



Geotechnical
Environmental and
Water Resources
Engineering

**Remedial Design Document – Appendix C
33 N Clinton Ave/Cooper Lane System Design**

Bay Shore/Brightwaters Former MGP Site

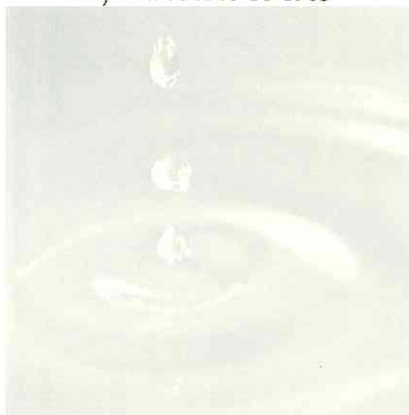
Operable Unit No. 2
Bay Shore, New York
AOC Index No. D1-0001-98-11

Submitted to:
National Grid
175 East Old Country Road
Hicksville, NY 11801

Submitted by:
GEI Consultants, Inc.
110 Walt Whitman Road, Suite 204
Huntington Station, NY 11746
631-760-9300

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Project #061140-10-1905



Matthew J. O'Neil, P.E.
Project Manager

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Abbreviations and Acronyms

ASME	American Society of Mechanical Engineers
AGWQS	Ambient Groundwater Quality Standards
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
COCs	Contaminants Of Concern
DNAPL	Dense Non-Aqueous Phase Liquid
EPA	United States Environmental Protection Agency
GWPC	Groundwater Protection Criteria
HP	Horse Power
IRM	Intermediate Remedial Measure
MGP	Manufactured Gas Plant
NAPL	Non-aqueous Phase Liquids
NEMA	National Electrical Manufacturers Association
NYSASP	New York State Analytical Services Protocol
NYSDEC	New York State Department of Environmental Conservation
NYSDEP	New York State Department of Environmental Protection
NYSDOH	New York State Department of Health
OM&M	Operations, Maintenance, and Monitoring Plan
ORP	Oxidation/Reduction Potential
OU	Operable Unit
PAH	Polycyclic Aromatic Hydrocarbon
PID	Photoionization Detector
PVC	Polyvinyl chloride
RAP	Remedial Action Plan
RAWP	Remedial Action Work Plan
RDD	Remedial Design Document
RI	Remedial Investigation
SCDEE	Suffolk County Department of Environment and Energy
SCDHS	Suffolk County Department of Health Services
STP	Standard Temperature and Pressure
SVOC	Semivolatile Organic Compound
TAL	Total Analyte List
TEFC	Totally Enclosed, Fan Cooled
TOC	Total Organic Carbon
TPAH	Total PAH
VOC	Volatile Organic Compound

Abbreviations and Acronyms (cont.)

MEASUREMENTS

ACFM	Actual cubic feet per minute
CF	Cubic feet
ft	feet
gmol	gram-mole
Hz	hertz
ID	inner diameter
L	liter
lbs	pounds
lbs/day	pounds per day
MG	million gallons
MGal	Million Gallons
MGD	million gallons per day
mg/L	Milligrams per liter
msl	mean sea level
ppb	Parts per billion
ppm	Parts per million
psi	Pounds per square inch
SCFH	Standard cubic feet per hour
ug/L	Micrograms per liter
ug/m ³	Microgram per meter cubed
mg	milligrams

1. Introduction

This design document presents the design criteria and calculations for the oxygen injection system that will operate at 33 N. Clinton Avenue and Cooper Lane in Operable Unit No. 2 (OU-2) of the Bay Shore/Brightwaters Former Manufactured Gas Plant (MGP) site located in Bay Shore, in the Town of Islip, Suffolk County, New York (Figure 1). The system (herein referred to as the “33 N. Clinton/Cooper Injection Lines”) is divided into three injection lines. The first line runs along the northern property boundary of 33 N. Clinton Avenue (33 N. Clinton Line). The second line runs parallel to N. Clinton Avenue on the 33 N. Clinton Avenue property (N. Clinton Avenue Line). The third line runs along the northern right of way on Cooper Lane (Cooper Lane Line). The 33 N. Clinton Line and N. Clinton Avenue Line were installed between August 2008 and March 2009 and begin operation in March 2009. The Cooper Lane Line is scheduled for installation and operation in the summer/fall of 2009. This document is intended to supplement the Remedial Design Document (RDD) submitted by National Grid to the New York State Department of Environmental Conservation (NYSDEC) on January 12, 2008 as well as the preliminary design documents submitted to the NYSDEC and Suffolk County Department of Health Services (SCDHS) in August 2008.

OU-2 encompasses approximately 39 acres as depicted in Figure 2 of the RDD. The OU-2 area includes a mixture of residential and light commercial properties. The OU-2 groundwater plume appears to migrate south to southeast from OU-1 in the direction of natural groundwater flow. The dissolved phase contaminants within the groundwater plume primarily consist of BTEX (benzene, toluene, ethylbenzene, and xylene) and naphthalene. The RI and subsequent groundwater sampling events have bounded the width of the plume to an approximately 400 to 500 foot wide path that extends from OU-1 and the southeast corner of the Bay Shore/Brightwaters West Parcel. The total length of the plume is estimated to be approximately 3,400 feet extending from OU-1 to the discharge point at Lawrence Creek.

The 33 N. Clinton/Cooper Injection Lines will operate up-gradient from and in conjunction with the oxygen injection systems that were installed as part of the 2004 Interim Remedial Measure (2004 IRM) (GEI, 2004) along Montauk Highway and Manatuck Lane; as well as, the oxygen injection systems installed at 34 and 9 N. Clinton Avenue. The 33 N. Clinton/Cooper Injection Lines will inject oxygen into the subsurface below the water table within the groundwater plume, which was previously defined by groundwater sampling events performed up-gradient and in the vicinity of 33 N. Clinton Avenue and Cooper Lane. The injected oxygen will facilitate and promote the bioremediation of the MGP-related contaminants dissolved in the groundwater.

1.1 Design Document Organization

Section 1 of this design document provides a summary of OU-2 and the intent of the oxygen injection systems proposed for OU-2. Section 2 provides a summary of the remedial goals for the oxygen injection systems and the respective performance monitoring activities. Section 3 provides a description of the oxygen injection technology and the development of the 33 N. Clinton/Cooper Injection Lines design.

2. Remedial Goals and Performance Monitoring

2.1 Remedial Goals

The goal of the OU-2 remedy is to hasten the bioremediation of the dissolved phase contaminant plume emanating from OU-1 through the operation of a minimum of three additional oxygen injection lines. The RDD required that National Grid install a total of four treatment systems to inject oxygen into the groundwater to create an aerobic environment which will facilitate and promote the bioremediation of the dissolved MGP-related contaminants. The proposed oxygen injection treatment lines described in this design document will operate in conjunction with both the up-gradient and down gradient oxygen injection treatment lines that were installed as part of the 2004 IRM (GEI, 2004b) and as a temporary system at the OU-1 boundary in February 2008 (KeySpan, 2007).

As discussed in the 2004 IRM report and the Draft OU-2 Remedial Alternatives Analysis (GEI, 2008a), these systems will not serve as the final measure to address groundwater contamination associated with the Bay Shore/Brightwaters former MGP site. A source removal, containment, and in-situ treatment remedy is being implemented at OU-1. The subsurface barrier wall has been installed to prevent migration dense non-aqueous phase liquid (DNAPL) from OU-1. Recent groundwater sampling down-gradient of the subsurface barrier wall indicate that it is also proving effective as a hydraulic barrier. Groundwater concentrations at depths below the perforated window have been reduced significantly (see RDD Plate 2). Furthermore, the temporary oxygen injection system is treating the groundwater exiting the perforated window until the final groundwater treatment system is installed. This treatment system is designed to mitigate contaminated discharge from the former Bay Shore/Brightwaters MGP site into OU-2. The reduction in the flux of MGP-related contaminants into OU-2 following complete implementation of the OU-1 RAP will, over time, reduce or eliminate the discharge to OU-2.

National Grid proposes to implement and maintain the proposed oxygen injection systems until the following performance based goals are met.

- A permanent remedy is implemented at the Bay Shore site (OU-1) leading to control of the source of the groundwater contamination; and,
- Groundwater concentrations of MGP-related contaminants of concern meet the Ambient Groundwater Quality Standards and Guidance Values for a GA aquifer in OU-2; or,

- Continued operation of the systems produces diminishing returns as indicated by periodic groundwater monitoring up and down gradient of the oxygen injection treatment systems.

2.2 Performance Monitoring

2.2.1 Soil Vapor and Ambient Air Monitoring

Soil vapor and ambient air will be monitored prior to start-up of each line of the 33 N. Clinton/Cooper Injection Lines, during start-up phase, and at regular intervals during system operation. The purpose of these activities is to ensure that the system's operation remains consistent with previous studies that determined that no impact to soil vapor occurs. The soil vapor sampling and frequency protocol established in the Operations, Maintenance, and Monitoring Plan (OM&M) Plan will be followed to monitor the performance of the proposed oxygen injection systems. The sampling locations are identified in Figure 6.

Soil vapor analytical results will be tabulated prior to validation and transmitted to the NYSDEC, NYSDOH, SCDHS, and SCDEE as soon as the data is available.

2.2.2 Groundwater Monitoring

Groundwater will be monitored prior to start-up of each line of the Clinton/Cooper Injection System, during its start-up phase, and at regular intervals during system operation. NYSDEC requires that targeted groundwater monitoring wells closest to the injection points be sampled before system start-up and then once per month (monthly) for three months thereafter. Following the three month period after start-up, NYSDEC may reduce the sampling frequency to quarterly. Otherwise, sampling of the targeted wells will proceed monthly. The analytical results and field measurements will be used to evaluate the performance of the 33 N. Clinton/Cooper Injection Lines. Specifically, the data collected is focused on monitoring the aerobic environments created by the system, the bioactivity of the aquifer and its ability to reduce MGP-related contaminant concentrations in the dissolved phase.

The groundwater sampling and frequency protocol established in the Operations, Maintenance, and Monitoring Plan (OM&M) Plan will be followed to monitor the performance of the 33 N. Clinton/Cooper Injection Lines. The sampling locations are identified in Figure 6.

