEVATION CENTER NAVD88:
SITE NAME: Hornell MGP PD1	EQUIPMENT USED: Excavator	SURFACE ELEVATION END NAVD88:
GEOLOGIST: Garrett Schmidt	EARTHWORK SUBCONTRACTOR: TREC Environmental	NORTHING NAD83:
DEPTH WATER ENCOUNTERED:	OPERATOR:	EASTING NAD83:
START DATE: 11/20/2018	START TIME: 1:30 p.m.	LATITUDE:
FINISH DATE: 11/20/2018	FINISH TIME: 2:30 p.m.	LONGITUDE:

DEPTH (FEET)	PID HEADSPACE (PPM)	LABORATORY SAMPLE (FEET)	VISUAL OBSERVATIONS	SOIL LITHOLOGY USCS	SOIL DESCRIPTION LOG	STRUCTURES ENCOUNTERED OR COMMENTS
				Topsoil	Topsoil: 0.0-0.2 feet bgs	
1–6				SP-SM	0.2-7.0 POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM) with ~70% fine sand, ~20% low plasticity fines (silt), ~10% fine to coarse subangular gravel, few brick and coal fragments, many wood fragments; wet; blackish brown; moderate hydrocarbon-like odors	
7–15				GW-GM	7.0-15.0' WIDELY GRADED GRAVEL WITH SILT AND SAND (GW-GM) ~70% fine to coarse subangular gravel, ~20% fine sand, ~10% fines; wet; grayish-brown; moderate hydrocarbon-like odors	Sample taken for geotech
					Bottom of Test Pit @ 15.0' bgs	

Comments: TEST PIT LENGTH: 15'
TEST PIT WIDTH: 4' 15.0' depth
TEST PIT BACKFILL: Yes
LABORATORY ANALYSES:

GEI Consultants, Inc., P.C.
1301 Trumansburg Road
Suite N
Ithaca, New York 14850

Appendix D

Treatability Study Reports

MIX PREPARATION RECORDS

Client : GEI Consultants
Project : Hormell MGP Site

Print Date : 12/18/2018
Job No. : 18LS3723
Prepared By : AE
Checked By : JBJr

Material ID: Composite
-3/4 in Material
Portland : Type I/II Fresh
Mix Water : Tap
Cylinder Size : 3x6

land Mix Properties
Portland : 1000 gr
Water : 700 gr
Ratio : 0.7 w/c Ratio

Mix Record for Calibration Mix 1

Mix Date	Mix ID	Moist Comp gr	Portland Percent	Portland grams	Wt of Portland Slurry grams			Slump in
12/04/2018	Cal-Mix 1	5000	20	1000	1700			8 +

Test Cylinders : 3 **Avg Bulk Density of Cylinder :** 124.3 pcf

	grams	Bulk Density, pcf
Cylinder 1 :	1388.1	124.7
Cylinder 2 :	1370.9	123.0
Cylinder 3 :	1396.3	125.2

JLT Laboratories, Inc. 938 S. Central Ave, Canonsburg, Pa 15317

TABLE 1

UNCONFINED STRENGTH TEST RESULTS

ASTM D-1633

Client : GEI Consultants, Inc
Project : Hormell MGP Site
Material : Portland Mix Test Cylinders

Job Number: 18LS3723
Print Date : 12/26/2018
PO :
Chk'd By : JBJr
Test Unit Calibration Chk.: 10/15/2018

Cal Mix1

Mix ID	Fabrication Date	Test Date	Age Days	Weight grams	Height inches	Diameter inches	Area sq in	Bulk Density pcf	Load lbs	Peak Stress psi
Mix 1A	12/04/2018	12/11/2018	7	1352.1	5.85	3.00	7.069	124.5	2033.2	287.6
Permeability	12/04/2018	12/18/2018	14	376.3	6.00	3.00	7.069	33.8	2412.8	341.3
	12/04/2018	01/01/2019	28							

JLT Laboratories, Inc.

SUMMARY OF FLEX WALL PERMEABILITY TEST RESULTS

ASTM D-5084 (Method A)

Client	:	GEI Consultants	Print Date	:	12/26/2018
Project Location	:	Hornell MPG Site	Job No.	:	18LS3723
Sample Number	:	Cal - Mix 1	Tested By	:	MLB
			Checked By	:	JBJr
Fabrication Date	:	12/04/2018	Page 1 of 2		Page 2 Optional
Start Date	:	12/18/2018	Spec. Gravity	:	2.71 Assumed
Sge , Days	:	14			

Physical Property Data

Initial Height (in)	:	5.97	Final Height (in)	:	5.94
Initial Diameter (in)	:	2.93	Final Diameter (in)	:	2.93
Initial Wet Weight (g)	:	1360.20	Final Wet Weight (g)	:	1378.53
Wet Density (pcf)	:	128.62	Wet Density (pcf)	:	131.01
Moisture Content %	:	18.89	Moisture Content %	:	20.49
Dry Density (pcf)	:	108.18	Dry Density (pcf)	:	108.73
Initial Void Ratio	:	0.5631	Final Void Ratio	:	0.5553
Saturation ,%	:	90.9	Saturation ,%	:	100.0

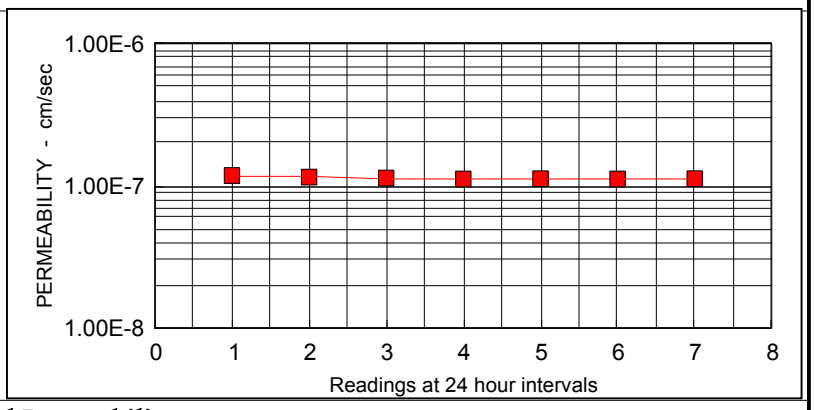
Test Parameters

Fluid	:	De-Aired Water	**Effective**		
Cell Pressure (psi)	:	65.00	**Confining Pressure (psi)**	:	**10**
Head Water (psi)	:	57.70	Gradient	:	25.09
Tail Water (psi)	:	52.30			

Permeability Input Data

For Last Data Point

Flow, Q	(cc)	:	10.60
Length, L	(in)	:	5.94
Area, A	(sqin)	:	6.74
Head, h	**(psi)**	:	**5.40**
Time, t	(min)	:	1441.00
Temp, T	(Deg C)	:	19.8



Computed Permeability

PERMEABILITY, K =	1.12E-007	**(cm/sec) at 20 Degrees C**
Average of Last 3 Readings	1.12E-007	**cm/sec**

SUMMARY OF FLEX WALL PERMEABILITY TEST RESULTS

ASTM D-5084 (Method A)

Client	:	GEI Consultants	Print Date	:	01/01/2019
Project Location	:	Hornell MPG Site	Job No.	:	18LS3723
Sample Number	:	Mix 1A	Tested By	:	MLB
			Checked By	:	JBJr
Fabrication Date	:	12/11/2018	Page 1 of 2		Page 2 Optional
Start Date	:	12/25/2018	Spec. Gravity	:	2.71 Assumed
Sge , Days	:	14			

Physical Property Data

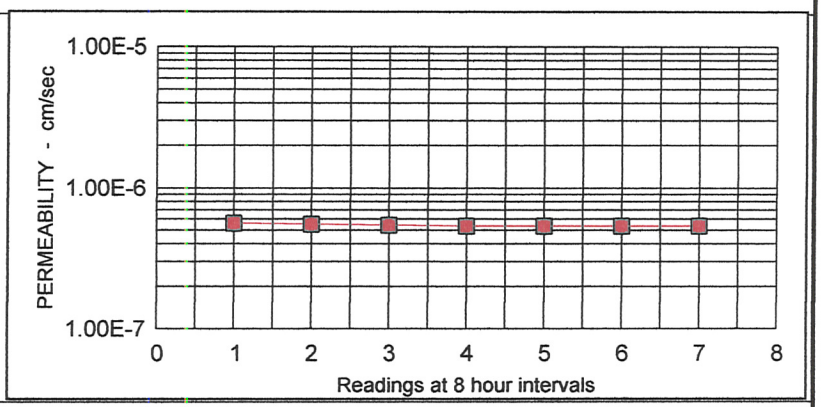
Initial Height (in)	:	5.99	Final Height (in)	:	5.99
Initial Diameter (in)	:	3.00	Final Diameter (in)	:	2.98
Initial Wet Weight (g)	:	1410.60	Final Wet Weight (g)	:	1435.12
Wet Density (pcf)	:	126.80	Wet Density (pcf)	:	130.75
Moisture Content %	:	18.65	Moisture Content %	:	20.71
Dry Density (pcf)	:	106.88	Dry Density (pcf)	:	108.31
Initial Void Ratio	:	0.5823	Final Void Ratio	:	0.5612
Saturation ,%	:	86.8	Saturation ,%	:	100.0

Test Parameters

Fluid	:	De-Aired Water	**Effective**		
Cell Pressure psi)	:	65.00	**Confining Pressure (psi)**	:	**10**
Head Water psi)	:	57.70	Gradient	:	24.88
Tail Water psi)	:	52.30			

Permeability Input Data
For Last Data Point

Flow, Q	(cc)	:	17.30
Length, L	(in)	:	5.99
Area, A	(sqin)	:	6.97
Head, h	**(psi)**	:	**5.40**
Time, t	(min)	:	480.00
Temp, T	(Deg C)	:	19.8



Computed Permeability

PERMEABILITY, K = 5.37E-007 **(cm/sec) at 20 Degrees C**
Average of Last 3 Readings 5.37E-007 **cm/sec**

SUMMARY OF FLEX WALL PERMEABILITY TEST RESULTS

ASTM D-5084 (Method A)

Client	:	GEI Consultants	Print Date	:	01/01/2019
Project Location	:	Hornell MPG Site	Job No.	:	18LS3723
Sample Number	:	Mix 1B	Tested By	:	MLB
			Checked By	:	JBJr
Fabrication Date	:	12/11/2018	Page 1 of 2		Page 2 Optional
Start Date	:	12/25/2018	Spec. Gravity	:	2.71 Assumed
Age , Days	:	14			

Physical Property Data

Initial Height (in)	:	5.94	Final Height (in)	:	5.94
Initial Diameter (in)	:	3.00	Final Diameter (in)	:	3.00
Initial Wet Weight (g)	:	1368.10	Final Wet Weight (g)	:	1403.15
Wet Density (pcf)	:	124.02	Wet Density (pcf)	:	127.20
Moisture Content %	:	20.77	Moisture Content %	:	23.87
Dry Density (pcf)	:	102.69	Dry Density (pcf)	:	102.69
Initial Void Ratio	:	0.6468	Final Void Ratio	:	0.6468
Saturation ,%	:	87.0	Saturation ,%	:	100.0

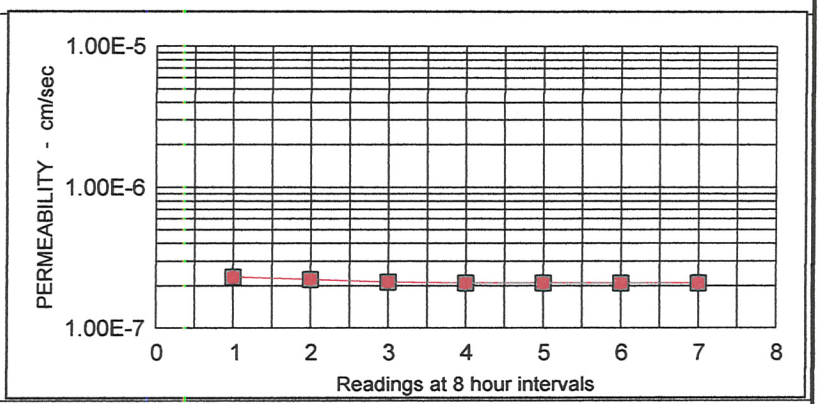
Test Parameters

Fluid		: De-Aired Water	**Effective**		
Cell Pressure	psi)	: 65.00	**Confining Pressure (psi)**	:	10
Head Water	psi)	: 57.70	Gradient	:	25.09
Tail Water	psi)	: 52.30			

Permeability Input Data

For Last Data Point

Flow, Q	(cc)	:	6.90
Length, L	(in)	:	5.94
Area, A	(sqin)	:	7.07
Head, h	**(psi)**	:	**5.40**
Time, t	(min)	:	480.00
Temp, T	(Deg C)	:	19.8



Computed Permeability

PERMEABILITY, K =	2.10E-007	(cm/sec) at 20 Degrees C
Average of Last 3 Readings	2.10E-007	cm/sec

SUMMARY OF FLEX WALL PERMEABILITY TEST RESULTS

ASTM D-5084 (Method A)

Client	:	GEI Consultants	Print Date	:	01/01/2019
Project Location	:	Hornell MPG Site	Job No.	:	18LS3723
Sample Number	:	Mix 1C	Tested By	:	MLB
			Checked By	:	JBJr
Fabrication Date	:	12/11/2018	Page 1 of 2		Page 2 Optional
Start Date	:	12/25/2018	Spec. Gravity	:	2.71 Assumed
Age , Days	:	14			

Physical Property Data

Initial Height (in)	:	5.98	Final Height (in)	:	5.98
Initial Diameter (in)	:	3.00	Final Diameter (in)	:	3.00
Initial Wet Weight (g)	:	1377.70	Final Wet Weight (g)	:	1415.30
Wet Density (pcf)	:	124.05	Wet Density (pcf)	:	127.44
Moisture Content %	:	20.35	Moisture Content %	:	23.64
Dry Density (pcf)	:	103.07	Dry Density (pcf)	:	103.07
Initial Void Ratio	:	0.6406	Final Void Ratio	:	0.6406
Saturation ,%	:	86.1	Saturation ,%	:	100.0

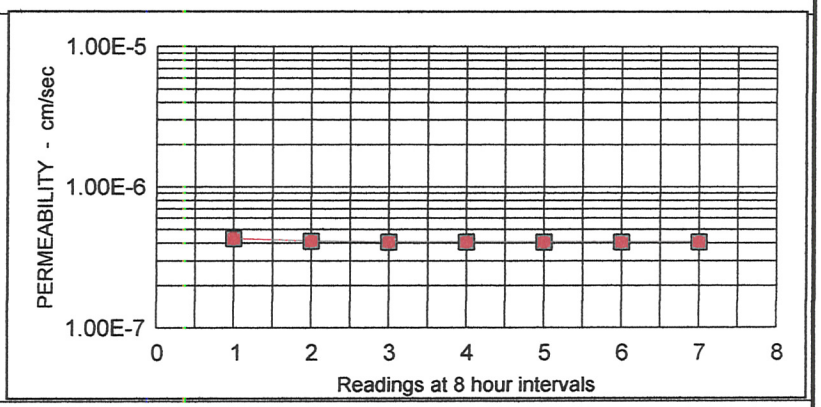
Test Parameters

Fluid	:	De-Aired Water	**Effective**		
Cell Pressure psi)	:	65.00	**Confining Pressure (psi)**	:	**10**
Head Water psi)	:	57.70	Gradient	:	24.92
Tail Water psi)	:	52.30			

Permeability Input Data

For Last Data Point

Flow, Q	(cc)	:	13.30
Length, L	(in)	:	5.98
Area, A	(sqin)	:	7.07
Head, h	**(psi)**	:	**5.40**
Time, t	(min)	:	480.00
Temp, T	(Deg C)	:	19.8



Computed Permeability

PERMEABILITY, K =	4.07E-007	**(cm/sec) at 20 Degrees C**
Average of Last 3 Readings	4.07E-007	**cm/sec**

SUMMARY OF FLEX WALL PERMEABILITY TEST RESULTS
ASTM D-5084 (Method A)