National Grid will report the results of the pre-startup and first monthly sampling event of each oxygen injection system to the NYSDEC, NYSDOH, SCDHS, and SCDEE in a Remediation System Startup Summary 45 days after the monthly sample results are received and validated. Subsequent sample results will be reported as available in the quarterly OMM reports.

3. Oxygen Injection System Design Details

3.1 Oxygen Injection Technology Overview

Oxygen injection technology involves the injection of a 90 to 95 percent pure oxygen gas into groundwater to increase the dissolved oxygen concentration and enhance aerobic biodegradation of BTEX and naphthalene. The technology filters ambient air to generate 90 to 95 percent pure oxygen gas, which is then injected in pulsed intervals into the subsurface through a series of injection wells at low flow rates. The low flow rates and pulsed injection intervals are cycled to allow for the maximum transfer of vapor-phase oxygen to dissolved-phase oxygen. Unlike air sparging, the goal of oxygen injection is to transfer the injected vapor to the aqueous phase. The goal of air sparging is to maintain the injected vapors in the vapor phase where they can strip the VOCs, such as BTEX, from the groundwater for collection in the vadose zone and subsequent treatment. Slowly injecting oxygen at 90 to 95 percent purity can increase dissolved oxygen concentrations to a maximum of approximately 40 milligrams per liter (mg/L). Whereas air injected under sparge processes yields maximum dissolved oxygen concentrations of approximately 9 mg/L. The injected oxygen in the dissolved-phase is then used by indigenous microorganisms to aerobically degrade the organic chemicals. Therefore, by injecting oxygen under these conditions, an aerobically active treatment zone is formed in the vicinity of the injection well. When groundwater passes through this zone, it becomes oxygenated and stimulates the aerobic microbes in the groundwater to biodegrade the dissolved-phase contaminants of concern (COCs).

The injection lines designed for OU-2 are constructed to traverse the flow path of the groundwater plume at various transects from OU-1 to Lawrence Creek. By creating and maintaining multiple aerobic environments along the flow path of the plume, the oxygen injection system will supplement one another by reducing the groundwater contaminant mass as the groundwater flows through each transect. The 33 N. Clinton/Cooper Injection Lines represent one transect and will supplement and operate up-gradient from the systems currently operating at 9 and 34 N. Clinton Avenue and along Montauk Highway and Manatuck and Garner Lanes.

3.2 Oxygen requirement

As described above, an oxygen injection system will slowly inject oxygen into the subsurface to increase levels of dissolved oxygen in the groundwater. This increase is necessary to stimulate the biodegradation of organic compounds by native microorganisms.

The following calculations will determine the oxygen requirements for the plume based on the average compound mass loadings estimated in the vicinity of the proposed injection line. These calculations will determine the minimum required oxygen generating capacity to meet the project objectives for the proposed system.

Plume BTEX and PAH data from historic and recent site monitoring activities are detailed on Figures 4 and 5 and summarized in Tables 1 and 2. This data was selected to represent the average plume conditions approaching the 33 N. Clinton/Cooper Injection Lines and was used to estimate the average compound mass loading.

3.2.1 Groundwater Plume Flowrate

As detailed in Figure 3, there are three lines included in the 33 N. Clinton/Cooper Injection Lines. There is one installed parallel to N Clinton Ave (N. Clinton Avenue Line), one installed along the northern property boundary of 33 N Clinton Ave (33 N Clinton Line), and one planned for installation along the northern right of way on Cooper Lane (Cooper Lane Line). The three lines will operate from one single system located on the north side of the 33 N. Clinton Avenue property. In the design documents provided in Appendix A and B, the groundwater plume flowrate was estimated by using an approximate cross-sectional shape of the plume as it approached the injection line. This approach will be used here but will not include the plume's cross-sectional area that is flowing parallel to N. Clinton Avenue. This is because the N. Clinton Avenue Line represents a secondary injection line that will be treating compound mass that was reduced by migrating through the 33 N. Clinton Line. Both of these lines will operate from a single oxygen generator. This oxygen generator will be designed to produce enough oxygen required to treat the highest average compound mass that is projected to make first contact at the 33 N. Clinton line.

The shape of the cross-sectional area of the groundwater plume approaching 33 N. Clinton/Cooper Injection Lines is estimated by using data collected from groundwater probes OU2GP-11 to OU2GP-15, OU2GP-19, OU2GP23, and OU2GP-24; and groundwater monitoring well clusters OU2MW-17 to OU2MW-20. The analytical data used is summarized on Tables 1 (groundwater probe data) and 2 (groundwater monitoring well data), and a cross-section of the approaching groundwater plume is depicted in Figure 4. The volumetric flow rate of the portion of the groundwater plume that will be treated by the 33 N. Clinton/Cooper Injection Lines was estimated using the following assumptions:

- The cross-sectional area of the groundwater plume is conservatively estimated by assuming the cross-sectional shape of the plume is made up of a rectangle on top of a square. The rectangle represents the plume's shape from approximately 5 feet below ground surface (ft bgs) to 35 ft bgs; and the square represents the plume's shape from approximately 35 ft bgs to 70 ft bgs (Figure 4).

The dimensions of the rectangle are approximately 580 feet wide by 30 feet deep; and the dimensions of the square are approximately 280 feet wide by 35 feet deep.

- The formation porosity is 30%.
- The groundwater seepage velocity is approximately 1 foot/day.

Using the data and these assumptions, the volumetric flow rate of the groundwater plume projected to pass through the 33 N. Clinton/Cooper Injection Lines is approximately 8,160 cubic feet per day (CF/day) or 0.061 million gallons per day (MGD). See calculation below.

EQUATION 3.1

Cross-Sectional Area of Approaching Groundwater Plume

$$= (580FT \times 30FT) + (280FT \times 35FT) = 27,200FT^2$$

EQUATION 3.2

$$\text{Volumetric Flow Rate} = (27,200FT^2 \times 1FT/DAY) \times 0.3 = 8,160FT^3/DAY$$

Converting to Million Gallons per Day (Mgal/Day) =

$$8,160FT^3/DAY * 7.45 \text{ gallons}/FT^3 * 1M\text{gallon}/1,000,000\text{gal} = 0.061M\text{Gal}/DAY$$

3.2.2 Average Compound Mass Loading

The average concentration loading of total VOCs, total SVOCs, and total metals was estimated using data collected from each 5 foot sample interval between 10 and 70 feet below ground surface at each groundwater probe (OU2GP-11 to OU2GP-15, OU2GP-19, OU2GP23, and OU2GP-24) and the designated sample intervals at the monitoring wells (OU2MW-17 to OU2MW-20). The analytical data collected from the groundwater probes and monitoring well clusters listed above are summarized in Tables 1 and 2. Only the groundwater monitoring wells on Table 2 had data available to estimate the average total dissolved metals concentration. These results and their contribution to the compound mass loading are discussed below. The estimated average contaminant (VOCs and SVOCs) concentration loading ranges between 0.12 to 6.42 mg/L across the cross-sectional area of the plume approaching the 33 N. Clinton/Cooper Injection Lines.

However, because a large portion of the oxygen demand is derived from the amount of oxygen consumed by the amount of carbon in a compound, this loading is converted to a carbon loading. Assuming that the estimated concentration loading for oxygen consumption is comprised of 94% carbon, the average carbon concentration loading due to the average concentration loadings across the cross-sectional area of the plume ranges between 0.11 and 6.03 mg/L. Applying the average carbon concentration load to the estimated plume flow rate of 0.061 MGD as found in Section 3.2.1 with a unit conversion factor of 8.34 (lbs)(L)/(MG)(mg), the average carbon mass loading can be estimated:

EQUATION 3.4

Average Carbon Mass Loading (lbs/DAY) =
 $6.03\text{mg/L} * 0.061\text{Mgal/Day} * 8.34\text{lbs} \cdot \text{L/Mgal} \cdot \text{mg} = 3.07\text{lbs/DAY}$

Using the above equation, the total carbon mass loading for this plume ranges from 0.06 to 3.07 lbs/day (Table 3).

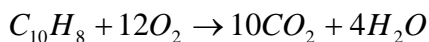
In addition to oxygen demand from the carbon mass load, a percentage of dissolved metals will also consume oxygen as it passes through the injection line. The total metals were estimated utilizing data from monitoring well clusters OU2MW-17 to OU2MW-20, as summarized by Table 2. It is assumed that 50% of the dissolved total metals will be consumed by the dissolved oxygen from the system. Therefore, 50% of the average concentration load from metals will contribute to the total compound loading for the oxygen demand in the plume. The average total metals concentration load contributing to the compound mass loading is 48 mg/L or 24.42 lbs/day. See Table 3 for more detail.

The total compound mass loading is then estimated by adding the carbon mass loading to the mass loading due to dissolved metals. This yields a range of total compound mass loading rates of 24.48 to 27.49 lbs/day. The system will be designed and operated such that higher amounts of oxygen can be directed to the sections of the plume that have the highest concentration loadings.

3.2.3 Estimated Oxygen Demand

As estimated in Section 3.2.2, the highest average compound loading entering the treatment zone is approximately 27.49 lbs/day. This value was used to design the system for this location. For the purpose of design, the ratio of oxygen to contaminant mass is estimated from the reaction of oxygen with a carbon source (naphthalene) producing entirely carbon dioxide and water. Naphthalene was chosen based on its dominating presence within the plume and its higher recalcitrance to attenuation when compared to the BTEX molecules.

Oxidation Reaction for Naphthalene



As noted in the reaction above, 12 gmol of oxygen are required for the oxidation of 1 gmol of naphthalene. Expressed in molecular weights:

EQUATIONS 3.5 AND 3.6

$$\text{Oxygen} = (12) * (2 * 16) = 384$$

$$\text{Naphthalene} = (1 * ((10 * 12) + (8 * 1))) = 128$$

This calculates a ratio of approximately 3.0 grams of oxygen per gram of naphthalene. This oxygen to carbon ratio was used to estimate the required oxygen demand.

A small percentage of injected oxygen will either not get dissolved or be consumed by cations or other organic matter. A factor of safety of 2.0 will be applied to oxygen in the 3:1 oxygen to carbon ratio in order to ensure that the required amount of oxygen is available for contaminant biodegradation. Therefore, a minimum 6.0 pounds of oxygen per pound of carbon must be injected into the treatment zone to sufficiently degrade the BTEX and PAH mass in the plume. Using the highest average compound loading entering the treatment zone of 27.49 lbs/day, approximately 165 pounds of oxygen will need to be injected daily to effectively treat the groundwater impacts approaching the 33 N. Clinton/Cooper Injection Lines.

3.2.4 System Details

Typical well spacing within treatment transects for this technology with similar subsurface conditions is approximately 20-25 feet. Eighteen to twenty feet spacing was selected for each line of the Clinton/Cooper Injection System based on the distribution of contaminated groundwater (Figures 4 and 5), aquifer hydrogeologic properties, and performance of the systems operating down-gradient along Montauk Highway and Manatuck Lane. Based on this information, the 33 N. Clinton/Cooper Injection Lines was designed using 61 injection wells to provide coverage of the approaching groundwater plume (Figures 4 and 5). The total system capacity will be greater than the required 61 injection points to facilitate system expansion if needed. Additional system installation details are included in Figure 7.

The oxygen injection system will be provided by Matrix Environmental and include the following minimum specifications:

- Oxygen Production Capacity of 160 standard cubic feet per hour (SCFH)
- Oxygen Delivery Manifold with 64 points (6 banks of 10, plus a bank of 4)
- Power Supply = Three phase 230-volts
- Six foot by 14-foot insulated double axle cargo trailer with rear locking double doors, trailer jacks, lighting, wall-mounted heater, ceiling-mounted ventilator and 120-volt duplex receptacle. This may be modified based on the final location of the system as dictated by pending access agreements.
- AirSep Model AS-160 oxygen generator with a 120-gallon surge tank and regulator. Single phase/60 Hz/110 volts.

- Kaeser SM-8 rotary screw air compressor with air dryer, pressure tank with auto drain, and low sound enclosure. Rated for 32 ACFM @ 100 PSIG. 7.5 HP TEFC motor, three phase/60 Hz/230 volts. The compressor should include a programmable logic controller.
- Manifold for 60 injection points to include individual pressure gauge (0-30 PSI) and Dwyer variable area flow meter (10-100 SCFH).
- Six adjustable timers and solenoid valves (per set of ten points) to control oxygen flow for pulse injection.
- 125-amp electrical panel (NEMA 1 load center) with breakers located inside the trailer and 100-amp (NEMA 3R rainproof) safety switch on outside of trailer. All wiring is copper in Liquid-Tight flexible conduit (steel jacket) or UL listed SCH40 PVC rigid electrical conduit.
- Fully integrated remediation system with all plumbing, electrical, and mechanical components installed.
- All pressure tanks will be ASME National Board Certified for compressed gas storage (200 PSI rating).
- The pressure relief valve will be muffled for noise reduction.
- U.L. certification.
- Operations manual with plumbing and instrumentation diagrams.

3.2.5 System Equipment Capacity

The oxygen generating equipment is rated for a maximum generation capacity of 160 standard cubic feet per hour (SCFH). However, the oxygen output should not exceed 75% of the oxygen production capacity. This is an operational guideline that serves to maintain adequate oxygen gas pressure in the storage tank for injection, maintain high oxygen gas purity, and prevent excessive motor starts and load time on the compressor. Therefore, a flow rate of 120 SCFH was used for design purposes. The corresponding mass flow rate of oxygen into the aquifer is calculated below.

$$\text{Flow Rate} = 120 \text{ SCF} / \text{H} * 28.317 \text{ L} / \text{CF} = 3,398.0 \text{ L} / \text{H}$$

For an Ideal Gas @ STP: 1 mole of gas = 22.4 L; 1 mole of Oxygen = 32 grams

$$\frac{X}{32 \text{ g}} = \frac{3,398.0 \text{ L}}{22.4 \text{ L}} \rightarrow X = 4,854.28 \text{ g} * 0.0022 \text{ lbs} / \text{g} = 10.68 \text{ lb Oxygen}$$

Alternately using the vapor density of Oxygen @ STP of 1.43g/L

$$\frac{X}{1.43g} = \frac{3,398.0L}{1L} \rightarrow X = 4,859.14g * 0.0022\frac{lbs}{g} = 10.69lb \text{ Oxygen}$$

However, the oxygen transfer efficiency to groundwater is not 100%. It is very difficult to estimate this variable. It is dependant on both the oxygen solubility and the depth of injection. Oxygen solubility is site specific and affected by water temperature, cation content, and other factors. Oxygen solubility in groundwater is usually from 20-30 mg/L, but can range as high as 40-50 mg/L. However, oxygen solubility does not have as significant an effect on the transfer efficiency as depth of injection. The deeper the point of injection is installed below the water table, the higher the transfer efficiency due to longer contact time between the oxygen gas molecule and the groundwater. For injection points at depths of 25 to 80 feet bgs, the assumed transfer efficiency ranges from 75-95%, respectively.

Assuming 90% oxygen generation efficiency, a flow stream of up to 10.68 pounds of oxygen per hour is available for injection into the aquifer. This equates to a maximum daily injection of approximately 256.3 pounds of oxygen per day across all injection points at a continuous injection rate. At a transfer efficiency range of 75-90%, approximately 8.0 to 9.6 pounds of oxygen per hour is likely to transfer from the vapor phase into the aqueous phase. This estimates a daily available injection range of approximately 192 to 230.4 pounds of oxygen per day at a continuous injection rate.

As detailed in Section 3.2.3, approximately 165 lbs of oxygen a day is required to effectively degrade the average compound loading of 27.49 lbs/day from the plume. The minimum of 192 lbs/day of oxygen delivered by the oxygen system is sufficient enough to supply the 165 lbs/day requirement. Based on an oxygen supply rate of 192 lbs/day, it would take approximately 1,269 minutes/day to inject 165 lbs of oxygen into the plume. This equates to a rate of approximately 0.13 pounds of oxygen per minute. Injecting oxygen at this rate across a 61 injection point system will inject approximately 7.93 pounds of oxygen into the aquifer every minute [0.13 lbs/min x 61 injection points = 7.93 lbs/min]. Therefore, to satisfy the estimated requirement of 165 lbs of oxygen, the system will need to inject oxygen for approximately 21 minutes. To maintain and increase the transfer efficiency of the oxygen gas into the aqueous phase, the injection system will inject oxygen on a cycle of at least 21 minutes every hour.

One operational advantage of this system is that larger amounts of oxygen mass can be routed to any particular section of the plume. Therefore, if monitoring activities during system operation indicates that a specific section of the approaching plume has a higher carbon loading relative to the rest of the plume, then higher amounts of oxygen mass can be directed to this section without sacrificing the lower oxygen demand across the rest of the plume.

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Tables

Table 1
Groundwater Probe Analytical Results
OU-2 Remedial Design Document - Appendix C
Bay Shore/Brightwaters Former MGP Site

Sample Location: Sample Depth: Sample Date:	NYSDEC SCG	OU2GP-13 (65-69) 1/8/2008	OU2GP-14 (6-10) 12/26/2007	OU2GP-14 (15-19) 12/26/2007	OU2GP-14 (25-29) 12/26/2007	OU2GP-14 (35-39) 12/26/2007	OU2GP-14 (45-49) 12/26/2007	OU2GP-14 (55-59) 12/26/2007	Duplicate of OU2GP-14 (55-59) 12/26/2007	OU2GP-14 (65-69) 12/26/2007	OU2GP-15 (6-10) 12/27/2007	OU2GP-15 (15-19) 12/27/2007	OU2GP-15 (25-29) 12/27/2007	OU2GP-15 (35-39) 12/27/2007	OU2GP-15 (45-49) 12/27/2007	OU2GP-15 (55-59) 12/27/2007	OU2GP-15 (65-69) 12/27/2007	OU2GP-16 (6-10) 1/10/2008	OU2GP-16 (15-19) 1/10/2008	OU2GP-16 (25-29) 1/10/2008	OU2GP-16 (35-39) 1/10/2008	OU2GP-16 (45-49) 1/10/2008
BTEX (ug/L)																						
Benzene	1	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	100 J	10 U	95	10 U
Toluene	5	110	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	29	10 U	17	10 U
Ethylbenzene	5	120	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	100 U	10 U	200 J	10 U
Xylene, m-p-	NE	200 J	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	34	50	150	10 U
Xylene, o-	NE	100 J	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	160	27	150	10 U
Total BTEX	NE	530	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	383	77	612	ND
Other VOCs (ug/L)																						
Acetaldehyde	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Acetone	50	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Allyl chloride	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Bromodichloromethane	50	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Bromoform	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Bromomethane	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Butadiene, 1,3-	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Butanone, 2-	50	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Carbon disulfide	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Carbon tetrachloride	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chlorobenzene	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chloroethane	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chloroform	7	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chloromethane	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chlorotoluene	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Cryofluorane	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Cyclohexane	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dibromochloromethane	50	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dibromoethane, 1,2-	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dichlorobenzene, 1,2-	3	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dichlorobenzene, 1,3-	3	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dichlorobenzene, 1,4-	3	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dichlorodifluoromethane	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dichloroethane, 1,1-	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dichloroethane, 1,2-	0.6	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dichloroethene, cis-1,2-	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dichloroethene, 1,1-	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dichloropropane, 1,2-	1	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dichloropropene, cis-1,3	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dichloropropene, trans-1,3	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dioxane, 1,4-	NE	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U
Ethanol	NE	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U
Heptane, n-	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Hexachlorobutadiene	0.5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Hexane, n-	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Hexanone, 2-	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Isopropyl benzene	5	10 U	10 U	16	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	20	10 U	14	10 U
Methyl tert-butyl ether	NE	10 U	10 U	10 U	10 U	15	25	100	100	10 U	10 U	10 U	10 U	18	11	32	14	10 U	10 U	16	10 U	10 U
Methyl-2-pentanone, 4-	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Methylene chloride	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Propanol, 2-	NE	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U
Propylbenzene, n-	5	25	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	34	25	17	10 U
Styrene	5	200 J	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Tetrachloroethane, 1,1,1,2-	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Tetrachloroethane, 1,1,2,2-	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Tetrachloroethene	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Tetrahydrofuran	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Trans-1,2-dichloroethene	5	10 U	10 U	10 U	10 U																	