Client	:	GEI Consultants	Print Date	:	01/01/2019
Project Location	:	Hornell MPG Site	Job No.	:	18LS3723
Sample Number	:	Mix 1D	Tested By	:	MLB
			Checked By	:	JBJr
Fabrication Date	:	12/11/2018	Page 1 of 2		Page 2 Optional
Start Date	:	12/25/2018	Spec. Gravity	:	2.71 Assumed
Age , Days	:	14			

Physical Property Data

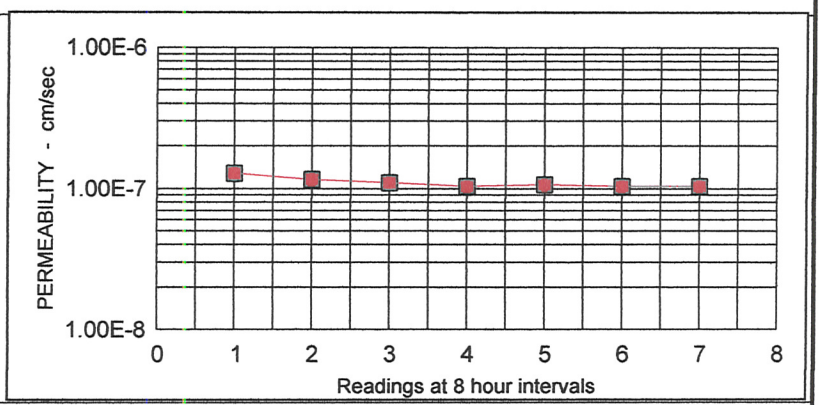
Initial Height (in)	:	5.98	Final Height (in)	:	5.98
Initial Diameter (in)	:	3.00	Final Diameter (in)	:	3.00
Initial Wet Weight (g)	:	1371.20	Final Wet Weight (g)	:	1405.96
Wet Density (pcf)	:	123.47	Wet Density (pcf)	:	126.60
Moisture Content %	:	21.36	Moisture Content %	:	24.43
Dry Density (pcf)	:	101.74	Dry Density (pcf)	:	101.74
Initial Void Ratio	:	0.6621	Final Void Ratio	:	0.6621
Saturation ,%	:	87.4	Saturation ,%	:	100.0

Test Parameters

Fluid	:	De-Aired Water	**Effective**		
Cell Pressure psi)	:	65.00	**Confining Pressure (psi)**	:	10
Head Water psi)	:	57.70	Gradient	:	24.92
Tail Water psi)	:	52.30			

Permeability Input Data
For Last Data Point

Flow, Q	(cc)	:	3.40
Length, L	(in)	:	5.98
Area, A	(sqin)	:	7.07
Head, h	**(psi)**	:	**5.40**
Time, t	(min)	:	480.00
Temp, T	(Deg C)	:	19.8



Computed Permeability

PERMEABILITY, K =	1.04E-007	**(cm/sec) at 20 Degrees C**
Average of Last 3 Readings	1.05E-007	**cm/sec**

MIX PREPARATION RECORDS

Client : GEI Consultants
Project : Hormell MGP Site

Print Date : 12/11/2018
Job No. : 18LS3723
Prepared By : AE
Checked By : JBJr

Material ID: Composite
-3/4 in Material
Portland : Type I/II Fresh
SLAG Cement : Lafarge-Holcim
Mix Water : Tap
Bentonite : WyoBen 90
Cylinder Size : 3x6

Mix Record for First Trial Mixes

Mix Date	Mix ID	Moist Comp grams	50:50 P/GGBFL Percent	50 : 50 grams	Bentonite Percent	Bentonite grams	0.7 W/C Ratio Water, gr	Added Water for Slump, gr	Bulk Density pcf	Slump in
12/11/2018	Mix 1A	9000	8	720	0.25	22.50	504	113	127.3	5
12/11/2018	Mix 1B	9000	8	720	0.75	67.50	504	274	124.6	5
12/11/2018	Mix 1C	9000	15	1350	0.25	22.50	945	0	126.1	6
12/11/2018	Mix 1D	9000	15	1350	0.75	67.50	945	154	124.8	5

7 3x6 Cylinders per Mix

JLT Laboratories, Inc. 938 S. Central Ave, Canonsburg, Pa 15317

TABLE 2

SUMMARY OF FLEX WALL PERMEABILITY TEST RESULTS

ASTM D-5084 (Method A)

Client	:	GEI Consultants	Print Date	:	01/15/2019
Project Location	:	Hornell MPG Site	Job No.	:	18LS3723
Sample Number	:	Mix 1A	Tested By	:	MLB
			Checked By	:	JBJr
Fabrication Date	:	12/11/2018	Page 1 of 2		Page 2 Optional
Start Date	:	01/08/2019	Spec. Gravity	:	2.71 Assumed
Sge , Days	:	28			

Physical Property Data

Initial Height (in)	:	5.99	Final Height (in)	:	5.99
Initial Diameter (in)	:	3.00	Final Diameter (in)	:	2.98
Initial Wet Weight (g)	:	1426.90	Final Wet Weight (g)	:	1439.85
Wet Density (pcf)	:	128.27	Wet Density (pcf)	:	131.18
Moisture Content %	:	19.27	Moisture Content %	:	20.35
Dry Density (pcf)	:	107.55	Dry Density (pcf)	:	109.00
Initial Void Ratio	:	0.5723	Final Void Ratio	:	0.5514
Saturation ,%	:	91.2	Saturation ,%	:	100.0

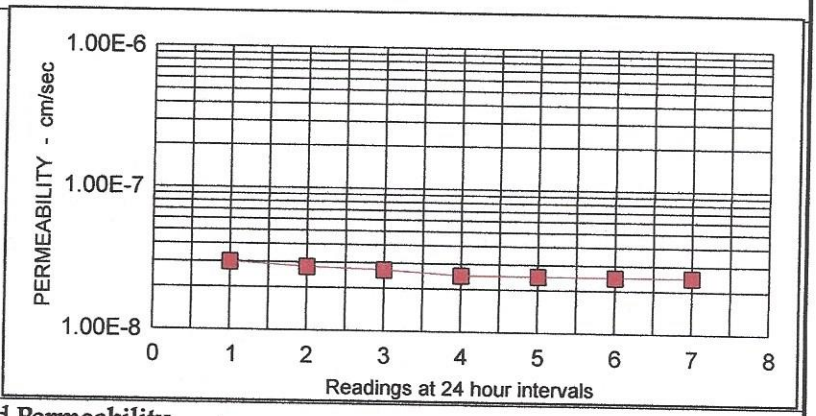
Test Parameters

Fluid	:	De-Aired Water	**Effective**		
Cell Pressure psi)	:	65.00	**Confining Pressure (psi)**	:	10
Head Water psi)	:	57.70	Gradient	:	24.88
Tail Water psi)	:	52.30			

Permeability Input Data

For Last Data Point

Flow, Q	(cc)	:	2.4
Length, L	(in)	:	5.99
Area, A	(sqin)	:	6.97
Head, h	**(psi)**	:	**5.40**
Time, t	(min)	:	1441
Temp, T	(Deg C)	:	19.8



Computed Permeability

PERMEABILITY, K =	2.48E-008	**(cm/sec) at 20 Degrees C**
Average of Last 3 Readings	2.48E-008	**cm/sec**

SUMMARY OF FLEX WALL PERMEABILITY TEST RESULTS
ASTM D-5084 (Method A)

Client	:	GEI Consultants	Print Date	:	01/15/2019
Project Location	:	Hornell MPG Site	Job No.	:	18LS3723
Sample Number	:	Mix 1B	Tested By	:	MLB
			Checked By	:	JBJr
Fabrication Date	:	12/11/2018	Page 1 of 2		Page 2 Optional
Start Date	:	01/08/2019	Spec. Gravity	:	2.71 Assumed
Age , Days	:	28			

Physical Property Data

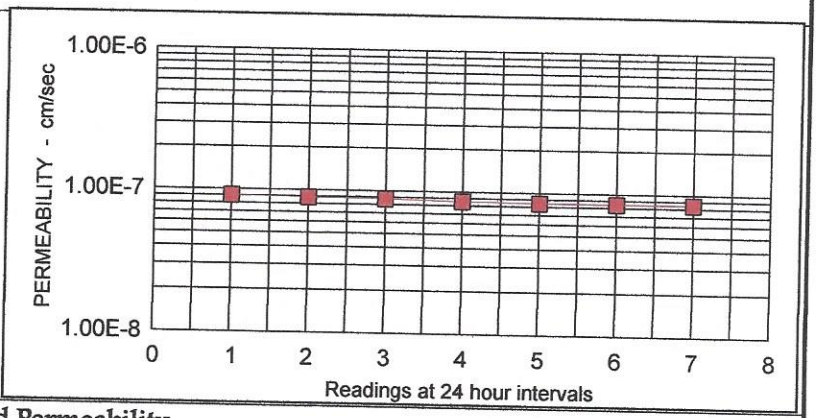
Initial Height (in)	:	5.99	Final Height (in)	:	5.99
Initial Diameter (in)	:	3.00	Final Diameter (in)	:	3.00
Initial Wet Weight (g)	:	1384.30	Final Wet Weight (g)	:	1404.15
Wet Density (pcf)	:	124.44	Wet Density (pcf)	:	126.22
Moisture Content %	:	23.03	Moisture Content %	:	24.79
Dry Density (pcf)	:	101.15	Dry Density (pcf)	:	101.15
Initial Void Ratio	:	0.6718	Final Void Ratio	:	0.6718
Saturation ,%	:	92.9	Saturation ,%	:	100.0

Test Parameters

Fluid	:	De-Aired Water	**Effective**		
Cell Pressure psi)	:	65.00	**Confining Pressure (psi)**	:	10
Head Water psi)	:	57.70	Gradient	:	24.88
Tail Water psi)	:	52.30			

Permeability Input Data
For Last Data Point

Flow, Q	(cc)	:	8.3
Length, L	(in)	:	5.99
Area, A	(sqin)	:	7.07
Head, h	**(psi)**	:	**5.40**
Time, t	(min)	:	1442
Temp, T	(Deg C)	:	19.8



Computed Permeability

PERMEABILITY, K =	8.46E-008	**(cm/sec) at 20 Degrees C**
Average of Last 3 Readings	8.47E-008	**cm/sec**

SUMMARY OF FLEX WALL PERMEABILITY TEST RESULTS
ASTM D-5084 (Method A)

Client	:	GEI Consultants	Print Date	:	01/15/2019
Project Location	:	Hornell MPG Site	Job No.	:	18LS3723
Sample Number	:	Mix 1C	Tested By	:	MLB
			Checked By	:	JBJr
Fabrication Date	:	12/11/2018	Page 1 of 2		Page 2 Optional
Start Date	:	01/08/2019	Spec. Gravity	:	2.71 Assumed
Age , Days	:	28			

Physical Property Data

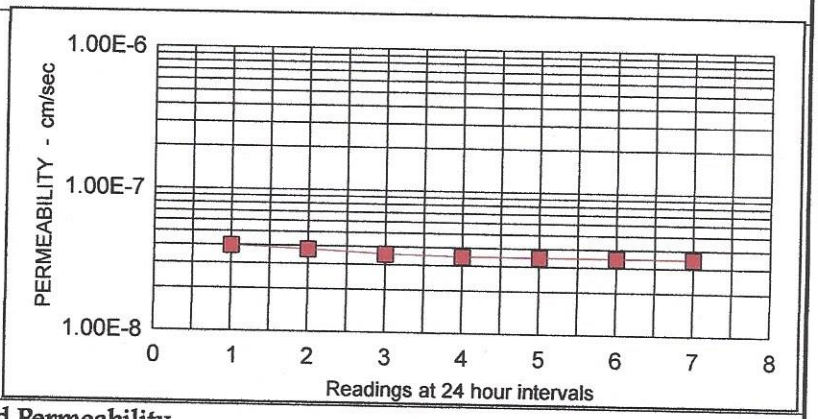
Initial Height (in)	:	5.99	Final Height (in)	:	5.99
Initial Diameter (in)	:	3.00	Final Diameter (in)	:	3.00
Initial Wet Weight (g)	:	1384.50	Final Wet Weight (g)	:	1418.35
Wet Density (pcf)	:	124.46	Wet Density (pcf)	:	127.50
Moisture Content %	:	20.63	Moisture Content %	:	23.58
Dry Density (pcf)	:	103.17	Dry Density (pcf)	:	103.17
Initial Void Ratio	:	0.6391	Final Void Ratio	:	0.6391
Saturation ,%	:	87.5	Saturation ,%	:	100.0

Test Parameters

Fluid	:	De-Aired Water	**Effective**		
Cell Pressure psi)	:	65.00	**Confining Pressure (psi)**	:	10
Head Water psi)	:	57.70	Gradient	:	24.88
Tail Water psi)	:	52.30			

Permeability Input Data
For Last Data Point

Flow, Q	(cc)	:	3.4
Length, L	(in)	:	5.99
Area, A	(sqin)	:	7.07
Head, h	**(psi)**	:	**5.40**
Time, t	(min)	:	1442
Temp, T	(Deg C)	:	19.8



Computed Permeability

PERMEABILITY, K =	3.47E-008	**(cm/sec) at 20 Degrees C**
Average of Last 3 Readings	3.47E-008	**cm/sec**

SUMMARY OF FLEX WALL PERMEABILITY TEST RESULTS

ASTM D-5084 (Method A)

Client	:	GEI Consultants	Print Date	:	01/15/2019
Project Location	:	Hornell MPG Site	Job No.	:	18LS3723
Sample Number	:	Mix 1D	Tested By	:	MLB
			Checked By	:	JBJr
Fabrication Date	:	12/11/2018	Page 1 of 2		Page 2 Optional
Start Date	:	01/08/2019	Spec. Gravity	:	2.71 Assumed
Age , Days	:	28			

Physical Property Data

Initial Height (in)	:	5.99	Final Height (in)	:	5.99
Initial Diameter (in)	:	3.00	Final Diameter (in)	:	3.00
Initial Wet Weight (g)	:	1374.30	Final Wet Weight (g)	:	1408.32
Wet Density (pcf)	:	123.54	Wet Density (pcf)	:	126.60
Moisture Content %	:	21.43	Moisture Content %	:	24.43
Dry Density (pcf)	:	101.74	Dry Density (pcf)	:	101.74
Initial Void Ratio	:	0.6621	Final Void Ratio	:	0.6621
Saturation ,%	:	87.7	Saturation ,%	:	100.0

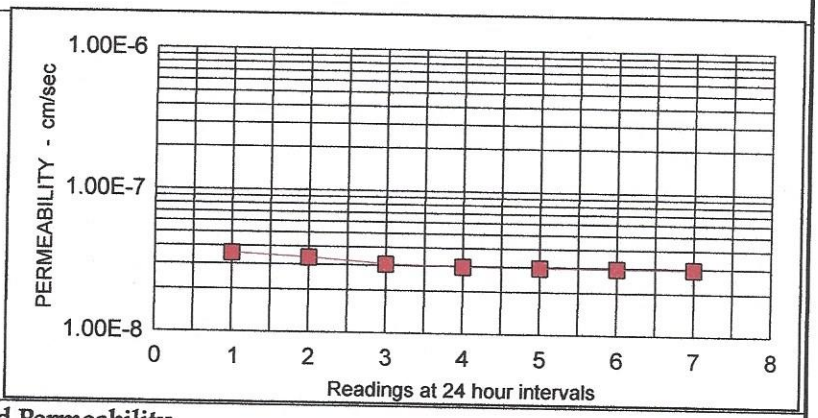
Test Parameters

Fluid	:	De-Aired Water	**Effective**		
Cell Pressure psi)	:	65.00	**Confining Pressure (psi)**	:	**10**
Head Water psi)	:	57.70	Gradient	:	24.88
Tail Water psi)	:	52.30			

Permeability Input Data

For Last Data Point

Flow, Q	(cc)	:	2.9
Length, L	(in)	:	5.99
Area, A	(sqin)	:	7.07
Head, h	**(psi)**	:	**5.40**
Time, t	(min)	:	1441
Temp, T	(Deg C)	:	19.8