Table 1
Groundwater Probe Analytical Results
OU-2 Remedial Design Document - Appendix C
Bay Shore/Brightwaters Former MGP Site

Sample Location: Sample Depth: Sample Date:	NYSDEC	OU2GP-27 (61-65) 08/04/08	OU2GP-28 (12-10) 07/14/08	OU2GP-28 (22-20) 07/14/08	OU2GP-28 (32-30) 07/14/08	OU2GP-28 (42-40) 07/14/08	OU2GP-28 (52-50) 07/14/08	Duplicate of: OU2GP-28 (52-50) 07/14/08	OU2GP-28 (62-60) 07/14/08	OU2GP-29 (6-10) 08/07/08	OU2GP-29 (11-15) 08/07/08	OU2GP-29 (21-25) 08/07/08	OU2GP-29 (31-35) 08/07/08	OU2GP-29 (41-45) 08/07/08
BTEX (ug/L)														
Benzene	1	10 U	10 U	43	42 J	6	10	10	10 U	10 U	10 U	40	10 U	10 U
Toluene	5	10 U	10 U	10 U	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Ethylbenzene	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Xylene, m,p-	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Xylene, o-	NE	10 U	10 U	10 UJ	1 J	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U	1 J	10 U	10 U
Total BTEX	NE	ND	ND	43	43	6	10	10	ND	ND	ND	41	ND	ND
Other VOCs (ug/L)														
Acetaldehyde	NE	10 UJ	10 U	10 UJ	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U	10 U	10 U	10 U
Acetone	50	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ
Allyl chloride	NE	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ
Bromodichloromethane	50	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Bromoform	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Bromomethane	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Butadiene, 1,3-	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Butanone, 2-	50	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ
Carbon disulfide	NE	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U	10 U	10 U	10 U
Carbon tetrachloride	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chlorobenzene	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chloroethane	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chloroform	7	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chloromethane	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chlorotoluene	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Cryofluorane	NE	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U	10 U	10 U	10 U
Cyclohexane	NE	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U	10 U	10 U	10 U
Dibromochloromethane	50	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dibromoethane, 1,2-	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dichlorobenzene, 1,2-	3	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dichlorobenzene, 1,3-	3	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dichlorobenzene, 1,4-	3	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dichlorodifluoromethane	NE	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U	10 U	10 U	10 U
Dichloroethane, 1,1-	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dichloroethane, 1,2-	0.6	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dichloroethene, cis-1,2-	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dichloroethene, 1,1-	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dichloropropane, 1,2-	1	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dichloropropene, cis-1,3	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dichloropropene, trans-1,3	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dioxane, 1,4-	NE	R	R	R	R	R	R	R	R	R	R	R	R	R
Ethanol	NE	R	R	R	R	R	R	R	R	R	R	R	R	R
Heptane, n-	NE	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ
Hexachlorobutadiene	0.5	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ
Hexane, n-	NE	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ
Hexanone, 2-	NE	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U	10 U	10 U	10 U
Isopropyl benzene	5	10 U	10 UJ	10 U	10 UJ	10 U	10 U	10 U	10 U	10 UJ	10 UJ	3 J	10 UJ	10 UJ
Methyl tert-butyl ether	NE	10 U	10 UJ	10 UJ	2 J	9 J	8 J	8 J	15 J	10 U	10 U	10 U	2 J	5 J
Methyl-2-pentanone, 4-	NE	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U	10 U	10 U	10 U
Methylene chloride	5	10 U	10 U	10 UJ	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U	10 U	10 U	10 U
Propanol, 2-	NE	R	R	R	R	500 UJ	R	R	R	R	R	R	R	R
Propylbenzene, n-	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ
Styrene	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Tetrachloroethane, 1,1,1,2-	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Tetrachloroethane, 1,1,2,2-	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Tetrahydrofuran	5	10 U	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U	10 U	10 U	10 U
Tetrahydrofuran	NE	10 U	10 UJ	10 U	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Trans-1,2-dichloroethene	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Trichloro-1,2,2-trifluoroethane, 1,1,2-	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Trichlorobenzene, 1,2,4-	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ
Trichloroethane, 1,1,1-	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Trichloroethane, 1,1,2-	1	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Trichloroethene	5	10 U	10 U	10 U	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Trichlorofluoromethane	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Trimethylbenzene, 1,3,5-/P-ethyltoluene	NE	10 U	10 UJ	10 U	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	3 J	10 U	10 U
Trimethylbenzene, 1,2,4-	5	10 U	10 U	10 U	2.0 J	10 U	10 U	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ
Trimethylpentane, 2,2,4-	NE	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ
Vinyl acetate	NE	10 U	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	10 U	10 U	10 U	10 U	10 U
Vinyl chloride	2	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U

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OU-2 Remedial Design Document - Appendix C
Bay Shore/Brightwaters Former MGP Site

Sample Location: Sample Depth: Sample Date:	NYSDEC	OU2GP-27 (61-65) 08/04/08	OU2GP-28 (12-10) 07/14/08	OU2GP-28 (22-20) 07/14/08	OU2GP-28 (32-30) 07/14/08	OU2GP-28 (42-40) 07/14/08	OU2GP-28 (52-50) 07/14/08	Duplicate of: OU2GP-28 (52-50) 07/14/08	OU2GP-28 (62-60) 07/14/08	OU2GP-29 (6-10) 08/07/08	OU2GP-29 (11-15) 08/07/08	OU2GP-29 (21-25) 08/07/08	OU2GP-29 (31-35) 08/07/08	OU2GP-29 (41-45) 08/07/08
Non-carcin PAHs (ug/L)														
Acenaphthene	20*	10 U	10	19	10 U	1 J	10 U	10 U	2 J	10 U	10 U	17	10 U	10 U
Acenaphthylene	NE	10 U	10 U	44	10 U	10 U	10 U	10 U	10 U	10 U	10 U	20	10 U	10 U
Anthracene	50	10 U	10 U	3 J	10 U	10 U	10 U	10 U	10 U	10 U	10 U	2 J	10 U	10 U
Benz[a]h]perylene	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Fluoranthene	50	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Fluorene	50	10 U	2 J	3 J	10 U	10 U	10 U	10 U	10 U	10 U	10 U	2 J	10 U	10 U
Methylnaphthalene,2-	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	49	10 U	10 U
Naphthalene	10*	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Phenanthrene	50	10 U	13	17	10 U	10 U	10 U	10 U	10 U	10 U	10 U	9	10 U	10 U
Pyrene	50	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	2 J	10 U	10 U
Total Noncarcinogenic PAHs	NE	ND	26	86	ND	1	ND	ND	2	ND	ND	101	ND	ND
Carcinogenic PAHs (ug/L)														
Benz[a]anthracene	0.002	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benz[a]pyrene	ND	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benz[b]fluoranthene	0.002	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benz[k]fluoranthene	0.002	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chrysene	0.002	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dibenz[a,h]anthracene	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Indeno[1,2,3-cd]pyrene	0.002	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Total Carcinogenic PAHs	NE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total PAHs (ug/L)														
Total PAHs	NE	ND	26	86	ND	1	ND	ND	2	ND	ND	101	ND	ND
Other SVOCs (ug/L)														
Bis(2-chloroethoxy)methane	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Bis(2-chloroethyl)ether	1	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Bis(2-ethylhexyl)phthalate	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	1 J	1 J	1 J	2 J
Bis(chloroisopropyl)ether	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Bromophenyl phenyl ether, 4-	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Butyl benzyl phthalate	50*	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Carbazole	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chloro-3-methylphenol, 4-	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chloroaniline, 4-	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chloronaphthalene, 2-	NE	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chlorophenol, 2-	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chlorophenyl phenyl ether, 4-	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dibenzofuran	NE	10 U	10 U	3 J	10 U	10 U	10 U	10 U	10 U	10 U	10 U	1 J	10 U	10 U
Dichlorobenzene, 1,2-	3	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dichlorobenzene, 1,3-	3	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dichlorobenzene, 1,4-	3	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dichlorobenzidine, 3,3'-	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dichlorophenol, 2,4-	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Diethyl phthalate	50*	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dimethyl phthalate	50*	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dimethylphenol, 2,4-	50*	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Di-n-butyl phthalate	50	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dinitro-2-methylphenol, 4,6-	NE	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U
Dinitrophenol, 2,4-	10*	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U
Dinitrotoluene, 2,4-	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dinitrotoluene, 2,6-	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Di-n-octyl phthalate	50*	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Hexachlorobenzene	0.04	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Hexachlorobutadiene	0.5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Hexachlorocyclopentadiene	NE	10 UJ	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 UJ	10 UJ	10 UJ	10 UJ
Hexachloroethane	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Isophorone	50*	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Methylphenol, 2-	1	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Methylphenol, 4-	1	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Nitroaniline, 2-	5	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U
Nitroaniline, 3-	5	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U
Nitroaniline, 4-	NE	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U
Nitrobenzene	0.4	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Nitrophenol, 2-	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Nitrophenol, 4-	NE	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U
Nitrosodi-n-propylamine, N-	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Nitrosodiphenylamine, N-	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Pentachlorophenol	NE	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U
Phenol	1	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Trichlorobenzene, 1,2,4-	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Trichlorophenol, 2,4,5-	NE	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U	25 U
Trichlorophenol, 2,4,6-	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Total Cyanide (ug/L)														
Cyanide, Total	200	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 1
Groundwater Probe Analytical Results
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Bay Shore/Brightwaters Former MGP Site

Notes:

ug/l - micrograms per liter or parts per billion (ppb)
BTEX - benzene, toluene, ethylbenzene, and xylenes
VOCs - volatile organic compounds
PAHs - polycyclic aromatic hydrocarbons
SVOCs - semivolatile organic compounds
Total BTEX and Total PAHs are calculated using detects only.