Computed Permeability

PERMEABILITY, K =	2.96E-008	**(cm/sec) at 20 Degrees C**
Average of Last 3 Readings	2.96E-008	**cm/sec**

UNCONFINED STRENGTH TEST RESULTS

ASTM D-1633

JLT

Client : GEI Consultants, Inc
Project : Hormell MGP Site
Material : Test Cylinders for Mixes 1A hru 1D

Job Number: 18LS3723
Print Date : 12/25/2018
PO :
Chk'd By : JBJr
Test Unit Calibration Chk.: 10/15/2018

Mix ID	Fabrication Date	Test Date	Age Days	Weight grams	Height inches	Diameter inches	Area sq in	Bulk Density pcf	Load lbs	Peak Stress psi
Mix 1A Permeability	12/11/2018	12/18/2018	7	1382.6	6.00	3.00	7.069	124.1	1132	160.1
	12/11/2018	12/25/2018	14	1370.0	5.98	3.00	7.069	123.4	1362	192.7
	12/11/2018	01/08/2019	28							

Mix ID	Fabrication Date	Test Date	Age Days	Weight grams	Height inches	Diameter inches	Area sq in	Bulk Density pcf	Load lbs	Peak Stress psi
Mix 1B Permeability	12/11/2018	12/18/2018	7	1399.1	6.00	3.00	7.069	125.6	871	123.2
	12/11/2018	12/25/2018	14	1383.1	5.98	3.00	7.069	124.5	1391	196.8
	12/11/2018	01/08/2019	28							

Mix ID	Fabrication Date	Test Date	Age Days	Weight grams	Height inches	Diameter inches	Area sq in	Bulk Density pcf	Load lbs	Peak Stress psi
Mix 1C Permeability	12/11/2018	12/18/2018	7	1394.1	6.00	3.00	7.069	125.1	2015	285.1
	12/11/2018	12/25/2018	14	1395.6	5.99	3.00	7.069	125.5	2210	312.7
	12/11/2018	01/08/2019	28							

Mix ID	Fabrication Date	Test Date	Age Days	Weight grams	Height inches	Diameter inches	Area sq in	Bulk Density pcf	Load lbs	Peak Stress psi
Mix 1D Permeability	12/11/2018	12/18/2018	7	1379.0	6.00	3.00	7.069	123.8	1788.8	253.1
	12/11/2018	12/25/2018	14	1379.0	5.99	3.00	7.069	124.0	1887.6	267.0
	12/11/2018	01/08/2019	28							

UNCONFINED STRENGTH TEST RESULTS

ASTM D-1633

Client : GEI Consultants, Inc
Project : Hormell MGP Site
Material : Test Cylinders for Mixes 1A hru 1D

Job Number: 18LS3723
Print Date : 01/14/2019
PO :
Chk'd By : JBJr
Test Unit Calibration Chk.: 10/15/2018

Mix ID	Fabrication Date	Test Date	Age Days	Weight grams	Height inches	Diameter inches	Area sq in	Bulk Density pcf	Load lbs	Peak Stress psi
Mix 1A Permeability	12/11/2018	12/18/2018	7	1382.6	6.00	3.00	7.069	124.1	1132	160.1
	12/11/2018	12/25/2018	14	1370.0	5.98	3.00	7.069	123.4	1362	192.7
	12/11/2018	01/08/2019	28	1446.6	6.00	3.00	7.069	129.8	1555	220.0

Mix ID	Fabrication Date	Test Date	Age Days	Weight grams	Height inches	Diameter inches	Area sq in	Bulk Density pcf	Load lbs	Peak Stress psi
Mix 1B Permeability	12/11/2018	12/18/2018	7	1399.1	6.00	3.00	7.069	125.6	871	123.2
	12/11/2018	12/25/2018	14	1383.1	5.98	3.00	7.069	124.5	1391	196.8
	12/11/2018	01/08/2019	28	1399.0	5.99	3.00	7.069	125.8	1586	224.4

Mix ID	Fabrication Date	Test Date	Age Days	Weight grams	Height inches	Diameter inches	Area sq in	Bulk Density pcf	Load lbs	Peak Stress psi
Mix 1C Permeability	12/11/2018	12/18/2018	7	1394.1	6.00	3.00	7.069	125.1	2015	285.1
	12/11/2018	12/25/2018	14	1395.6	5.99	3.00	7.069	125.5	2210	312.7
	12/11/2018	01/08/2019	28	1414.9	5.99	3.00	7.069	127.2	2647	374.4

Mix ID	Fabrication Date	Test Date	Age Days	Weight grams	Height inches	Diameter inches	Area sq in	Bulk Density pcf	Load lbs	Peak Stress psi
Mix 1D Permeability	12/11/2018	12/18/2018	7	1379.0	6.00	3.00	7.069	123.8	1789	253.1
	12/11/2018	12/25/2018	14	1379.0	5.99	3.00	7.069	124.0	1888	267.0
	12/11/2018	01/08/2019	28	1405.1	6.00	3.00	7.069	126.1	2860	404.6

Attachment 2

50% Specification Outline and Remedial Design Drawings

SECTION 00 01 10

TABLE OF CONTENTS

INTRODUCTORY INFORMATION

DIVISION 01 – GENERAL REQUIREMENTS

DIVISION 02 – EXISTING CONDITIONS

DIVISION 31 – EARTHWORK

31 41 00	Shoring

Division 32 – EXTERIOR IMPROVEMENTS

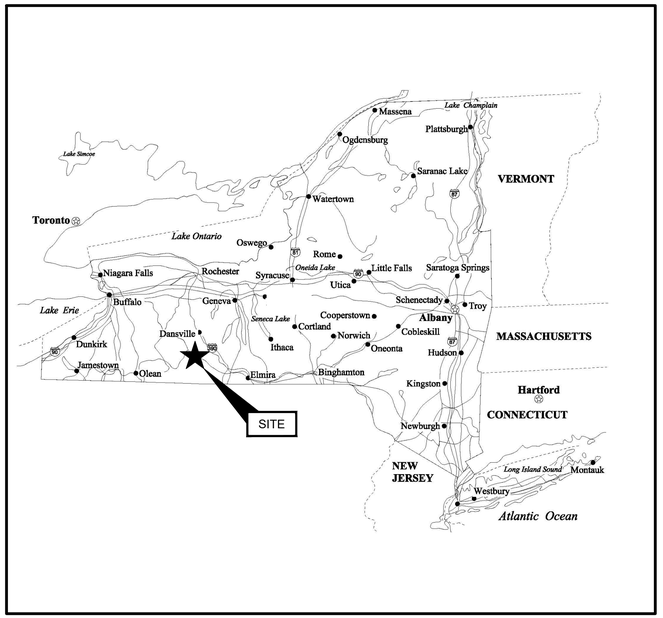
Section No.	Description
32 90 00	Planting

Division 33 – UTILITIES

Section No.	Description
33 05 16	Subsurface Utilities

REMEDIAL ACTION

HORNELL FORMER MGP SITE
NYSDEC SITE #851032
CITY OF HORNELL, STEUBEN COUNTY, NEW YORK



SOURCE:
MAP IMAGE PREPARED BY MAGELLAN GEOGRAPHICX, SANTA BARBARA, CA 1994.

STATE MAP
APPROXIMTE SCALE: 1" = 100 MILES

SITE LOCATION MAP
SCALE: 1"=1000'

SHEET INDEX

SHEET NO.	DRAWING NO.	TITLE
1	S-001	TITLE SHEET
2	S-002	CONSTRUCTION NOTES
3	S-003	EXISTING CONDITIONS AND EXPLORATIONS PLAN
4	S-004	HISTORIC STRCTURES
5	S-005	REMEDIATION OVERVIEW
6	S-006	REMEDIATION PHASING PLAN
7	S-007	MATERIAL MANAGEMENT PLAN
8	S-008	TRANSPORTATION PLAN
9	S-009	DEMOLITION AND PROTECTION PLAN
10	S-010	EROSION CONTROL AND SITE MANAGEMENT PLAN
11	S-011	PRE-ISS EXCAVATION PLAN
12	S-012	EXCAVATION SUPPORT PLAN
13	S-013	EXCAVATION SUPPORT DETAILS
14	S-014	ISS PLAN
15	S-015	ISS SECTIONS
16	S-016	RESTORATION PLAN
17	S-017	RESTORATION DETAILS
18	S-018	SITE MANAGEMENT DETAILS

Dig Safely. New York. Call 811 before you dig

PREPARED FOR:

NATIONAL FUEL GAS DISTRIBUTION CO.

National Fuel

PREPARED BY:

GEI CONSULTANTS, INC., P.C.
1301 TRUMANSBURG ROAD
SUITE N
ITHACA, NY 14850
(607)216-8955

GEI Consultants

50% DESIGN

GEI PROJECT NO. 1801687

WARNING:
IT IS A VIOLATION OF SECTION 7209.2 OF THE NEW YORK STAT EDUCATION LAW FOR ANY PERSON, UNLESS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, TO ALTER IN ANY WAY PLANS, SPECIFICATIONS, PLATS OR REPOTS TO WHICH THE SEAL OF A PROFESSIONAL ENGINEER HAS BEEN APPLIED. IF AN ITEM BEARING THE SEAL OF A PROFESSIONAL ENGIEER IS ALTERED, THE ALTERING ENGINEER SHALL AFFIX TO THE ITEM HIS SEAL AND THE NOTATION "ALTERED BY" FOLLOWED BY HIS SIGNATURE, THE DATE, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NO.	DATE	ISSUE/REVISION	APP
1	1/29/2018	50% DESIGN	CRP
0	12/7/2018	PROGRESS 50%	CRP

DRAFT

DWG. NO.
S-001

SHEET NO.
1 OF 18

A. GENERAL CONSTRUCTION NOTES

1. DURING CONSTRUCTION, TEMPORARY FENCING SHALL BE INSTALLED AND THE SITE AREA SHALL BE SECURELY MAINTAINED. UPON COMPLETION OF CONSTRUCTION, THE TEMPORARY FENCING SHALL BE REMOVED.
2. THE CONTRACTOR IS NOT REQUIRED TO PROVIDE A SECURITY GUARD, BUT MAY CHOOSE TO DO SO AT THEIR OWN DISCRETION FOR THE CARE AND PROTECTION OF THE WORK, EQUIPMENT AND MATERIAL.
3. LOCAL FIRE DEPARTMENTS AND EMERGENCY MANAGEMENT TEAMS SHALL BE MADE AWARE OF SITE ACTIVITIES PRIOR TO INITIATION OF REMEDIAL ACTIVITIES.
4. ALL CONSTRUCTION ACTIVITIES, INCLUDING OPERATION OF MACHINERY, EXCAVATION, FILLING, GRADING, CLEARING OF VEGETATION, DISPOSAL OF WASTE, AND STOCKPILING OF MATERIAL SHALL TAKE PLACE WITHIN THE APPROVED WORK AREA AS DEPICTED ON THE CONSTRUCTION DRAWINGS AND/OR AS SPECIFIED IN THE CONTRACT DOCUMENTS. CONTRACTOR SHALL MANAGE ALL TRAFFIC WITHIN THE CONSTRUCTION AREA.
5. THE CONTRACTOR SHALL LIMIT MOVEMENT OF CREWS, VEHICLES, AND EQUIPMENT ON APPROVED ACCESS ROADS TO MINIMIZE DAMAGE TO PROPERTIES AND DISRUPTION OF NORMAL LAND USE ACTIVITY.
6. THE CONTRACTOR SHALL PARK PERSONNEL AND CONSTRUCTION VEHICLES IN AREAS DESIGNATED IN SUCH A WAY THAT THEY SHALL NOT INTERFERE WITH NORMAL TRAFFIC, CAUSE A SAFETY HAZARD, OR INTERFERE WITH EXISTING LAND USE OUTSIDE OF THE SITE AS WELL AS WITH OTHER ACTIVITIES WITHIN THE SITE.
7. WASTE WATERS FROM CONSTRUCTION OPERATIONS SHALL NOT ENTER STREAMS, WATER COURSES OR OTHER SURFACE WATERS WITHOUT THE USE OF APPROPRIATE AND APPROVED TURBIDITY CONTROL METHODS AND COMPLYING WITH THE PERTINENT FEDERAL, STATE, AND/OR LOCAL REGULATIONS. WATER GENERATED DURING EXCAVATION ACTIVITIES INCLUDING, BUT NOT LIMITED TO, THE DEWATERING OF EXCAVATIONS AND DECONTAMINATION FLUIDS, SHALL BE COLLECTED AND TREATED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
8. ALL VEHICLES EXITING THE SITE MUST PASS THROUGH A TIRE WASH/DECONTAMINATION ZONE, WHERE VISIBLE DIRT WILL BE REMOVED FROM THE TIRES AND OTHER PARTS OF THE VEHICLES. PERFORM VEHICLE WASHDOWNS AS DIRECTED BY THE ENGINEER.
9. NOISE IMPACTS SHALL BE MINIMIZED AND MITIGATED. CONTRACTOR SHALL COMPLY WITH STATE AND LOCAL NOISE ORDINANCES, INCLUDING POTENTIAL RESTRICTION OF WORK HOURS AS SET FORTH IN THOSE REGULATIONS. CONTRACTOR SHALL MAINTAIN ALL EQUIPMENT IN GOOD OPERATING CONDITIONS AND ALL MOTORS AND ENGINES SHALL BE MUFFLED ACCORDING TO MANUFACTURER'S SPECIFICATIONS. ANY FAULTY NOISE SUPPRESSOR SHALL BE REPAIRED OR REPLACED.
10. ALL WELLS WITHIN THE LIMITS OF WORK ARE TO BE ABANDONED AS REQUIRED BY NYSDEC CP-43 GROUNDWATER MONITORING WELL DECOMMISSION POLICY.
11. THE CONTRACTOR SHALL PROVIDE SAFE PEDESTRIAN ACCESS AND PROTECTION ADJACENT TO WORK AREA THROUGHOUT THE DURATION OF THE PROJECT.

B. GENERAL NOTES FOR SURVEY

1. COORDINATE AND HORIZONTAL REFERENCE BASED ON NEW YORK CENTRAL ZONE (3101) NORTH AMERICAN DATUM OF 1983 (NAD 83). VERTICAL DATUM IS BASED UPON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
2. ALL CONSTRUCTION STAKEOUT SHALL BE PERFORMED UNDER THE SUPERVISION OF A NEW YORK STATE LICENSED SURVEYOR.

C. GENERAL NOTES FOR UTILITIES

1. VERIFY ALL UTILITY LOCATIONS AND DEPTHS PRIOR TO BEGINNING WORK BY POSITIVE IDENTIFICATION USING AIR KNIFE TO A MINIMUM DEPTH OF 5 FEET, AT LEAST 48 HOURS PRIOR TO DIGGING, THE CONTRACTOR SHALL CALL "DIG SAFELY, NEW YORK", TELEPHONE NUMBER 1-800-962-7962 AND OTHERS, AS NECESSARY, FOR UTILITY MARKOUTS.
2. THE CONTRACTOR SHALL USE SOFT-DIG TECHNIQUES WHEN EXCAVATING NEAR EXISTING UTILITIES. EXTREME CAUTION SHALL BE EXERCISED WHILE EXCAVATING, INSTALLING, BACKFILLING, OR COMPACTING AROUND THE UTILITIES.
3. VERIFICATION OF THE PRESENCE AND LOCATION OF ALL UTILITIES PRIOR TO INITIATING WORK SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR SHALL COORDINATE ALL UTILITY RELOCATION WITH THE ENGINEER.

D. GENERAL NOTES FOR SITE AIR AND STORMWATER CONTROL

1. CONTRACTOR SHALL COMPLY WITH THE COMMUNITY AIR MONITORING PLAN WHICH HAS BEEN PREPARED BY GEI.
2. THE CONTRACTOR SHALL COMPLY WITH THE EROSION AND SEDIMENT CONTROL PLAN AS SHOWN ON DRAWING S-010.

E. GENERAL NOTES FOR WORK AND SITE INSPECTION

1. REPRESENTATIVE FROM THE NYSDEC SHALL BE PERMITTED TO INSPECT THE SITE (INCLUDING RELEVANT RECORDS) AT ANY TIME DEEMED NECESSARY TO ENSURE THAT ALL ACTIVITIES ARE IN ACCORDANCE WITH CONTRACT REQUIREMENTS, NYSDEC APPROVED SITE PLANS AND THE TERMS AND CONDITIONS SPECIFIED IN THE ISSUED PERMITS.
2. NOTIFY THE CONSTRUCTION MANAGER A MINIMUM OF 72 HOURS BEFORE COMMENCING ANY EXCAVATION, CONSTRUCTION, INSTALLATION, TESTING, OR BACKFILLING ACTIVITIES.

F. CONSTRUCTION SEQUENCE

1. PERFORM INTERIOR AND EXTERIOR EXISTING CONDITIONS SURVEY OF ABUTTING PROPERTIES AND MARK OUT UTILITIES.
2. VERIFY ALL UTILITY LOCATIONS AND DEPTHS WITHIN THE LIMIT OF WORK USING SOFT DIG METHODS.
3. PERFORM UTILITY RELOCATION.
4. TEST TEMPORARY UTILITIES.
5. INSTALL TEMPORARY FENCING, LIGHTING, SIGNAGE, AND OTHER TEMPORARY FACILITIES AND CONTROLS.
6. PROTECT EXISTING FEATURES TO REMAIN, AND CONDUCT SELECTIVE DEMOLITION.
7. INSTALL THE TEMPORARY EXCAVATION SUPPORT SYSTEM.
8. PERFORM THE PRE-ISS EXCAVATION.
9. PERFORM THE ISS.
10. BACKFILL THE SITE AND CUT DOWN AND ABANDON THE SOE SYSTEM IN-PLACE.
11. PERFORM GENERAL SITE RESTORATION AND FINAL GRADING.
12. INSTALL PLANTINGS AND SEEDING.
13. REMOVE TEMPORARY FACILITIES AND CONTROLS.

G. SOLDIER PILE INSTALLATION NOTES

1. WHERE SHOWN ON THE PLAN, SOLDIER PILES SHALL BE INSTALLED IN 24" DIAMETER DRILLED HOLES. DRILLED-IN PILES SHALL BE INSTALLED IN THE FOLLOWING MANNER:
   a. DRILL 24" CASING TO THE REQUIRED TIP ELEVATION USING ROTARY DRILLING METHODS.
   b. CLEAN OUT THE CASING; MAINTAIN A POSITIVE HEAD IN THE CASING AT ALL TIMES.
   c. LOWER SOLDIER PILE INTO CASING
   d. AS CASING IS EXTRACTED, FILL VOID SPACE WITH CONCRETE BELOW FINAL SUBGRADE AND WITH FLOWABLE FILL OR SAND ABOVE FINAL SUBGRADE.
2. IN OTHER LOCATIONS, SOLDIER PILES MAY BE DRIVEN IN THE FOLLOWING MANNER:
   a. PRE-AUGER AN 18" DIAMETER HOLE TO FINAL SUBGRADE.
3. DRIVE PILE THROUGH PRE-AUGERED HOLE TO REQUIRED TIP ELEVATION.

H. TIMBER LAGGING NOTES

1. TIMBER LAGGING SHALL BE FULL DIMENSION, ROUGH CUT, WITH A MINIMUM ALLOWABLE BENDING STRESS OF 1,200 PSI AND ALLOWABLE SHEAR STRESS OF 175 PSI.
2. LAGGING BOARDS SHALL BE ROUGH CUT, FULL DIMENSION, 3" THICK.
3. BACKFILL ALL VOIDS BEHIND LAGGING BOARDS WITH HAND COMPACTED SOIL IMMEDIATELY AFTER EACH BOARD IS INSTALLED. ALL LOUVERS BETWEEN LAGGING BOARDS SHALL BE PACKED WITH HAY OR GEOTEXTILE FABRIC.
4. EXCAVATION ADJACENT TO LAGGING WALLS SHALL NOT EXTEND MORE THAN 1 FOOT BELOW THE BOTTOM OF THE LOWEST LAGGING BOARD.

I. TIEBACK NOTES

1. TIEBACK DESIGN LOAD (P) = 120 KIP.
2. TIEBACK INSTALLATION TOLERANCE FOR VERTICAL AND HORIZONTAL ANGLES SHALL BE A MAXIMUM OF 3 DEGREES.
3. TIEBACK GROUT USED TO FILL THE DRILLED HOLE SHALL CONSIST OF MIXTURE OF PORTLAND CEMENT, WATER, AND FLUIDIFIER (IF REQUIRED) PROPORTIONED TO PROVIDE GROUT CAPABLE OF BEING PLACED WITHOUT DIFFICULTY AND WHICH WILL LATERALLY PENETRATE AND FILL THE SOIL AROUND THE ANCHOR. MATERIALS SHALL BE PROPORTIONED TO PROVIDE A MINIMUM COMPRESSIVE STRENGTH OF 3500 PSI AT 7 DAYS AND 5000 PSI AT 28 DAYS.
4. HOLES FOR TIEBACKS SHALL BE DRILLED BY ROTARY METHOD USING INTERNAL FLUSH OF DRILL CUTTINGS AND UTILIZING TEMPORARY METHODS OF INSTALLATION WHICH SHALL PREVENT THE LOSS OF GROUND DUE TO EROSION. INSTALLATION METHODS SHALL BE SUCH THAT THE FLOW OF WATER OR MOVEMENT OF SOIL THROUGH ANNULAR SPACES OUTSIDE THE CASING IS PREVENTED.
5. TEST EVERY PRODUCTION ANCHOR IN THE PRESENCE OF THE ENGINEER AS SPECIFIED BELOW:

   5.1. PERFORMANCE TEST - FIRST TWO PRODUCTION ANCHORS AND AT LEAST ONE ANCHOR ON EACH WALL.
   5.2. PROOF TEST - ALL OTHER ANCHORS
   5.3. P = DESIGN LOAD, L = LOCK-OFF LOAD (0.8P), AL = ALIGNMENT LOAD
   5.4. THE ENGINEER WILL MONITOR THE ANCHOR HEAD MOVEMENTS DURING EACH TEST.
6. PERFORMANCE TEST - THE PERFORMANCE TESTING SHALL CONSIST OF CYCLICALLY AND INCREMENTALLY LOADING AND UNLOADING THE ANCHOR IN THE INCREMENTS BELOW:

   6.1. AL, 0.25P
   6.2. AL,, 0.25P, 0.50P
   6.3. AL,, 0.25P, 0.50P, 0.75P
   6.4. AL,, 0.25P, 0.50P, 0.75P, 1.00P
   6.5. AL,, 0.25P, 0.50P, 0.75P, 1.00P, 1.20P
   6.6. AL,, 0.25P, 0.50P, 0.75P, 1.00P, 1.20P, 1.33P
   6.7. UNLOAD AND LOCK-OFF AT L
7. PROOF TEST - ALL ANCHORS NOT PERFORMANCE TESTED SHALL BE PROOF TESTED. THE PROOF TESTING SHALL CONSIST OF INCREMENTALLY LOADING AS FOLLOWS:

   7.1. AL,, 0.25P, 0.50P, 0.75P, 1.00P, 1.20P, 1.33P
   7.2. UNLOAD AND LOCK-OFF AT L
8. IN ALL LOAD TESTS THE FINAL INCREMENT SHALL BE HELD FOR 10 MINUTES. IF THE CREEP CRITERIA FOR THE 10 MINUTE HOLD PERIOD IS NOT MET (SEE NOTE 9 BELOW), THE HOLD PERIOD SHALL BE EXTENDED TO 60 MINUTES. ALL OTHER INCREMENTS SHALL BE HELD LONG ENOUGH FOR THE ENGINEER TO OBTAIN THE MOVEMENT READING, BUT NOT LONGER THAN 1 MINUTE.

J. ABBREVIATIONS

CAMP	COMMUNITY AIR MONITORING PLAN
ISS	IN-SITU SOLIDIFICATION
KIP	KILO-POUND
NYSDEC	NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
NYSDOH	NEW YORK STATE DEPARTMENT OF HEALTH
PSI	POUNDS PER SQUARE INCH
SOE	SUPPORT OF EXCAVATION

50% DESIGN

Attention:

0 1"

If this scale bar does not measure 1" then drawing is not original scale.

NO.	DATE	ISSUE/REVISION	APP
1	1/29/2018	50% DESIGN	CRP
0	12/7/2018	PROGRESS 50%	CRP

DRAFT

Designed:	C. PRAY
Checked:	J. HOLDEN
Drawn:	D. EDDY
Submitted By:	D. KOPCOW
P.E. Number:	077276

GEI Consultants
GEI CONSULTANTS, INC., P.C.
1301 TRUMANSBURG ROAD
SUITE N
ITHACA, NY 14850
(607)216-8955

National Fuel

GEI Project 1801687

Hornell Former MGP Site
Hornell, New York

CONSTRUCTION NOTES

DWG. NO. S-002

SHEET NO. 2 OF 18

LEGEND:

- LIMITS OF WORK
- APPROXIMATE PROPERTY BOUNDARIES
- MONITORING WELL
- SOIL BORING
- TEST PIT
- FORMER MONITORING WELL
- FORMER SOIL BORING
- SURFACE SOIL SAMPLE
- CHAIN-LINK FENCE
- EXISTING STRUCTURE
- TELEPHONE LINE
- SANITARY SEWER LINE
- UNDERGROUND GAS LINE
- UTILITY POLE
- LIGHT POLE
- GAS METER
- WATER VALVE
- MANHOLE
- FIRE HYDRANT
- DROP INLET
- 1156 GROUND SURFACE ELEVATION (NAVD 88)
- BENCHMARK
- SANITARY SEWER
- CLEANOUT
- PRE-DESIGN INVESTIGATION BORINGS

SOURCES:

1. SURVEY PREPARED FOR GEI CONSULTANTS, INC. BY WILLIAM J TUCKER, II PLS #50369, CLEAR CREEK LAND SURVEYING, L.L.C., SPRINGVILLE, N.Y. DATED FEBRUARY 11, 2011.
2. SURVEY PREPARED FOR GEI CONSULTANTS, INC. BY WILLIAM J TUCKER, II PLS #50369, CLEAR CREEK LAND SURVEYING, L.L.C., 7449 MILL STREET, CANEADEA, N.Y., DATED NOVEMBER 26, 2018.
3. CITY OF HORNELL, STEUBEN COUNTY, NY TAX MAP NO. 166.06 DATED OCT. 18, 2008.
4. *MODIFICATION TO ORDER ON CONSENT AND ADMINISTRATIVE SETTLEMENT, ATTACHMENT 1* BETWEEN NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, OFFICE OF GENERAL COUNSEL, AND NATIONAL FUEL GAS DATED OCT. 21, 2010.
5. SANBORN FIRE INSURANCE MAPS FROM 1888 TO 1961.

0 30 60
SCALE: 1" = 30'

50% DESIGN

Attention:

0 1"

If this scale bar does not measure 1" then drawing is not original scale.

NO.	DATE	ISSUE/REVISION	APP
1	1/29/2018	50% DESIGN	CRP
0	12/7/2018	PROGRESS 50%	CRP

DRAFT

Designed:	C. PRAY
Checked:	J. HOLDEN
Drawn:	D. EDDY
Submitted By:	D. KOPCOW
P.E. Number:	077276

GEI Consultants
GEI CONSULTANTS, INC., P.C.
1301 TRUMANSBURG ROAD
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National Fuel

GEI Project 1801687

Hornell Former MGP Site
Hornell, New York

EXISTING CONDITIONS AND EXPLORATIONS PLAN

DWG. NO. S-003

SHEET NO. 3 OF 18

---- B:\Working\NATIONAL FUEL GAS\1801687 Hornell MGP Remediation DB\00_CAD\Design\Working\1801687 - S-003.dwg - 1/29/2019

LEGEND:

- LIMITS OF WORK
- APPROXIMATE PROPERTY BOUNDARIES
- MONITORING WELL
- SOIL BORING
- FORMER MONITORING WELL
- FORMER SOIL BORING
- SURFACE SOIL SAMPLE
- CHAIN-LINK FENCE
- EXISTING STRUCTURE
- HISTORIC STRUCTURE
- T — TELEPHONE LINE
- S — SANITARY SEWER LINE
- UNDERGROUND GAS LINE
- UTILITY POLE
- LIGHT POLE
- GAS METER
- WATER VALVE
- MANHOLE
- FIRE HYDRANT
- DROP INLET
- 1156 — GROUND SURFACE ELEVATION (NAVD 88)
- BENCHMARK
- SANITARY SEWER
- CLEANOUT
- PRE-DESIGN INVESTIGATION BORINGS

50% DESIGN

0 30 60
SCALE: 1" = 30'

Attention:
0 1"
If this scale bar does not measure 1" then drawing is not original scale.

NO.	DATE	ISSUE/REVISION	APP
1	1/29/2018	50% DESIGN	CRP
0	12/7/2018	PROGRESS 50%	CRP

DRAFT

Designed:	C. PRAY
Checked:	J. HOLDEN
Drawn:	D. EDDY
Submitted By:	D. KOPCOW
P.E. Number:	077276

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GEI Project 1801687

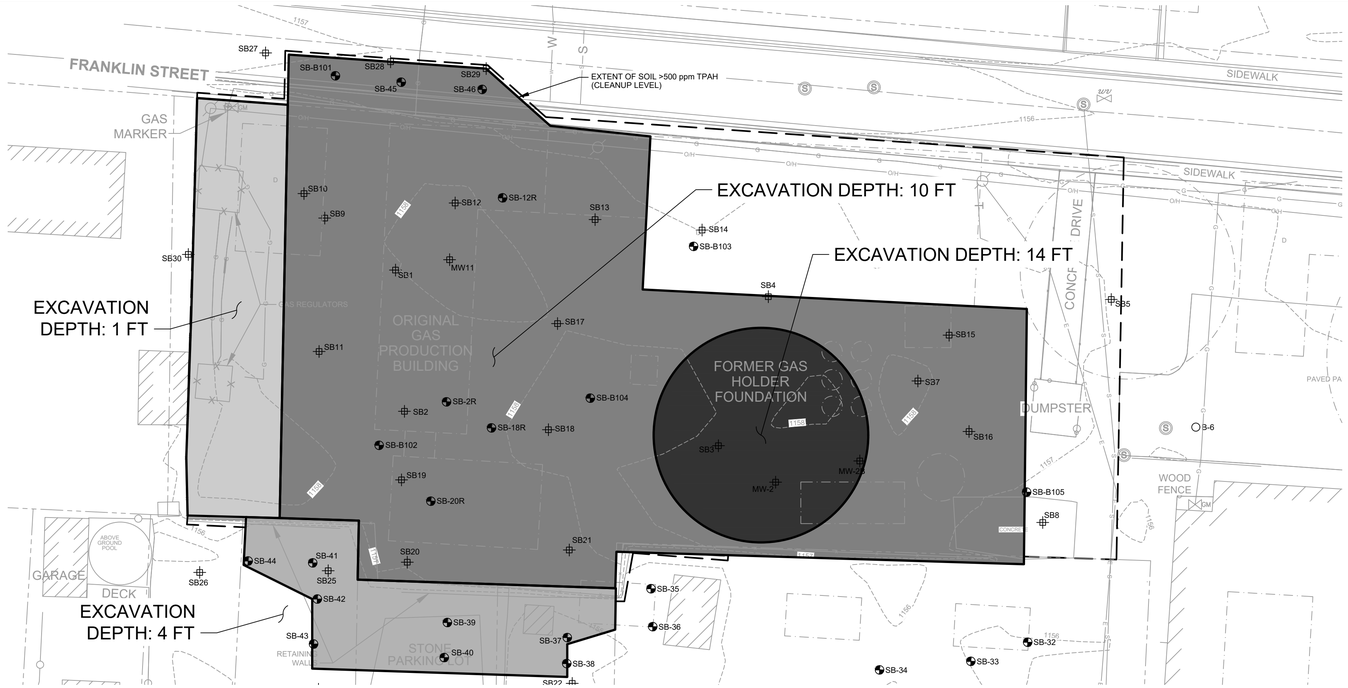
Hornell Former MGP Site
Hornell, New York