NYS AWQS - New York State Ambient Water Quality Standards and Guidance Values for GA groundwater
* indicates the value is a guidance value and not a standard

NE - not established
NA - not analyzed
ND - not detected; total concentration is listed as ND because no compounds were detected in the group

Bolding indicates a detected result value
Shading and bolding indicates that the detected result value exceeds the NYS AWQS objective it was compared to

Validation Qualifiers:

J - estimated value
U - indicates not detected to the reporting limit for organic analysis and the method detection limit for inorganic analysis
UJ - not detected at or above the reporting limit shown and the reporting limit is estimated
R - rejected

Table 2
Groundwater Monitoring Well Analytical Results
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Bay Shore/Brightwaters Former MGP Site

Sample Location: Sample Date:	NYS AQWS	OU2MW- 17S 5/20/2008	OU2MW- 17I 5/20/2008	OU2MW- 17I2 5/20/2008	OU2MW- 17D 5/20/2008	OU2MW- 18I 5/19/2008	OU2MW- 18I2 5/19/2008	OU2MW- 18D 5/19/2008	OU2MW- 19I 5/21/2008	OU2MW- 19I2 5/23/2008	OU2MW- 20S 5/21/2008	OU2MW- 20I 5/21/2008	OU2MW- 20I2 5/21/2008
BTEX (ug/L)													
Benzene	1	10 U	25	10 U	10 U	3900 D	10 U	10 U	15	16	10 U	2 J	10 U
Ethylbenzene	5	10 U	43	10 U	10 U	960 D	10 U	10 U	830 D	5 J	10 U	380 D	1 J
Toluene	5	10 U	1 J	10 U	10 U	20	10 U	10 U	61	10 U	10 U	7 J	10 U
Xylene, m,p-	NE	10 U	3 J	10 U	10 U	380	10 U	10 U	300	85	10 U	130	10 U
Xylene, o-	NE	10 U	18	10 U	10 U	240 DJ	10 U	10 U	410 D	24	10 U	97	10 U
Xylene, total	5	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA
Other VOCs (ug/L)													
Acetaldehyde	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Acetone	50	10 U	10 U	10 U	10 U	72	10 U	10 U	10 U	14	10 U	10 U	10 U
Allyl chloride	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Bromodichloromethane	50	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Bromoform	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Bromomethane	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Butadiene, 1,3-	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Butanone, 2-	50	10 U	10 U	10 U	10 U	700 D	10 U	10 U	10 U	2 J	25	10 U	10 U
Carbon disulfide	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Carbon tetrachloride	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chlorobenzene	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chloroethane	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chloroform	7	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chloromethane	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chlorotoluene	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Cryofluorane	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Cyclohexane	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dibromochloromethane	50	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dibromoethane, 1,2-	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dichlorobenzene, 1,2-	3	10 U	10 U	10 U	10 U	2 J	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dichlorobenzene, 1,3-	3	10 U	10 U	10 U	10 U	1 J	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dichlorobenzene, 1,4-	3	10 U	10 U	10 U	10 U	1 J	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dichlorodifluoromethane	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dichloroethane, 1,1-	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dichloroethane, 1,2-	0.6	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dichloroethene, cis-1,2-	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dichloroethene, 1,1-	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dichloropropane, 1,2-	1	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dichloropropene, cis-1,3	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dichloropropene, trans-1,3	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dioxane, 1,4-	NE	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U
Ethanol	NE	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U
Heptane, n-	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Hexachlorobutadiene	0.5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Hexane, n-	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Hexanone, 2-	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Isopropyl benzene	5	10 U	3 J	10 U	10 U	55	10 U	10 U	35	43	10 U	120	10 U
Methyl tert-butyl ether	NE	10 U	10 U	2 J	10 U	10 U	5 J	10 U	10 U	3 J	10 U	10 U	14
Methyl-2-pentanone, 4-	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Methylene chloride	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Propanol, 2-	NE	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U	500 U
Propylbenzene, n-	5	10 U	10 U	10 U	10 U	18	10 U	10 U	18	47	10 U	38	10 U
Styrene	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	15	10 U	10 U	10 U
Tetrachloroethane, 1,1,1,2-	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Tetrachloroethane, 1,1,2,2-	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Tetrachloroethene	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	5 J	10 U	10 U	10 U

Table 2
Groundwater Monitoring Well Analytical Results
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Bay Shore/Brightwaters Former MGP Site

Sample Location: Sample Date:	NYS AQWS	OU2MW- 17S 5/20/2008	OU2MW- 17I 5/20/2008	OU2MW- 17I2 5/20/2008	OU2MW- 17D 5/20/2008	OU2MW- 18I 5/19/2008	OU2MW- 18I2 5/19/2008	OU2MW- 18D 5/19/2008	OU2MW- 19I 5/21/2008	OU2MW- 19I2 5/23/2008	OU2MW- 20S 5/21/2008	OU2MW- 20I 5/21/2008	OU2MW- 20I2 5/21/2008
Tetrahydrofuran	NE	10 U	10 U	10 U	10 U	260 DJ	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Trans-1,2-dichloroethene	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Trichloro-1,2,2-trifluoroethane, 1,1,2-	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Trichlorobenzene, 1,2,4-	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Trichloroethane, 1,1,1-	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Trichloroethane, 1,1,2-	1	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Trichloroethene	5	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Trichlorofluoromethane	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Trimethylbenzene, 1,2,4-	5	10 U	14	10 U	10 U	230 DJ	10 U	10 U	330 D	1100 D	10 U	340 D	10 U
Trimethylbenzene, 1,3,5-/P-ethyltoluene	NE	10 U	7 J	10 U	10 U	180	10 U	10 U	230	330	10 U	36	10 U
Trimethylpentane, 2,2,4-	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Vinyl acetate	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Vinyl chloride	2	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Non-carcin PAHs (ug/L)													
Acenaphthene	20	10 U	4 J	10 U	10 U	50	10 U	10 U	140 D	14	10 U	9 J	10 U
Acenaphthylene	NE	10 U	4 J	10 U	10 U	35	10 U	10 U	44	270 DJ	10 U	10 U	4 J
Anthracene	50	10 U	10 U	10 U	10 U	4 J	10 U	10 U	10	7 J	10 U	2 J	10 U
Benzo[g,h,i]perylene	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Fluoranthene	50	10 U	10 U	10 U	10 U	10 U	10 U	10 U	3 J	2 J	10 U	1 J	10 U
Fluorene	50	10 U	1 J	10 U	10 U	26	10 U	10 U	44	36	10 U	6 J	10 U
Methylnaphthalene,2-	NE	10 U	10 U	10 U	10 U	500 D	10 U	10 U	240 D	750 DJ	10 U	14	10 U
Naphthalene	10	10 U	14	10 U	10 U	2200 D	10 U	10 U	510 D	5100 D	10 U	60	10 U
Phenanthrene	50	10 U	2 J	10 U	10 U	26	10 U	10 U	48	31	10 U	8 J	10 U
Pyrene	50	10 U	10 U	10 U	10 U	1 J	10 U	10 U	4 J	2 J	10 U	1 J	10 U
Carcinogenic PAHs (ug/L)													
Benz[a]anthracene	0.002	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo[a]pyrene	ND	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo[b]fluoranthene	0.002	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo[k]fluoranthene	0.002	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chrysene	0.002	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dibenz[a,h]anthracene	NE	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Indeno[1,2,3-cd]pyrene	0.002	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Total Metals (ug/l)													
Calcium	NE	19500	28400	18100	13800	51900	10800	48100	34600	36700	24300	30300	23400
Iron	300	2550	6310	924	16300	20700	325	46500	16400	20300	270	25800	215
Magnesium	35000	2250	3010	2970	4480	7910	2790	15400	4540	6370	2420	4590	4210
Manganese	300	54.2	180	3440	408	447	1350	1410	373	556	17.8	444	10600
Potassium	NE	8770	1900	5840	1500	3730	3300	3680	8070	3520	1450	3060	3930
Sodium	20000	20200	15200	53800	31400	36600	37100	132000	35100	62900	7410	45100	52800
Other (mg/l)													
Alkalinity	NE	62.4	70.6	33.8	1 U	146	10	1 U	136	97.2	36.2	119	66.8
Nitrogen, Nitrate	10000	7.49	0.41	4.02	0.1 U	3.88	4.11	0.1 U	0.1 U	0.1 U	2.96	0.1 U	1.48
Nitrogen, Nitrite	NE	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Sulfate	250000	18.5	9.9	27.5	133	26.9	37.8	225	5 U	122	19.9	6.1	20.2
Sulfide	NE	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U

Table 2
Groundwater Monitoring Well Analytical Results
OU-2 Remedial Design Document - Appendix C
Bay Shore/Brightwaters Former MGP Site

Notes:

ug/l - micrograms per liter or parts per billion (ppb)
mg/l - milligrams per liter or parts per million (ppm)
BTEX - benzene, toluene, ethylbenzene, and xylenes
VOCs - volatile organic compounds
PAHs - polycyclic aromatic hydrocarbons
SVOCs - semivolatile organic compounds
PCBs - Polychlorinated Biphenyls

Total BTEX, Total VOCs, and Total PAHs are calculated using detects only.