HISTORICAL CONDITIONS

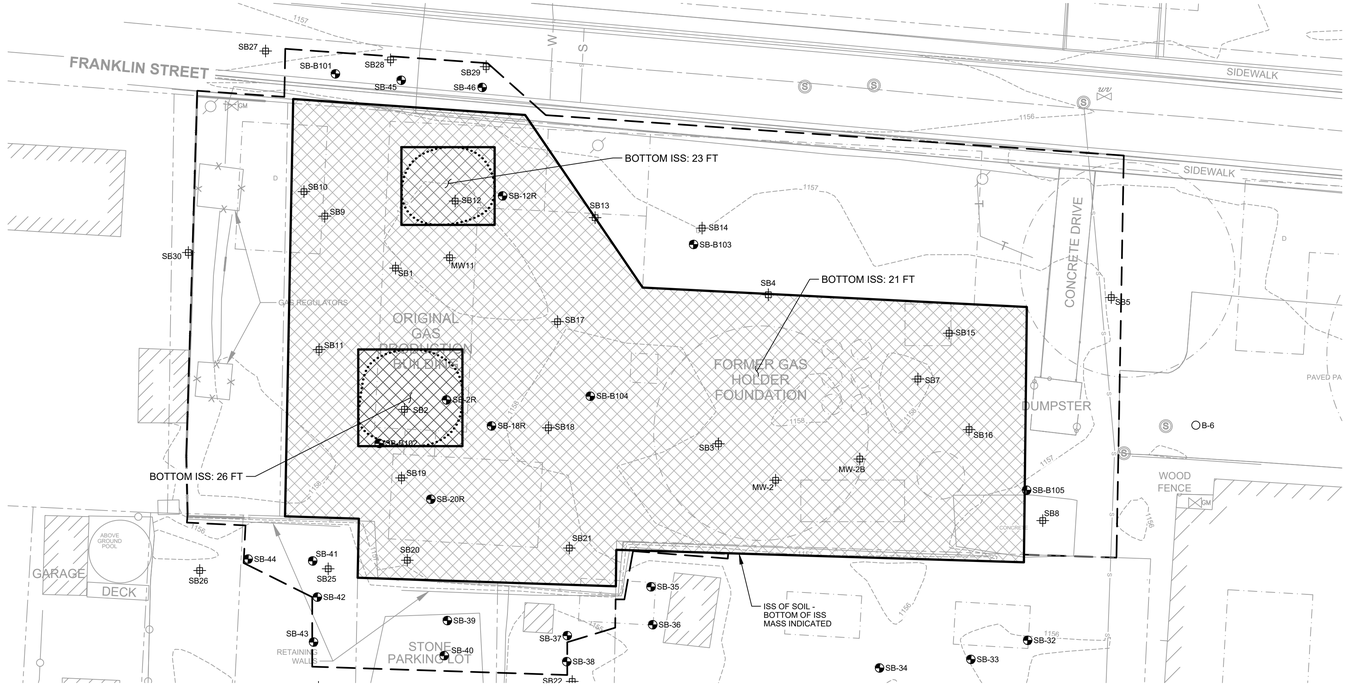
DWG. NO. S-004

SHEET NO. 4 OF 18

---- B:\Working\NATIONAL FUEL GAS\1801687 Hornell MGP Remediation DB\00_CAD\Design\Working\1801687 - S-004.dwg - 1/29/2019



PRE-ISS SOIL REMOVAL



ISS EXTENTS

LEGEND:

- LIMITS OF WORK
- APPROXIMATE PROPERTY BOUNDARIES
- MONITORING WELL
- SOIL BORING
- TEST PIT
- INDOOR AIR SAMPLE
- AMBIENT AIR SAMPLE
- SOIL VAPOR SAMPLE
- FORMER MONITORING WELL
- FORMER SOIL BORING
- SURFACE SOIL SAMPLE
- CHAIN-LINK FENCE
- EXISTING STRUCTURE
- HISTORIC STRUCTURES (APPROXIMATE)
- TELEPHONE LINE
- SANITARY SEWER LINE
- UTILITY POLE
- LIGHT POLE
- GAS METER
- WATER VALVE
- MANHOLE
- FIRE HYDRANT
- DROP INLET
- 1156 GROUND SURFACE ELEVATION (NAVD 88)
- BENCHMARK
- SANITARY SEWER
- CLEANOUT
- EXCAVATE TO 1-FOOT DEPTH
- EXCAVATE TO 4-FOOT DEPTH
- EXCAVATE TO 10-FOOT DEPTH
- EXCAVATE TO 14-FOOT DEPTH
- ISS TO 21-FOOT DEPTH
- ISS TO 23-FOOT DEPTH
- ISS TO 26-FOOT DEPTH
- PRE-DESIGN INVESTIGATION BORINGS

50% DESIGN

0 20 40
SCALE: 1" = 20'

Attention:
0 1"
If this scale bar does not measure 1" then drawing is not original scale.

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0	12/7/2018	PROGRESS 50%	CRP

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Hornell Former MGP Site
Hornell, New York

REMEDIATION OVERVIEW

DWG. NO. S-005

SHEET NO. 5 OF 18

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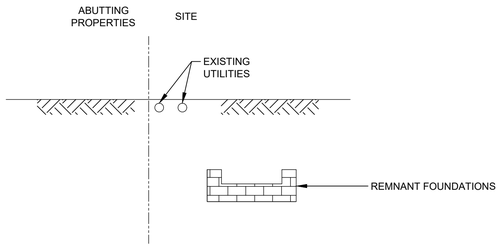
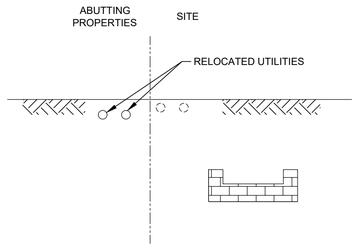
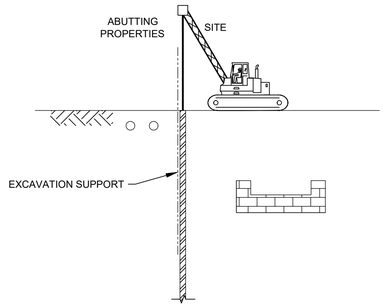


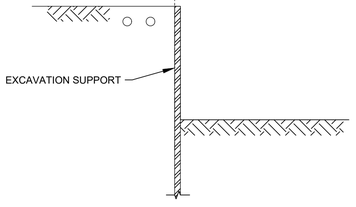
1 - DETAIL
EXISTING CONDITIONS
SCALE: N.T.S.



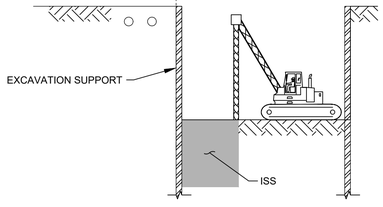
2 - DETAIL
RELOCATE UTILITIES
SCALE: N.T.S.



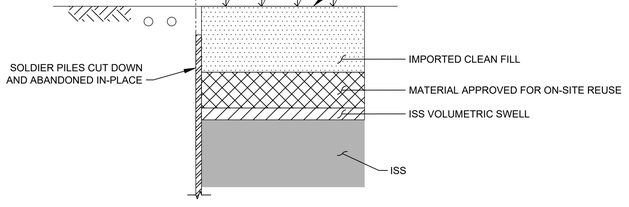
3 - DETAIL
INSTALL TEMPORARY EXCAVATION SUPPORT
SCALE: N.T.S.



4 - DETAIL
PRE-ISS EXCAVATION
SCALE: N.T.S.



5 - DETAIL
ISS
SCALE: N.T.S.



6 - DETAIL
RESTORATION
SCALE: N.T.S.

50% DESIGN

NOTES

1. THE PHASING SHOWN IS CONCEPTUAL, THE CONTRACTOR IS RESPONSIBLE FOR THE SEQUENCE AND MEANS AND METHODS OF CONSTRUCTION.

Attention:
0 1"
If this scale bar does not measure 1" then drawing is not original scale.

NO.	DATE	ISSUE/REVISION	APP
1	1/29/2018	50% DESIGN	CRP
0	12/7/2018	PROGRESS 50%	CRP

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P.E. Number:	077276

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REMEDIATION
PHASING PLAN

DWG. NO.
S-006

SHEET NO.
6 OF 18

---- B:\Working\NATIONAL FUEL GAS\1801687 Hornell MGP Remediation DB\00_CAD\Design\Working\1801687 - S-006.dwg - 1/29/2019

FLOW CHART LEGEND:

1. ACTIVITIES IN A SHADED SHAPE TO BE PERFORMED AND/OR APPROVED BY ENGINEER.

REMEDIATION ACTIVITY

DECISION ACTIVITY

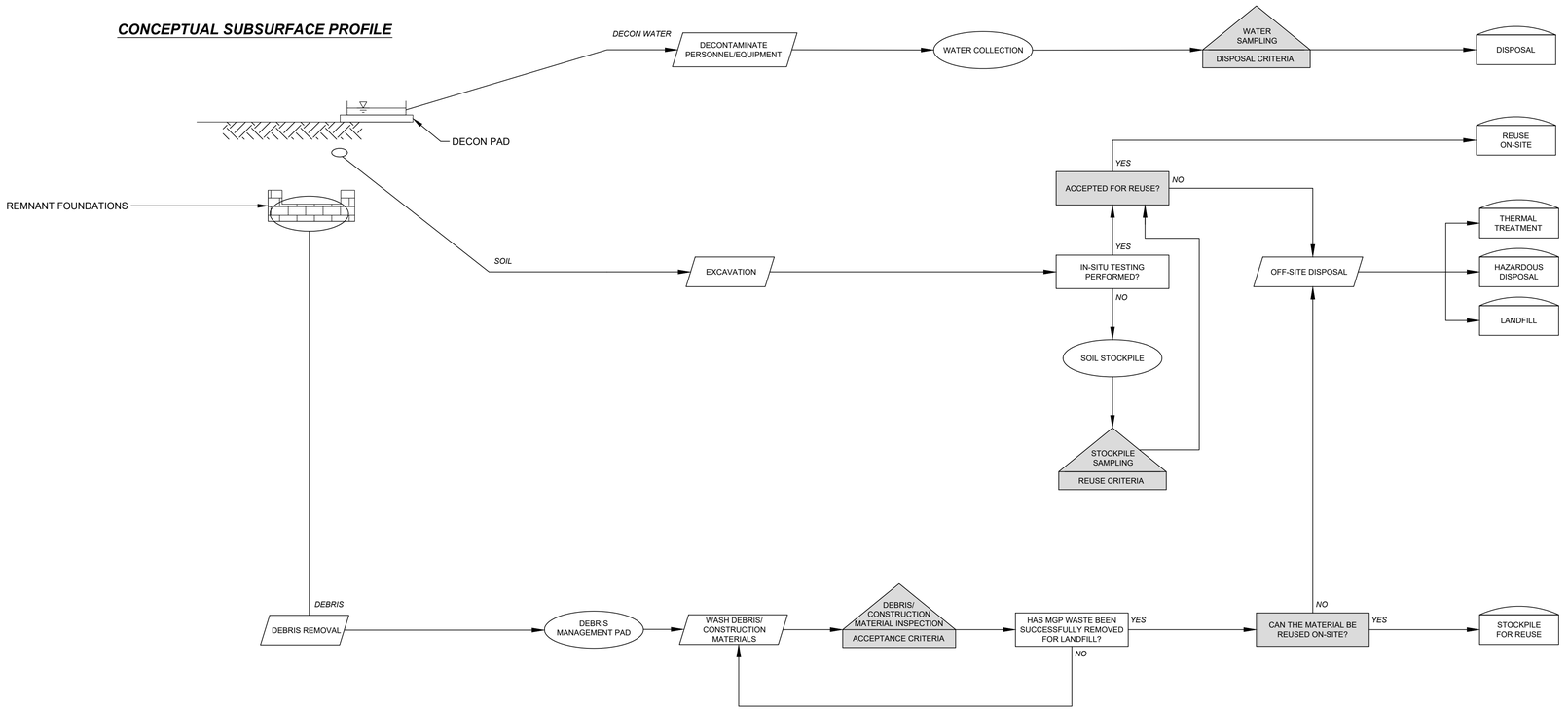
SOIL/MATERIAL STOCKPILE

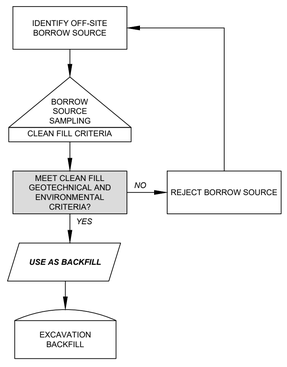
SAMPLING ACTIVITY

FINAL DISPOSITION

CONCEPTUAL SUBSURFACE PROFILE

MATERIAL MANAGEMENT SCHEMATIC





1 / - DETAIL

BORROW SOURCE EVALUATION FLOW CHART

SCALE: N.T.S.

50% DESIGN

Attention:	NO.	DATE	ISSUE/REVISION	
0 1"				
If this scale bar does not measure 1" then drawing is not original scale.	1	1/29/2018	50% DESIGN	CRP
	0	12/7/2018	PROGRESS 50%	CRP

DRAFT

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Hornell Former MGP Site
Hornell, New York

MATERIALS MANAGEMENT PLAN

DWG. NO. S-007

SHEET NO. 7 OF 18

TRANSPORTATION PLAN TO BE
PROVIDED WITH 95% REMEDIAL DESIGN

50% DESIGN

NO.	DATE	ISSUE/REVISION	
1	1/29/2018	50% DESIGN	CRP
0	12/7/2018	PROGRESS 50%	CRP

Attention:

0 1"

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DRAFT

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Submitted By:	D. KOPCOW
P.E. Number:	077276

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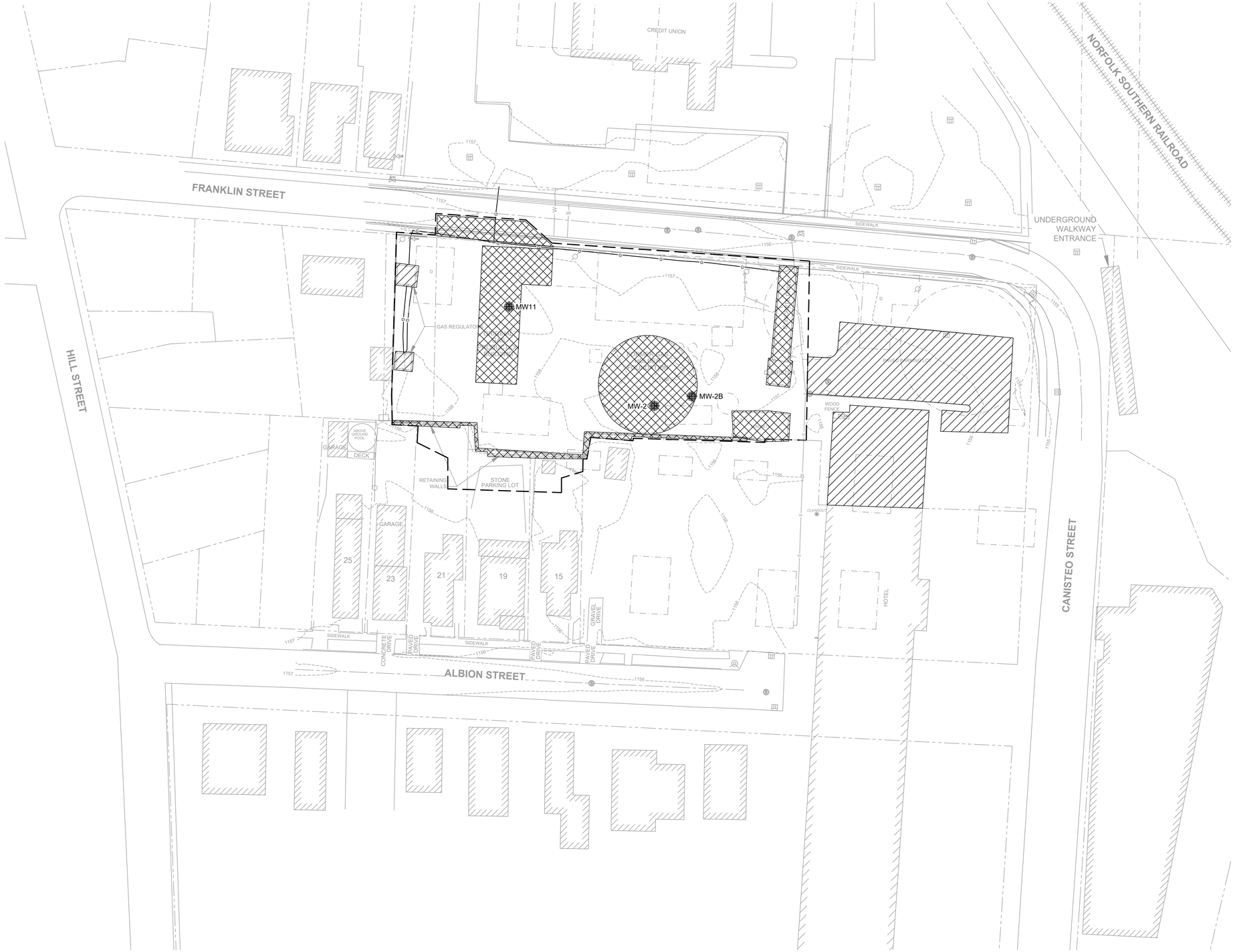
Hornell Former MGP Site
Hornell, New York

TRANSPORTATION PLAN

DWG. NO. S-008

SHEET NO. 8 OF 18



LEGEND:

- LIMITS OF WORK
- PROTECT
- DEMOLISH
- ABANDON MONITORING WELL (NOTE 5)
- GAS LINE TO BE RELOCATED

NOTES

1. PROTECT THE ABUTTING RESIDENCES AND HOTEL.
2. PROTECT THE ADJACENT ROADWAY WHERE NOT INDICATED FOR DEMOLITION.
3. DEMOLISH REMNANT STRUCTURES LOCATED WITHIN THE EXCAVATION EXTENTS.
4. RELOCATE THE DUMPSTER TO A LOCATION THAT IS ACCEPTABLE TO THE COMFORT INN.
5. ABANDON WELLS IN ACCORDANCE WITH NYSDEC CP-43 GROUNDWATER MONITORING WELL DECOMMISSIONING POLICY.

50% DESIGN

0 30 60
SCALE: 1" = 30'

Attention:
0 1"
If this scale bar does not measure 1" then drawing is not original scale.

NO.	DATE	ISSUE/REVISION	APP
1	1/29/2018	50% DESIGN	CRP
0	12/7/2018	PROGRESS 50%	CRP

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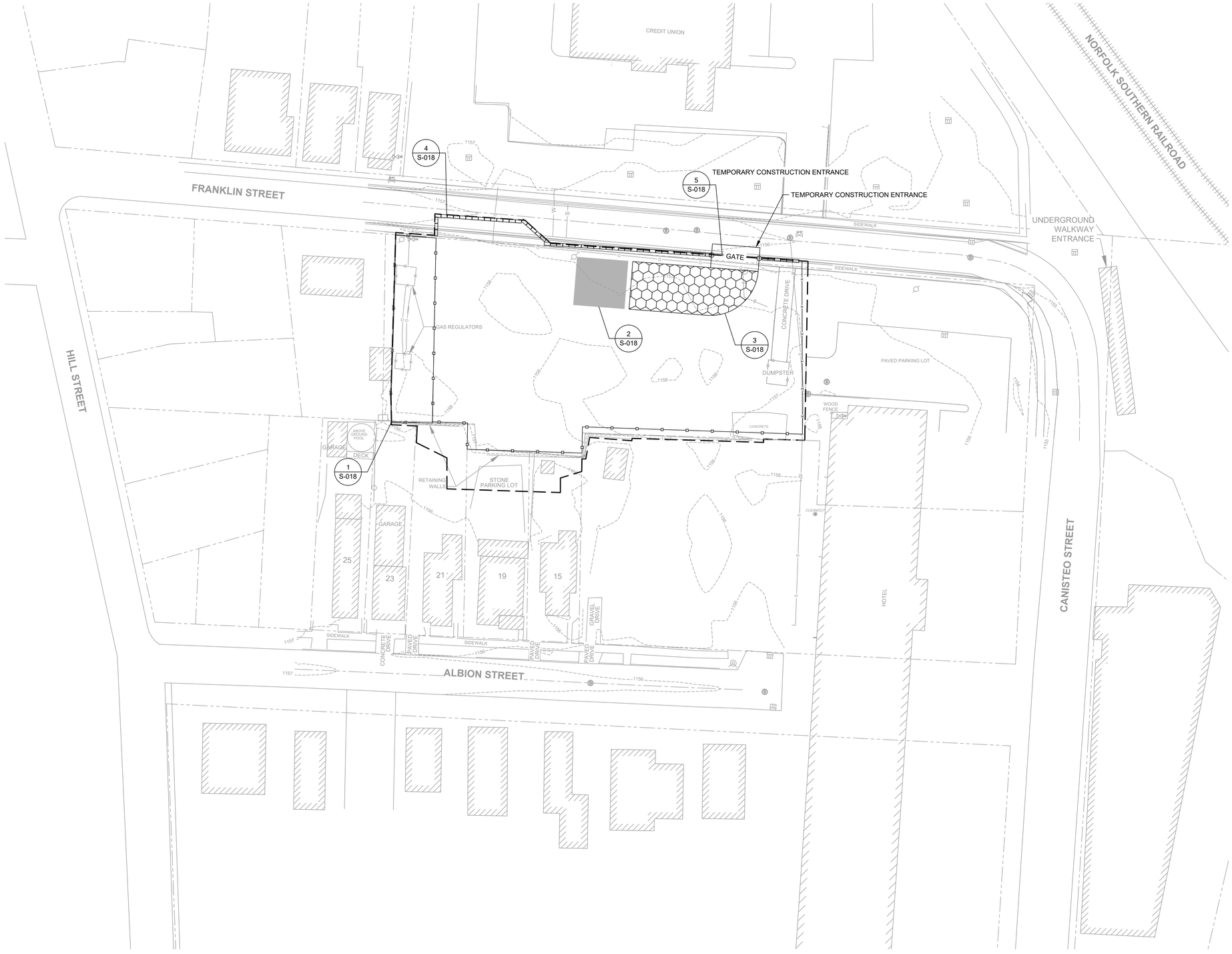
Hornell Former MGP Site
Hornell, New York

DEMOLITION AND PROTECTION PLAN

DWG. NO. S-009

SHEET NO. 9 OF 18

---- B:\Working\NATIONAL FUEL GAS\1801687 Hornell MGP Remediation DB\00_CAD\Design\Working\1801687 - S-009.dwg - 1/29/2019



LEGEND:

- LIMITS OF WORK
- SILT FENCE
- SECURITY FENCE
- FENCE / JERSEY BARRIER
- COMBINATION SECURITY FENCE AND SHORING
- ANTI-TRACKING PAD
- DECONTAMINATION PAD

NOTES

1. THE LAYOUT SHOWN IS CONCEPTUAL. THE CONTRACTOR IS RESPONSIBLE FOR THE FINAL SITE LAYOUT, SUBJECT TO THE APPROVAL OF THE ENGINEER.
2. CONSTRUCT TEMPORARY STOCKPILES AS SHOWN IN DETAIL: 6 / S-018

50% DESIGN

0 30 60
SCALE: 1" = 30'

Attention:

0 1"

If this scale bar does not measure 1" then drawing is not original scale.

NO.	DATE	ISSUE/REVISION	APP
1	1/29/2018	50% DESIGN	CRP
0	12/7/2018	PROGRESS 50%	CRP

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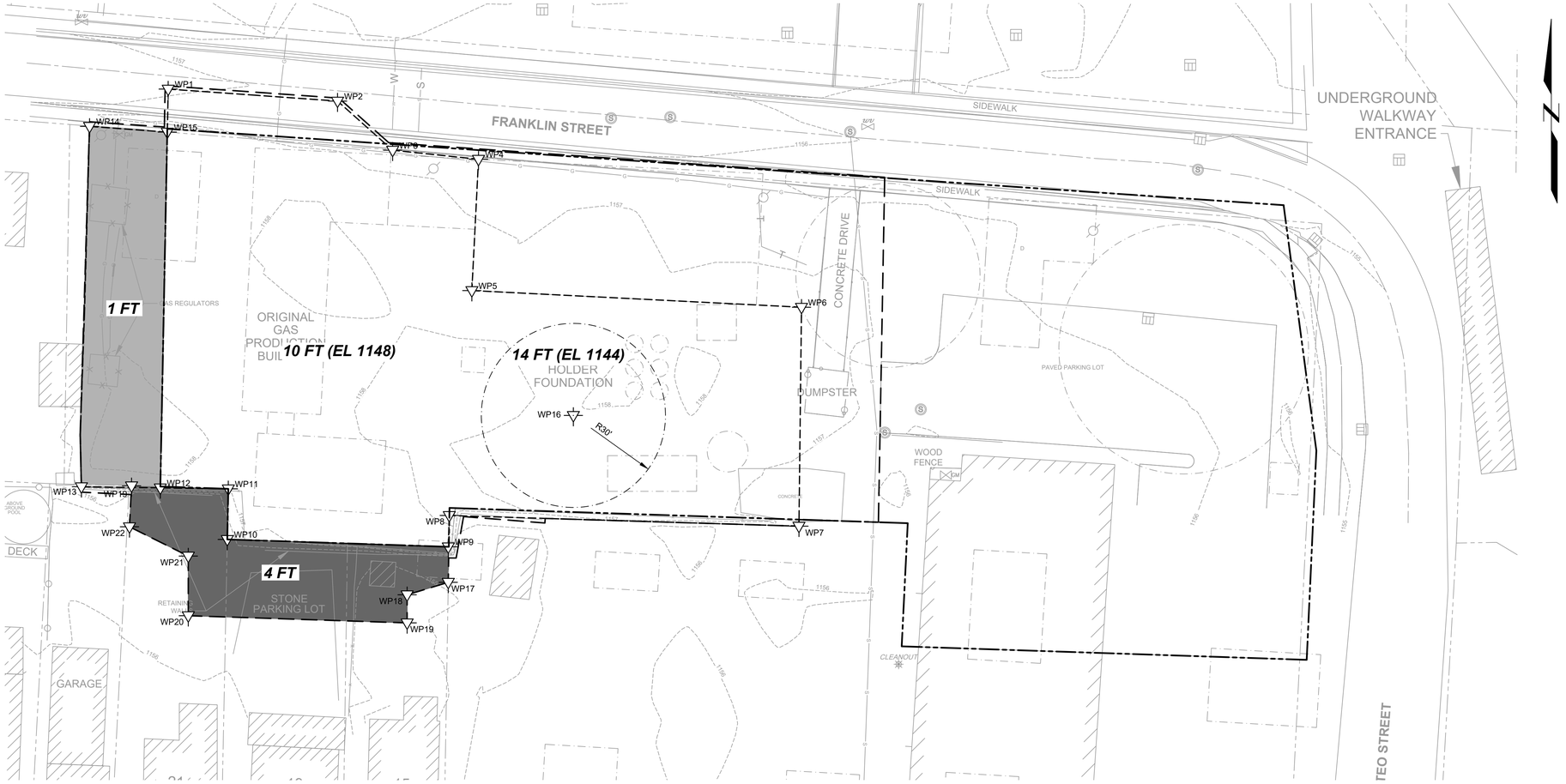
Hornell Former MGP Site
Hornell, New York

EROSION CONTROL AND SITE MANAGEMENT PLAN

DWG. NO. S-010

SHEET NO. 10 OF 18

---- B:\Working\NATIONAL FUEL GAS\1801687 Hornell MGP Remediation DB\00_CAD\Design\Working\1801687 - S-010.dwg - 1/29/2019



LEGEND:

- LIMITS OF WORK
- WORKING POINT
- LIMITS OF EXCAVATION
- **14 FT (EL 1144)** EXCAVATE 14 FEET BELOW EXISTING GRADE (TARGET EXCAVATION ELEVATION (FT))
- EXCAVATE 1-FOOT BELOW EXISTING GRADE
- EXCAVATE 4-FEET BELOW EXISTING GRADE

TABLE OF WORKING POINTS		
WP	EASTING	NORTHING
WP1	528170.04	848385.16
WP2	528225.20	848381.24
WP3	528243.15	848365.23
WP4	528271.12	848362.29
WP5	528268.96	848319.49
WP6	528376.32	848314.05
WP7	528375.49	848242.71
WP8	528261.59	848246.18
WP9	528261.28	848235.98
WP10	528189.29	848238.38
WP11	528189.62	848254.88
WP12	528167.48	848255.19
WP13	528141.78	848255.56
WP14	528144.43	848373.00
WP15	528169.76	848371.13
WP16	528302.01	848278.78
WP17	528261.27	848224.41
WP18	528247.87	848220.34
WP19	528247.87	848211.19
WP20	528176.59	848213.52
WP21	528176.59	848232.96
WP22	528157.43	848242.51

NOTES

1. THE LOCATION OF THE HOLDER FOUNDATION IS CONSIDERED APPROXIMATE, AND THE CONTRACTOR MUST BE PREPARED TO MAKE ADJUSTMENTS WHILE THE WORK IS BEING PERFORMED, AS NEEDED.
2. PERFORM WORK IN THE 1-FT EXCAVATION AREA USING VACUUM EXCAVATION, OR ENGINEER APPROVED EQUIVALENT METHOD.

50% DESIGN

0 20 40
SCALE: 1" = 20'

Attention:
0 1"
If this scale bar does not measure 1" then drawing is not original scale.

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Hornell Former MGP Site
Hornell, New York

PRE-ISS EXCAVATION PLAN

DWG. NO. S-011

SHEET NO. 11 OF 18

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LEGEND:

LIMITS OF WORK

SOLDIER PILE WALL

N

STREET

SIDEWALK

CONCRETE DRIVE

GAS REGULATORS

ORIGINAL GAS PRODUCTION BUILDING

FORMER GAS HOLDER FOUNDATION

AVERAGE DEPTH: 10 FT

14 FT

DUMPSTER

PAVED PARKIN

WOOD FENCE

CONCRETE

RETAINING WALLS

STONE PARKING LOT

1156 1157 1158

3.2' 55.3' 7 SPACES @ 7'-0" 3.2'

5' 24' 2 SPACES @ 7'-0" 5'

3.6' 3 SPACES @ 7'-0" 3.6' 3.9'

1 S-013

28.1'

HP 12X53 WALE AND CORNER STRUT

5 SPACES @ 7'-0" 42.9'

4.8' 107.5' 14 SPACES @ 7'-0" 4.8'

3.9'

HP12X53 SOLDIER PILE, TYP.

A S-013 B S-013

MC12 WALE, TYP.

7.7' 30' TYP.

TIEBACK, TYP.

8 SPACES @ 7'-0" 71.4'

C S-013 D S-013

1 FT 5' 130' 16 SPACES @ 7'-0"

22.1' 4.8' 4.1' 2 SPACES @ 7'-0" 4.1' 19.5' 7' 4.8'

HP 12X53 WALE AND CORNER STRUT

5.1' 10.2' 5.1' 6' 14 SPACES @ 7'-0" 113.9' 8'

4.5' 9 SPACES @ 7'-0" 72' 4.5'

3 S-013

2 S-013

LAGGING, TYP.

0 10 20

SCALE: 1" = 10'

50% DESIGN

Attention:

0 1"

If this scale bar does not measure 1" then drawing is not original scale.