NYS AWQS - New York State Ambient Water Quality Standards and Guidance Values for GA groundwater

* indicates the value is a guidance value and not a standard

NE - not established

NA - not analyzed

ND - not detected; total concentration is listed as ND because no compounds were detected in the group

Bolding indicates a detected result value

Shading and bolding indicates that the detected result value exceeds the NYS AWQS objective it was compared to

Validation Qualifiers:

J - estimated value

U - indicates not detected to the reporting limit for organic analysis and the method detection limit for inorganic analysis

UJ - Not detected at or above the reporting limit shown and the reporting limit is estimated

R - Rejected

Table 3
Average Compound Mass Loading
OU-2 Remedial Design Document - Appendix C
Bay Shore/Brightwaters Former MGP Site

Sample Depth Interval (feet below ground surface)	Average Total Contaminant Concentration Loading (mg/L)	Average Total Carbon Concentration Loading (mg/L)	Average Total Carbon Mass Loading (lbs/day)*	Average Total Metals Available for Oxygen Consumption (mg/L)	Percent of Total Metals Consuming Oxygen (%)	Average Total Metals Concentration Loading (mg/L)	Average Total Metals Mass Loading (lbs/day)*	Total Compound Mass Loading (lbs/day)
7 to 11 or 6 to 10	0.12	0.11	0.06	96	50	48	24.42	24.48
15 to 19	6.42	6.03	3.07	96	50	48	24.42	27.49
25 to 29	2.32	2.18	1.11	96	50	48	24.42	25.53
35 to 39	0.75	0.71	0.36	96	50	48	24.42	24.78
45 to 49	1.77	1.66	0.85	96	50	48	24.42	25.27
55 to 59	1.90	1.79	0.91	96	50	48	24.42	25.33
65 to 69	1.12	1.05	0.54	96	50	48	24.42	24.96

* - Calculated by (concentration in mg/L) x (plume flow rate in Mgal/day) x (unit conversion factor of 8.34)
Where the plume flow rate is estimated at 0.061 Mgal/day

Figures

OXYGEN INJECTION SYSTEM DESIGN SCHEMATICS

33 N CLINTON/COOPER INJECTION LINE

OPERABLE UNIT NO. 2
BAY SHORE/BRIGHTWATERS FORMER MANUFACTURED GAS PLANT SITE
BAY SHORE, NEW YORK



SITE LOCATION
SCALE: 1" = 1000'

SCHEDULE OF DRAWINGS

- 1 EXISTING CONDITIONS
- 2 INDEX MAP WITH TRAFFIC ROUTE
- 3 PROPOSED SYSTEM LOCATION
- 4 INJECTION POINT LAYOUT AND SCHEMATIC FOR 33 N. CLINTON/COOPER LANE LINE
- 5 INJECTION POINT LAYOUT AND SCHEMATIC FOR CLINTON LINE
- 6 PROPOSED MONITORING LOCATIONS
- 7 TRENCH AND INJECTION POINT DETAILS
- 8 N. CLINTON AVENUE CROSSING LOCATION AND DETAILS



PREPARED FOR:

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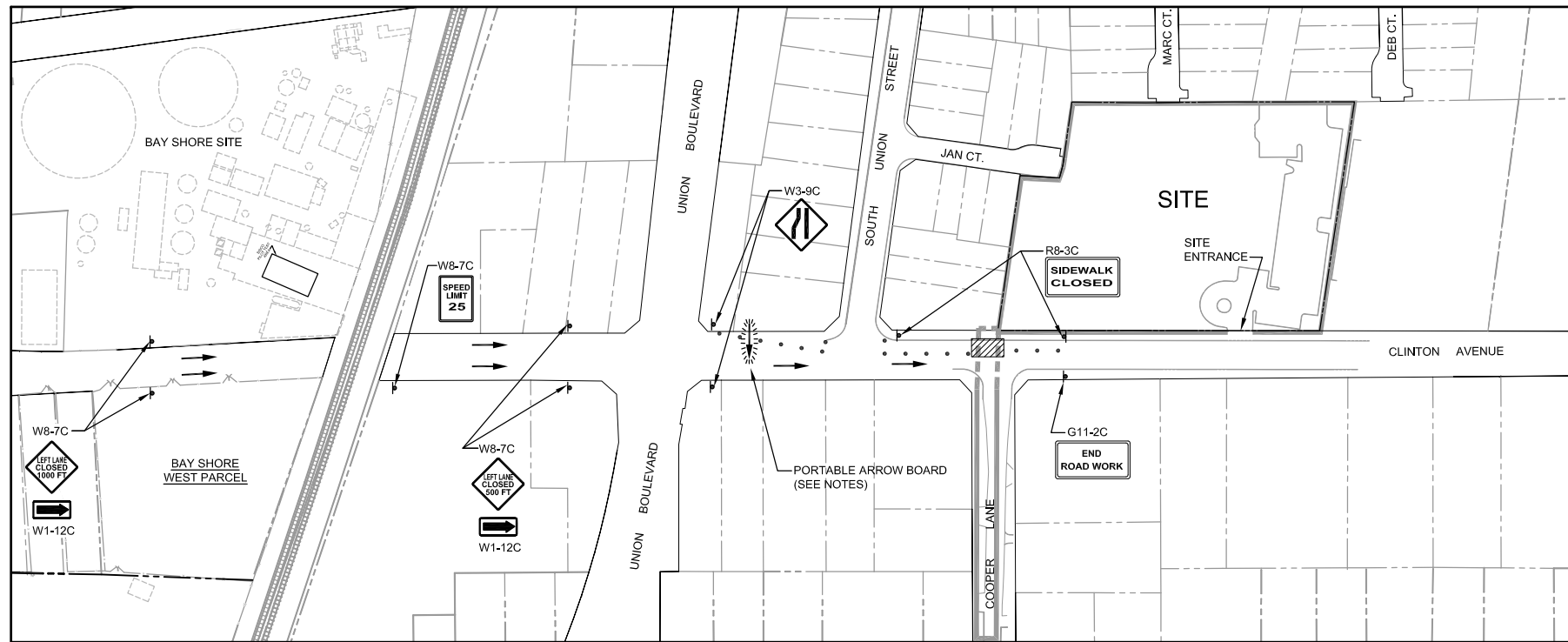
175 EAST OLD COUNTRY ROAD
HICKSVILLE, NEW YORK 11801



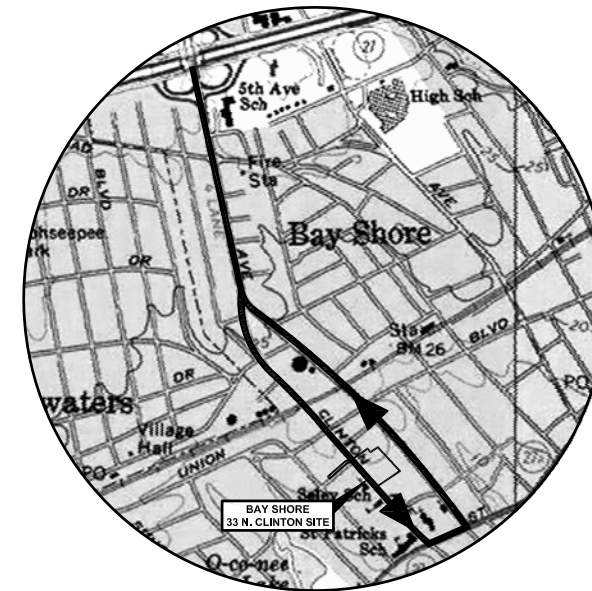
110 WALT WHITMAN ROAD, SUITE 204
HUNTINGTON STATION, NY 11746
631-760-9300, FAX 631-760-9301
www.geiconsultants.com

PROJECT NUMBER: 061140-10-1905

JUNE 2009

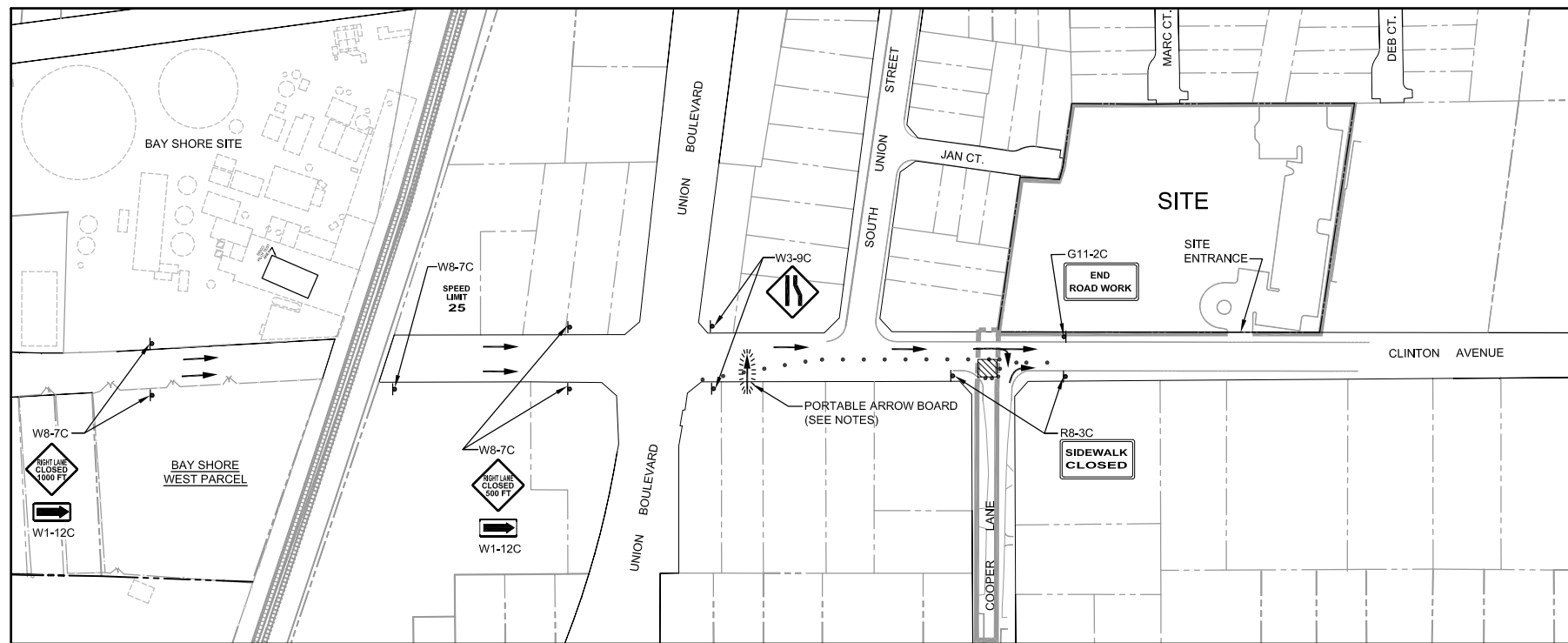
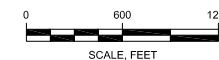


LEFT LANE CLOSURE



TRUCK ROUTE AND INDEX MAP

SCALE: 1"=800'

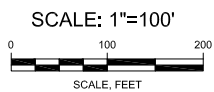


RIGHT LANE CLOSURE

TRAFFIC CONTROL NOTES:

1. NOTIFY THE LOCAL FIRE DEPARTMENT, EMERGENCY SERVICES, AND THE SUFFOLK COUNTY POLICE DEPARTMENT A MINIMUM OF FIVE DAYS PRIOR TO THE START OF CONSTRUCTION.
2. COMPLETE ALL WORK IN ACCORDANCE WITH THE APPLICABLE SCDPW OR TOI PERMIT(S).
3. PERFORM ALL WORK WITHIN THE SUFFOLK COUNTY RIGHT-OF-WAY (ROW) TO CONFORM TO THE SCDPW STANDARD SPECIFICATIONS, STANDARD DETAILS, AND PERMITS, OR AS DIRECTED BY THE ENGINEER.
4. INSTALL AND MAINTAIN ALL TRAFFIC CONTROLS AND ASSOCIATED WARNING DEVICES IN ACCORDANCE WITH THE DRAWINGS AND THE NEW YORK STATE "MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES" (LATEST EDITION) THE REQUIREMENTS OF SUFFOLK COUNTY DEPARTMENT OF PUBLIC WORKS (SCDPW).
5. A TRUCK-MOUNTED OR TRAILER-MOUNTED FLASHING ARROW BOARD WILL BE USED FOR ALL LANE CLOSURES. A FLASHING ARROW WILL BE DISPLAYED IN ADVANCE OF A LANE CLOSURE.
6. COVER ALL EXISTING TRAFFIC SIGNS WITHIN THE LIMITS OF THE TRAFFIC MAINTENANCE PLAN WHICH ARE INAPPROPRIATE, CONFLICTING OR CONFUSING WITH AN OPAQUE MATERIAL.

- SOURCES:**
1. MAP TITLED "BAY SHORE/BRIGHTWATERS, FORMER MGP SITE FINAL REMEDIAL INVESTIGATION, BAY SHORE, NEW YORK, OFF-SITE SAMPLE LOCATION MAP" DATED: SEPT. 2002 BY DVIKA AND BARTILUCCI.
 2. PROPERTY BOUNDARY LOCATIONS WERE DETERMINED BY OTHERS USING AERIAL PHOTOGRAPHS AND TAX MAPS. PROPERTY BOUNDARIES ARE APPROXIMATE AND MONITORING WELLS LOCATED NEAR OR AT PROPERTY BOUNDARIES DEPICTED ON THE MAP ARE WITHIN THE ROAD RIGHT-OF-WAY.



LEGEND

- SITE LOCATION
- DIRECTION OF TRAFFIC FLOW
- CONSTRUCTION DRUM
- ▲ CONSTRUCTION SIGN
- ▭ ARROW BOARD
- ▨ WORK AREA

NO.	DATE	DESCRIPTION	DES	DR	CH	APP

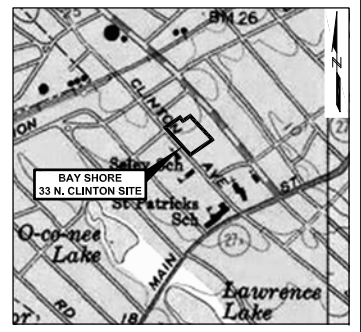
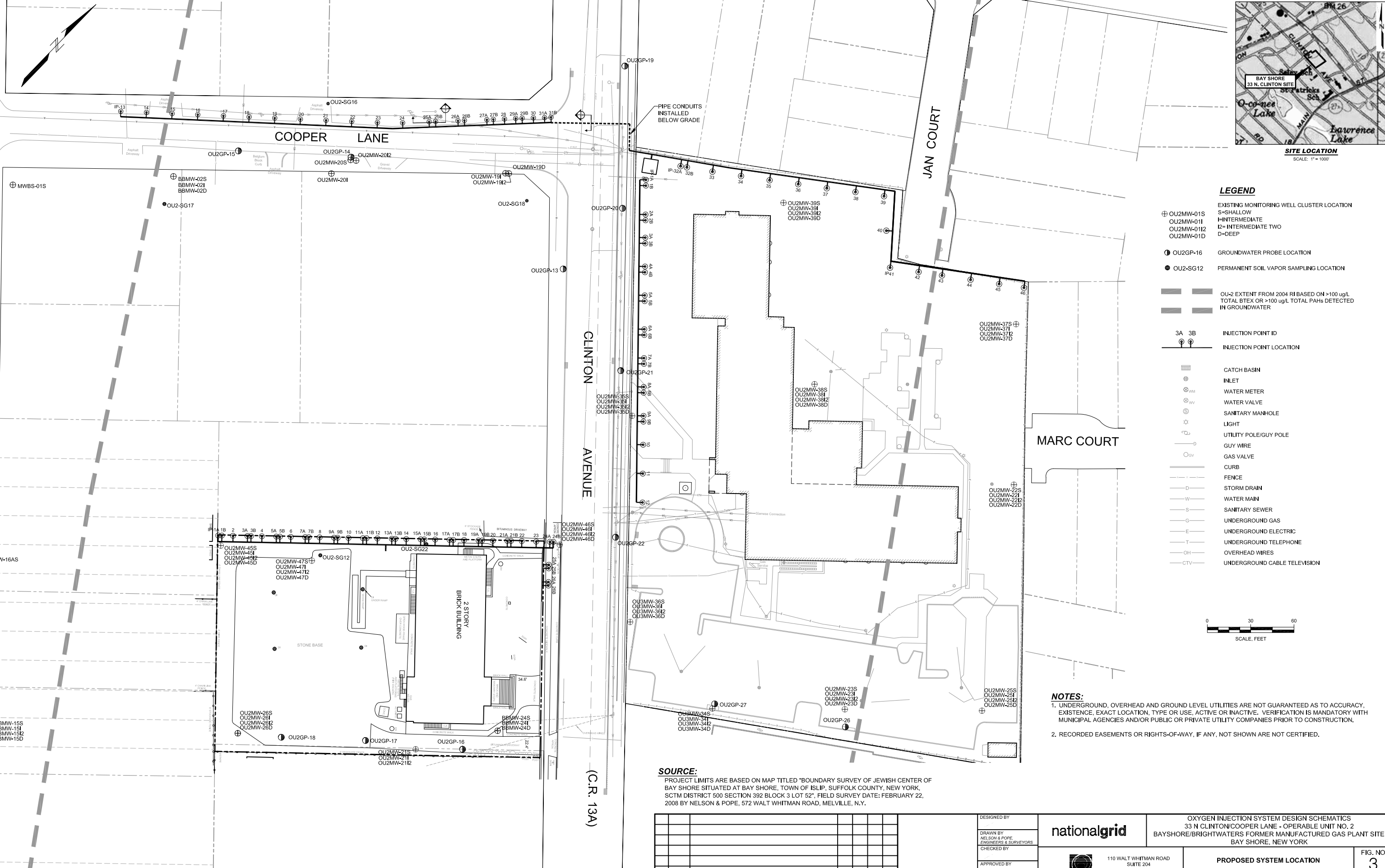
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DRAWN BY SCG
CHECKED BY M/O
APPROVED BY
DATE 06/09

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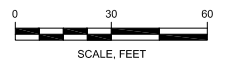
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SUITE 204
HUNTINGTON STATION, NY 11746
631-760-9300, FAX 631-760-9301
WWW.GEICONCONSULTANTS.COM

OXYGEN INJECTION SYSTEM DESIGN SCHEMATICS 33 N CLINTON/COOPER LANE - OPERABLE UNIT NO. 2 BAYSHORE/BRIGHTWATERS FORMER MANUFACTURED GAS PLANT SITE BAY SHORE, NEW YORK		FIG. NO. 2
INDEX MAP WITH TRAFFIC ROUTE	GEI PROJECT 061140-10-1905	SHEET NO. 2 of 8
ISSUE A		



LEGEND

- ⊕ OU2MW-01S EXISTING MONITORING WELL CLUSTER LOCATION
- S=SHALLOW
- I=INTERMEDIATE
- I2=INTERMEDIATE TWO
- D=DEEP
- OU2GP-16 GROUNDWATER PROBE LOCATION
- OU2-SG12 PERMANENT SOIL VAPOR SAMPLING LOCATION
- ▬▬▬ OU-2 EXTENT FROM 2004 RI BASED ON >100 ug/L TOTAL BTEX OR >100 ug/L TOTAL PAHS DETECTED IN GROUNDWATER
- 3A 3B INJECTION POINT ID
- ⊕ INJECTION POINT LOCATION
- ▭ CATCH BASIN
- ⊕ INLET
- ⊕ WM WATER METER
- ⊕ WV WATER VALVE
- ⊕ SM SANITARY MANHOLE
- ⊕ LIGHT
- ⊕ UP UTILITY POLE/GUY POLE
- ⊕ GW GUY WIRE
- ⊕ GV GAS VALVE
- ⊕ CURB
- ⊕ FENCE
- ⊕ SD STORM DRAIN
- ⊕ WM WATER MAIN
- ⊕ SS SANITARY SEWER
- ⊕ UG UNDERGROUND GAS
- ⊕ UE UNDERGROUND ELECTRIC
- ⊕ UT UNDERGROUND TELEPHONE
- ⊕ OH OVERHEAD WIRES
- ⊕ CTV UNDERGROUND CABLE TELEVISION



NOTES:
 1. UNDERGROUND, OVERHEAD AND GROUND LEVEL UTILITIES ARE NOT GUARANTEED AS TO ACCURACY, EXISTENCE, EXACT LOCATION, TYPE OR USE. ACTIVE OR INACTIVE. VERIFICATION IS MANDATORY WITH MUNICIPAL AGENCIES AND/OR PUBLIC OR PRIVATE UTILITY COMPANIES PRIOR TO CONSTRUCTION.
 2. RECORDED EASEMENTS OR RIGHTS-OF-WAY, IF ANY, NOT SHOWN ARE NOT CERTIFIED.

SOURCE:
 PROJECT LIMITS ARE BASED ON MAP TITLED "BOUNDARY SURVEY OF JEWISH CENTER OF BAY SHORE SITUATED AT BAY SHORE, TOWN OF ISLIP, SUFFOLK COUNTY, NEW YORK, SCTM DISTRICT 500 SECTION 392 BLOCK 3 LOT 52", FIELD SURVEY DATE: FEBRUARY 22, 2008 BY NELSON & POPE, 572 WALT WHITMAN ROAD, MELVILLE, N.Y.