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0	12/7/2018	PROGRESS 50%	CRP

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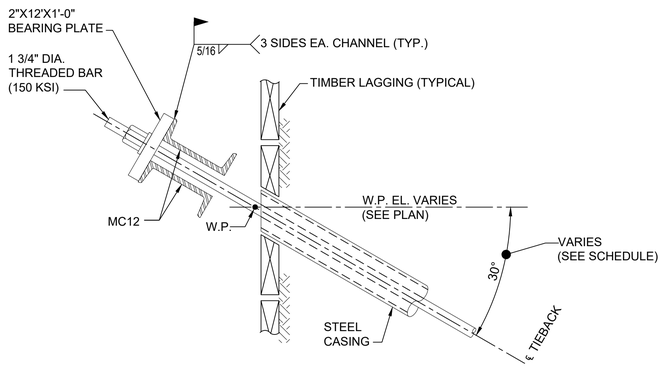
EXCAVATION SUPPORT PLAN

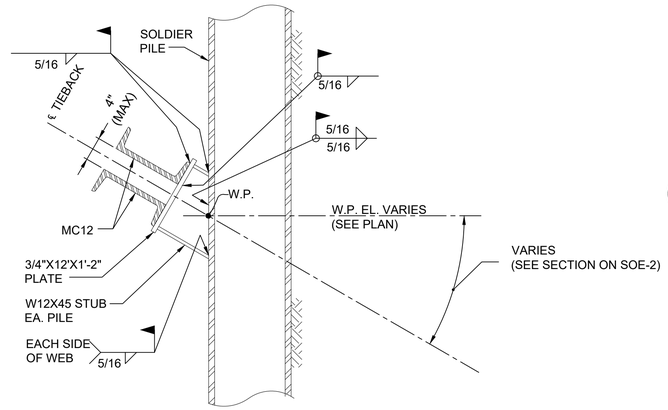
DWG. NO. S-012

SHEET NO. 12 OF 18

---- B:\Working\NATIONAL FUEL GAS\1801687 Hornell MGP Remediation DBI\00_CAD\Design\Working\1801687 - S-012.dwg - 1/29/2019

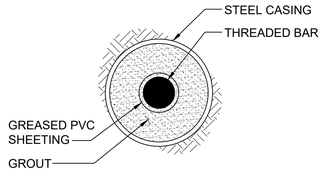


A S-012 SECTION
SCALE: 1"=1'-0"

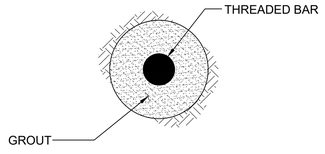


B S-012 SECTION
SCALE: 1"=1'-0"

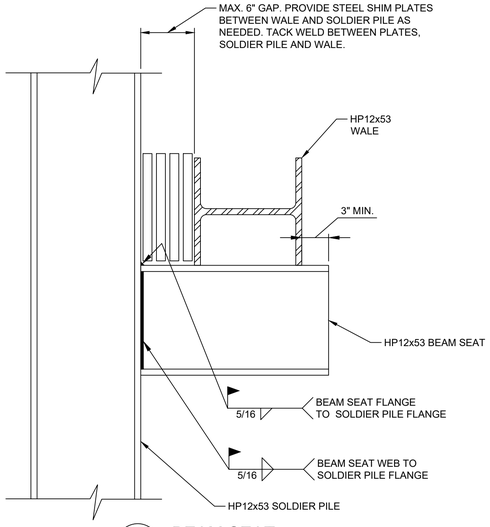
NOTE: TIMBER LAGGING NOT SHOWN FOR CLARITY



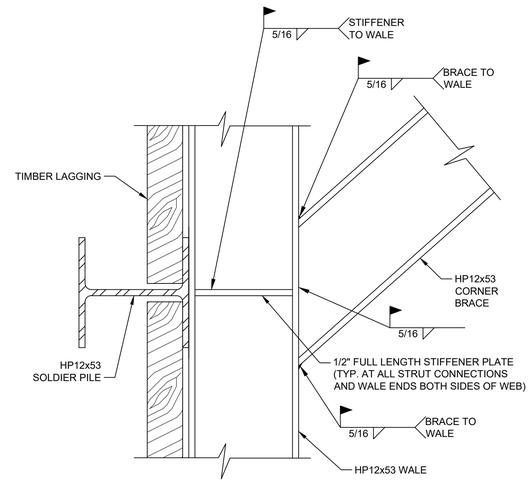
C S-012 TYPICAL SECTION THRU FREE LENGTH
SCALE: N.T.S.



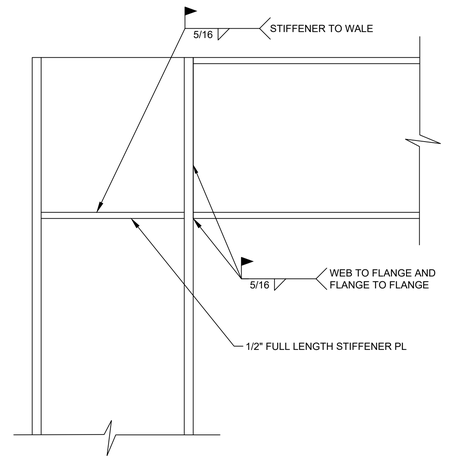
D S-012 TYPICAL SECTION THRU BOND ZONE
SCALE: N.T.S.



1 S-012 BEAM SEAT
SCALE: 1 1/2"=1'-0"



2 S-012 CORNER STRUT TO WALE CONNECTION
SCALE: 1 1/2"=1'-0"



3 S-012 WALE CONNECTION AT CORNER
SCALE: 1 1/2"=1'-0"

50% DESIGN

NO.	DATE	ISSUE/REVISION	APP
1	1/29/2018	50% DESIGN	CRP
0	12/7/2018	PROGRESS 50%	CRP

Attention:
0 1"
If this scale bar does not measure 1" then drawing is not original scale.

DRAFT

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Checked:	J. HOLDEN
Drawn:	D. EDDY
Submitted By:	D. KOPCOW
P.E. Number:	077276

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Hornell Former MGP Site
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EXCAVATION
SUPPORT DETAILS

DWG. NO.
S-013

SHEET NO.
13 OF 18

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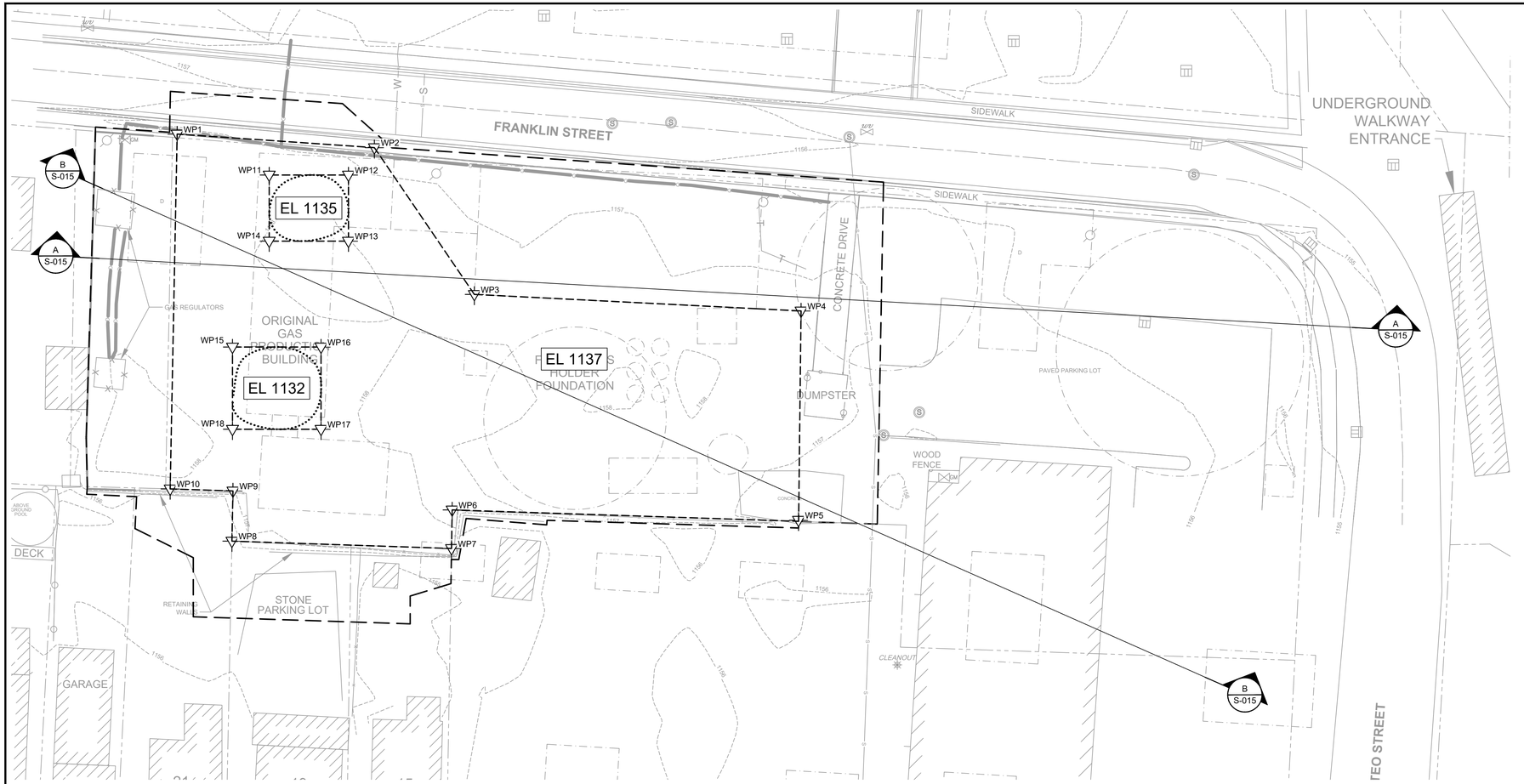
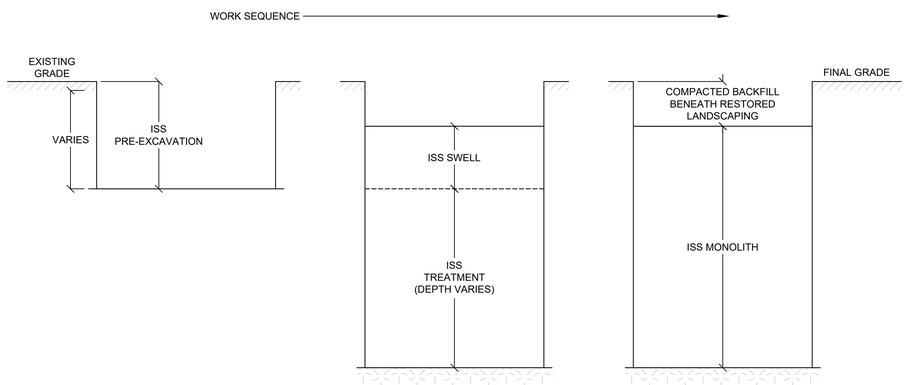


LEGEND:

- LIMITS OF WORK
- WORKING POINT
- LIMITS OF ISS
- EL 1137 — TARGET BOTTOM OF ISS EXCAVATION ELEVATION (FT)

WP	EASTING	NORTHING
ISS-WP1	528171.28	848372.20
ISS-WP2	528236.11	848367.74
ISS-WP3	528268.96	848319.49
ISS-WP4	528376.32	848314.05
ISS-WP5	528375.49	848245.26
ISS-WP6	528261.67	848248.65
ISS-WP7	528261.46	848235.97
ISS-WP8	528189.29	848238.38
ISS-WP9	528189.62	848254.88
ISS-WP10	528168.98	848255.55
ISS-WP11	528201.53	848358.74
ISS-WP12	528227.58	848358.74
ISS-WP13	528227.58	848337.02
ISS-WP14	528201.53	848337.02
ISS-WP15	528189.47	848302.19
ISS-WP16	528218.57	848302.19
ISS-WP17	528218.57	848275.17
ISS-WP18	528189.47	848275.17



1 / S-014 DETAIL
EXCAVATION AND ISS WORK SEQUENCE

0 4 8
SCALE: 1" = 4'

0 20 40
SCALE: 1" = 20'

50% DESIGN

Attention:

0 1"

If this scale bar does not measure 1" then drawing is not original scale.

NO.	DATE	ISSUE/REVISION	APP
1	1/29/2018	50% DESIGN	CRP
0	12/7/2018	PROGRESS 50%	CRP

DRAFT

Designed:	C. PRAY
Checked:	J. HOLDEN
Drawn:	D. EDDY
Submitted By:	D. KOPCOW
P.E. Number:	077276

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Hornell, New York

DWG. NO. S-014

ISS PLAN

SHEET NO. 14 OF 18

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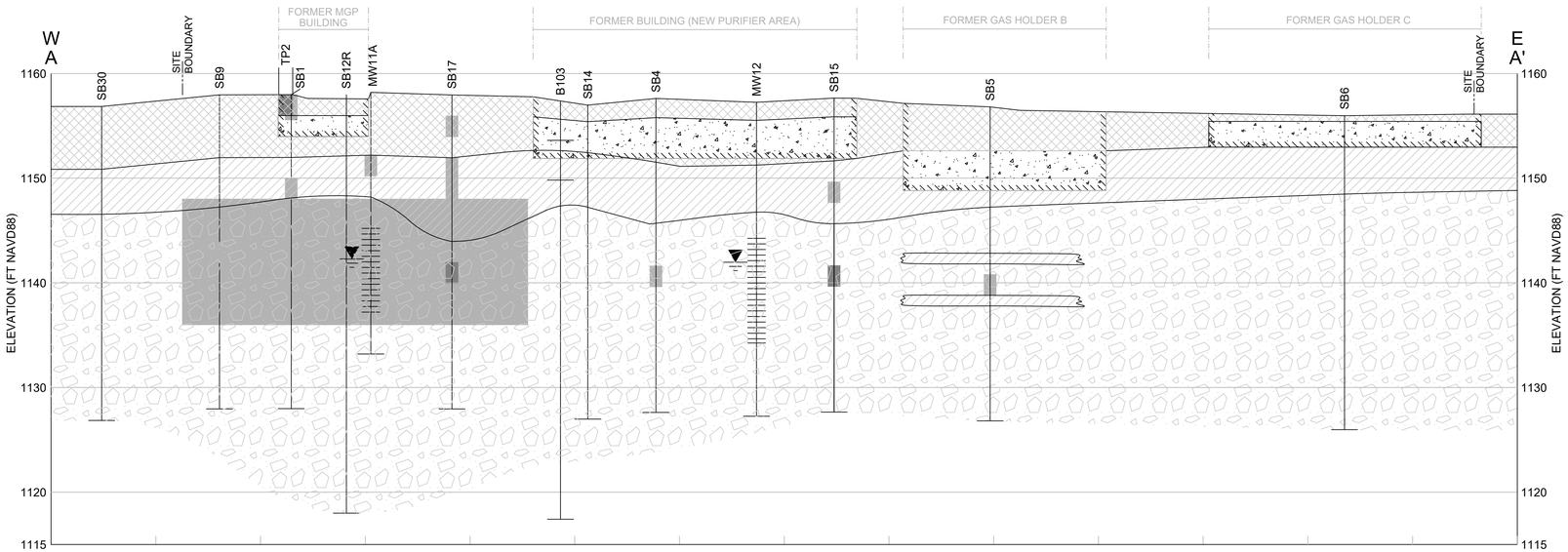
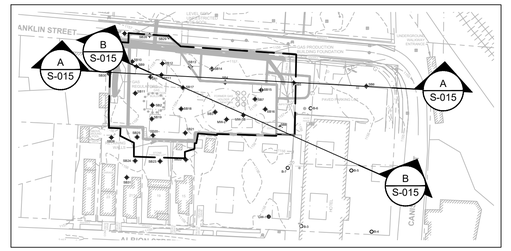




KEY PLAN

0 100 200

SCALE: 1" = 100'

HORIZONTAL SCALE: 1" = 20'

0 20' 40'

0 6.67' 13.33'

VERTICAL SCALE: 1" = 6.67'

NOTE: 3x VERTICAL EXAGGERATION

LEGEND

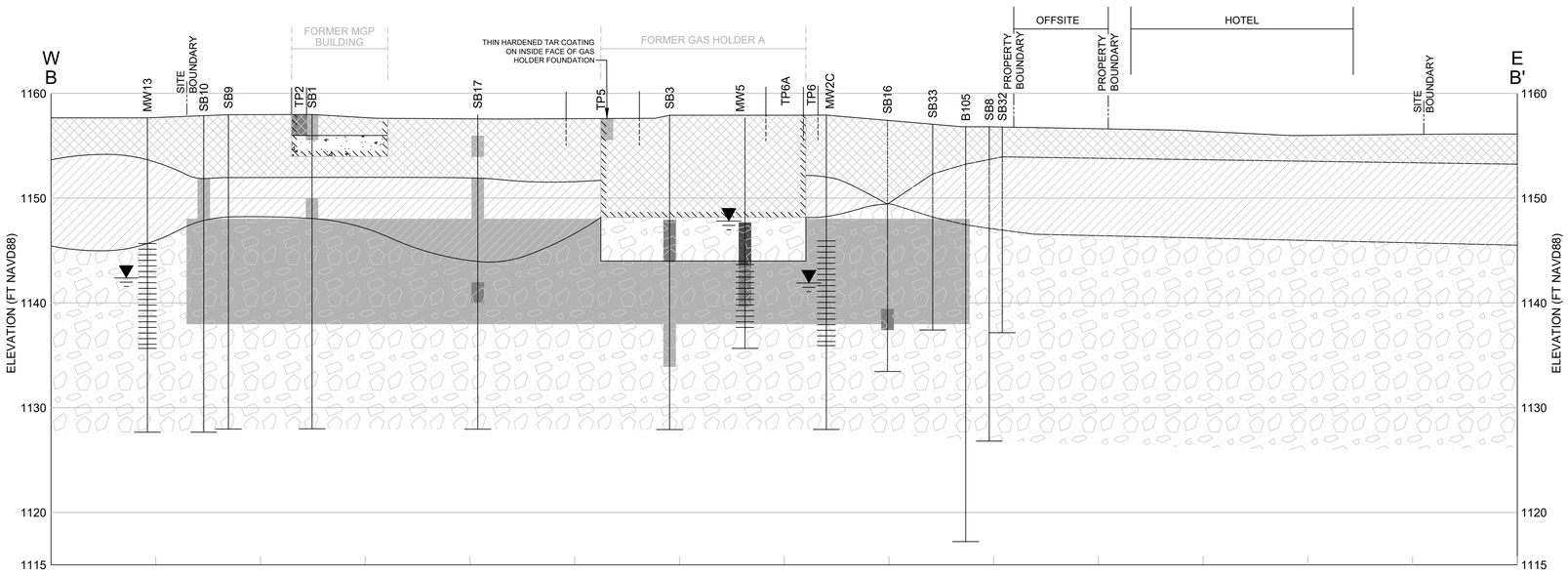
- MW1 — SOIL BORING/MONITORING WELL IDENTIFICATION
- OBSERVED GROUNDWATER TABLE 2/8/2012
- WELL SCREEN INTERVAL
- END OF BORING
- STRUCTURE
- ISS

GEOLOGY

- CONCRETE
- FILL
- SILT - CLAY
- GRAVEL AND SAND

PHYSICAL OBSERVATIONS

- TAR STAINING OR SHEEN
- TAR BLEBS, GLOBS, LENSES, STRINGERS, COATINGS
- TAR SATURATED



HORIZONTAL SCALE: 1" = 20'

0 20' 40'

0 6.67' 13.33'

VERTICAL SCALE: 1" = 6.67'

NOTE: 3x VERTICAL EXAGGERATION

50% DESIGN

Attention:

0 1"

If this scale bar does not measure 1" then drawing is not original scale.

NO.	DATE	ISSUE/REVISION	APP
1	1/29/2018	50% DESIGN	CRP
0	12/7/2018	PROGRESS 50%	CRP

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DWG. NO. S-015

ISS SECTIONS

SHEET NO. 15 OF 18

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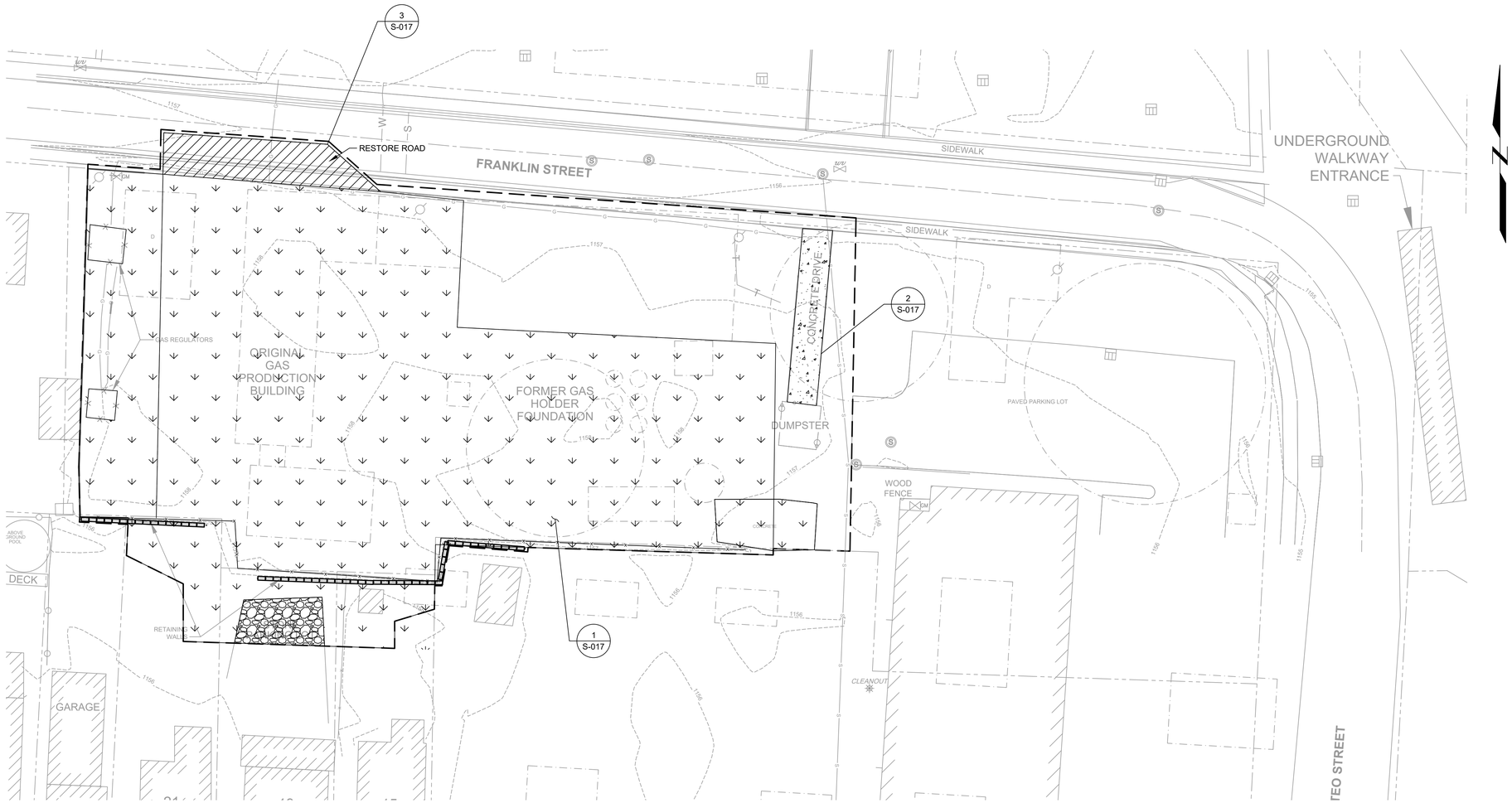
LEGEND:

- LIMITS OF WORK
- RESTORE CONCRETE
- PLANT GRASS SEED
- RESTORE GRAVEL PARKING AREA
- RESTORE ASPHALT
- CONSTRUCT NEW RETAINING WALL
- NEW FENCE

NOTES

1. RESTORE THE SITE TO ITS PRE-CONSTRUCTION GRADES.
2. RETAINING WALLS TO BE RESTORED TO PRE-EXISTING LOCATIONS AND ELEVATIONS WITH MATERIAL SIMILAR TO EXISTING MATERIALS, SUBJECT TO APPROVAL BY ENGINEER.



0 20 40
SCALE: 1" = 20'

50% DESIGN

Attention:	NO.	DATE	ISSUE/REVISION	APP
0 1"				
If this scale bar does not measure 1" then drawing is not original scale.	1	1/29/2018	50% DESIGN	CRP
	0	12/7/2018	PROGRESS 50%	CRP

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RESTORATION PLAN

DWG. NO. S-016

SHEET NO. 16 OF 18

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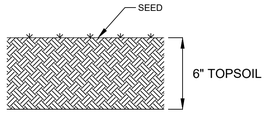
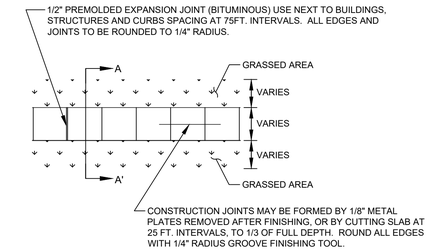


SEED NOTE:

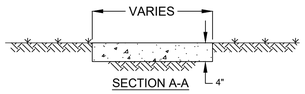
1. REFER TO CONTRACT DOCUMENTS FOR APPROPRIATE SEED MIXTURE.

1 S-016 SEED DETAIL

SCALE: N.T.S.



PLAN



SECTION A-A

2 S-016 CONCRETE SIDEWALK DETAIL

SCALE: N.T.S.

PAVEMENT DETAIL TO BE PROVIDED AT 95% DESIGN

3 S-016 PAVEMENT DETAIL

SCALE: N.T.S.

50% DESIGN

Attention:

0 1"

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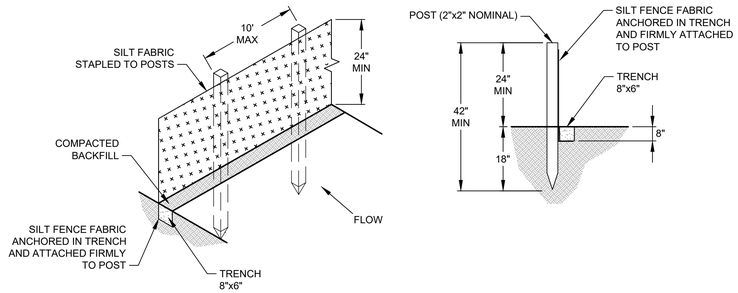
RESTORATION DETAILS

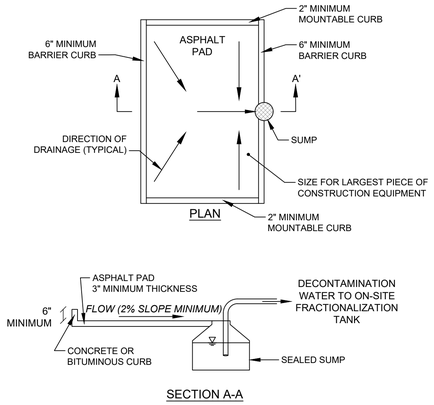
DWG. NO. S-017

SHEET NO. 17 OF 18



1 S-010 DETAIL - SILT FENCE

SCALE: N.T.S.



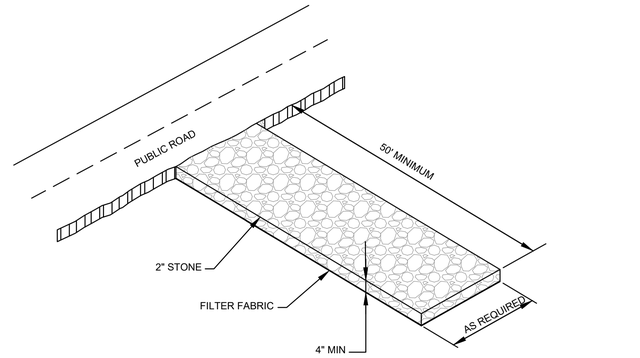
SECTION A-A

2 S-010 DETAIL - EQUIPMENT DECONTAMINATION PAD

SCALE: N.T.S.

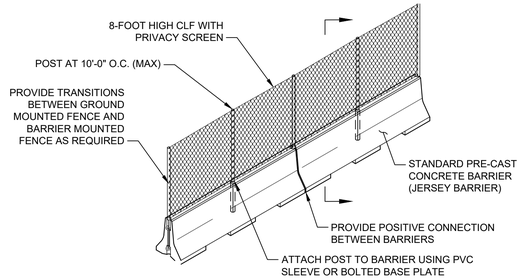
DECONTAMINATION NOTES:

1. ALL VEHICLES EXITING EXCLUSION ZONE MUST PASS THROUGH THE CONTAMINANT REDUCTION ZONE. USE EQUIPMENT DECONTAMINATION PAD AS REQUIRED BY ENGINEER AND NYSDEC. CONTROL OVER SPRAY.



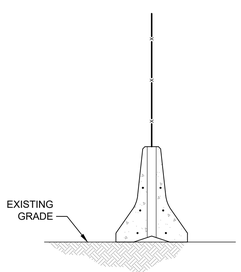
3 S-010 DETAIL - ANTI TRACKING PAD

SCALE: N.T.S.



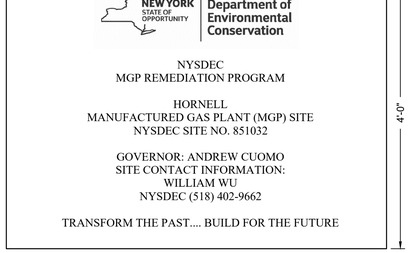
4 S-010 BARRIER AND FENCE

SCALE: N.T.S.



BARRIER FENCE SECTION

SCALE: N.T.S.



5 S-010 DETAIL - TYPICAL SIGN

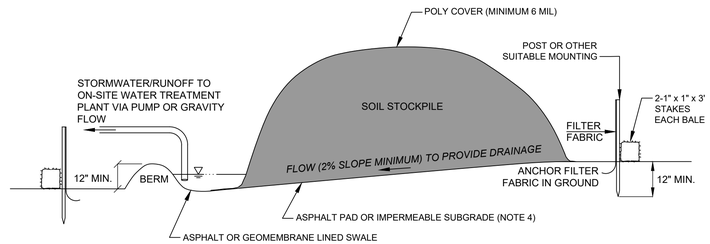
SCALE: N.T.S.

SIGN NOTES:

1. SIZE: HORIZONTAL FORMAT 96" BY 48" HIGH
2. NYSDEC LOGO TO BE SHOWN IN ACCORDANCE WITH NYSDEC SPECIFICATIONS.
3. TEXT: CASLON 540

MGP REMEDIATION PROGRAM	PMS 301
SITE NAME, SITE NUMBER, PARTY PERFORMING	PMS 355
NAME OF GOVERNOR	PMS 301
TRANSFORM THE PAST.... BUILD FOR THE FUTURE	PMS 355

4. CENTER EACH LINE OF COPY WITH SMALL CAPS AND INITIAL CAPS
5. 96" WIDE BY 48" HIGH ALUMINUM BLANKS WILL BE COVERED WITH VINYL SHEETING TO ACHIEVE BACKGROUND COLOR. COPY LOGO WILL BE SILK SCREENED ON THIS SURFACE.



6 S-010 DETAIL - SOIL/DEBRIS STOCKPILE PAD

SCALE: N.T.S.

PAD NOTES:

1. SOIL/DEBRIS STOCKPILE PAD DESIGN IS CONCEPTUAL. FINAL DESIGN WILL MEET THE INTENT OF THE CONCEPT AND BE APPROVED BY ENGINEER.
2. COLLECT ALL STORMWATER/RUNOFF WATER FROM THE SOIL/DEBRIS PADS AND DIRECT TO WATER TREATMENT SYSTEM.
3. LOCATE PADS INSIDE THE UNEXCAVATED PORTION OF THE REMEDIAL EXCAVATION. PADS MAY NOT BE LOCATED ON COMPLETED WORK OR PARTIALLY BACKFILLED SURFACES.
4. IMPERMEABLE SUBGRADE: 6 INCHES AGGREGATE BASE, GEOTEXTILE, 40 MIL HDPE LINER, GEOTEXTILE, 6 INCHES CRUSHED STONE.

50% DESIGN

Attention:

0 1"

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SITE MANAGEMENT DETAILS

DWG. NO. S-018

SHEET NO. 18 OF 18

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