NO.	DATE	DESCRIPTION	DES	DR	CH	APP

DESIGNED BY
 DRAWN BY
 CHECKED BY
 APPROVED BY
 DATE
 06/09

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 HUNTINGTON STATION, NY 11746
 631-760-9300, FAX 631-760-9301
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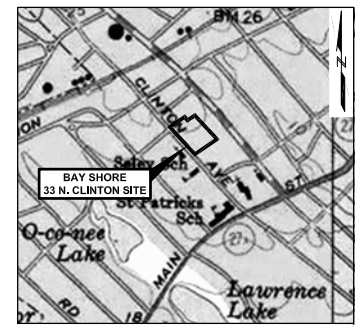
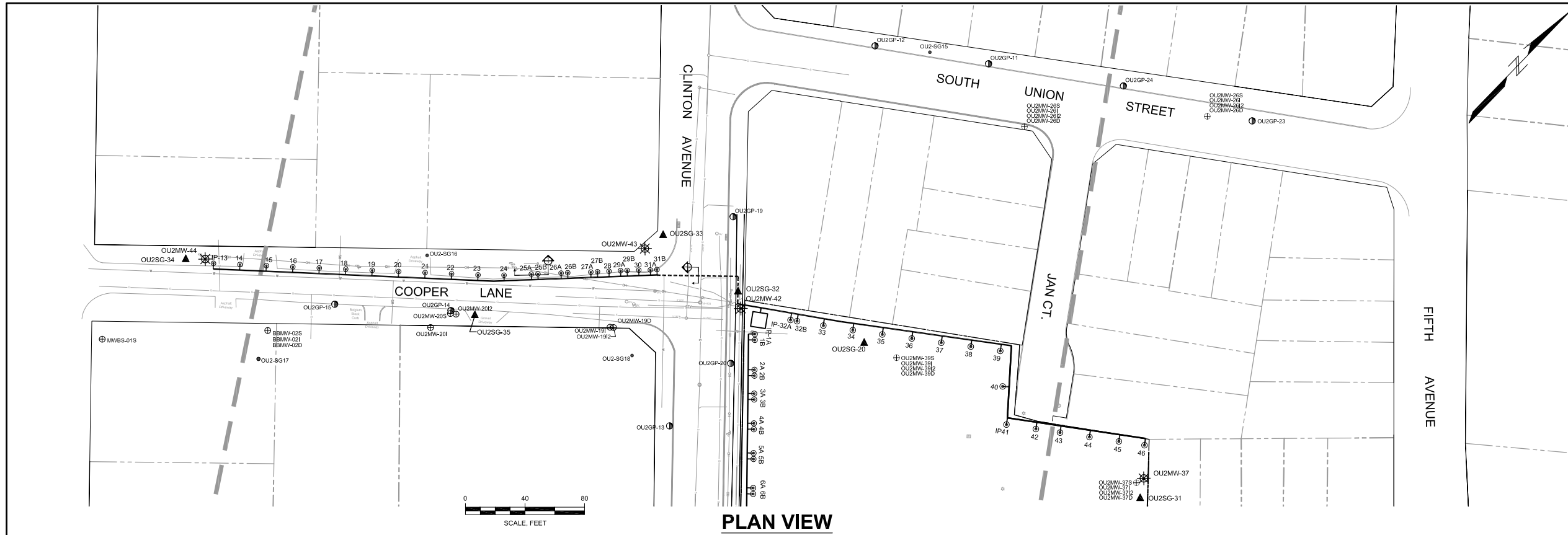
OXYGEN INJECTION SYSTEM DESIGN SCHEMATICS
 33 N CLINTON/COOPER LANE - OPERABLE UNIT NO. 2
 BAYSHORE/BRIGHTWATERS FORMER MANUFACTURED GAS PLANT SITE
 BAY SHORE, NEW YORK

PROPOSED SYSTEM LOCATION

GEI PROJECT: 061140-10-1905

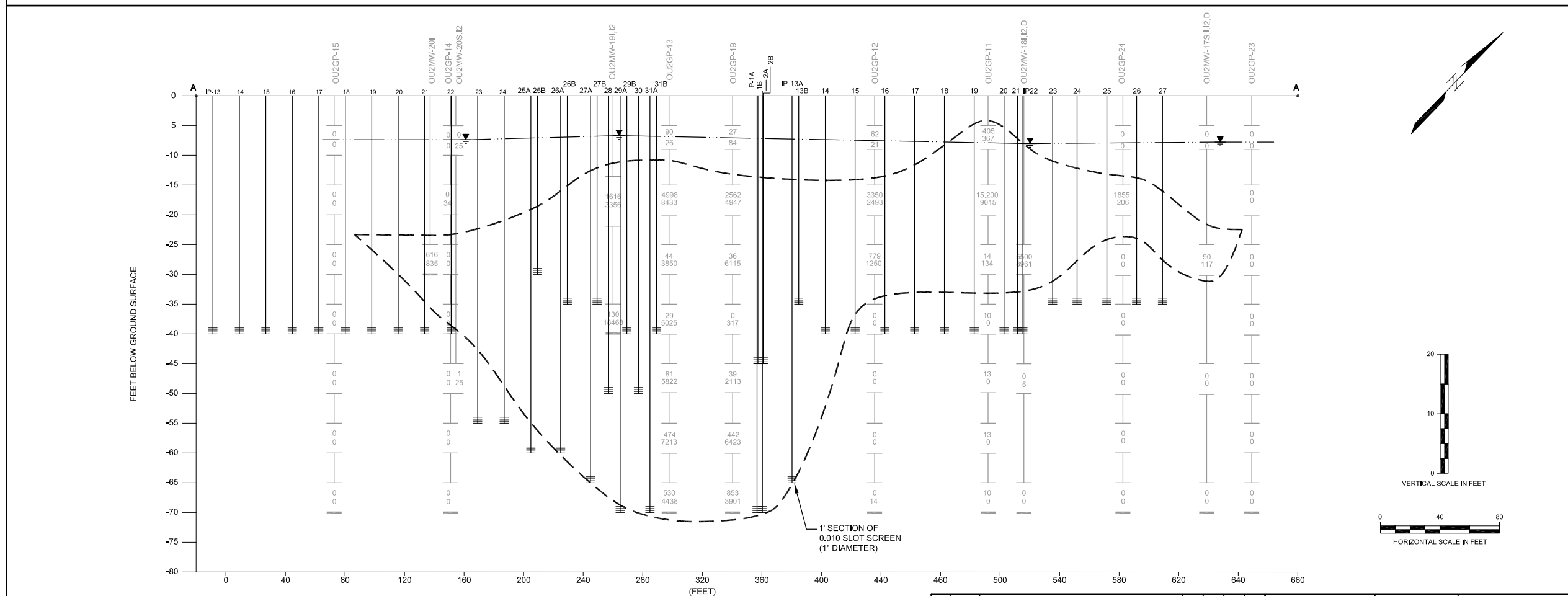
SHEET NO.: 3 of 8

FIG. NO.: 3
 ISSUE: A



- LEGEND**
- OU2MW-33 * PROPOSED MONITORING WELL LOCATION
 - OU2SG-26 ▲ PROPOSED SOIL VAPOR MONITORING POINT
 - OU2GP-16 GROUNDWATER PROBE LOCATION
 - OU2SG-12 PERMANENT SOIL VAPOR SAMPLING LOCATION
 - ⊕ EXISTING MONITORING WELL CLUSTER LOCATION
 - S=SHALLOW
 - I=INTERMEDIATE
 - I2= INTERMEDIATE TWO
 - D=DEEP

- EXISTING OR PROPOSED MONITORING WELL OR MONITORING POINT ID
- EXISTING OR PROPOSED MONITORING WELL OR MONITORING POINT LOCATION
- TOTAL BTEX ug/L
- TOTAL PAH ug/L
- WATER LEVEL
- END OF BORING/WELL
- TOTAL BTEX AND PAHS ≥ 100 ug/L
- BTEX BENZENE, TOLUENE, ETHYLBENZENE AND XYLENE
- PAHS POLYCYCLIC AROMATIC HYDROCARBONS
- ug/L MICROGRAMS PER LITER
- IP-1A INJECTION POINT ID
- INJECTION POINT LOCATION
- 0.010 SLOT SCREEN (1" DIAMETER)
- CATCH BASIN
- INLET
- WATER METER
- WATER VALVE
- SANITARY MANHOLE
- LIGHT
- UTILITY POLE/GUY POLE
- GUY WIRE
- GAS VALVE
- CURB
- FENCE
- STORM DRAIN
- WATER MAIN
- SANITARY SEWER
- UNDERGROUND GAS
- UNDERGROUND ELECTRIC
- UNDERGROUND TELEPHONE
- OVERHEAD WIRES
- UNDERGROUND CABLE TELEVISION



- TOTAL BTEX AND PAHS ≥ 100 ug/L
- BTEX BENZENE, TOLUENE, ETHYLBENZENE AND XYLENE
- PAHS POLYCYCLIC AROMATIC HYDROCARBONS
- ug/L MICROGRAMS PER LITER
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- INJECTION POINT LOCATION
- 0.010 SLOT SCREEN (1" DIAMETER)
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- SANITARY MANHOLE
- LIGHT
- UTILITY POLE/GUY POLE
- GUY WIRE
- GAS VALVE
- CURB
- FENCE
- STORM DRAIN
- WATER MAIN
- SANITARY SEWER
- UNDERGROUND GAS
- UNDERGROUND ELECTRIC
- UNDERGROUND TELEPHONE
- OVERHEAD WIRES
- UNDERGROUND CABLE TELEVISION

- NOTES:**
1. GROUNDWATER PROBE DATA COLLECTED QUARTER 4, 2007 AND QUARTER 1, 2008 BY GEI CONSULTANTS, INC.
 2. MONITORING WELL DATA COLLECTED QUARTER 2, 2008 BY GEI CONSULTANTS, INC.

CROSS-SECTION VIEW

NO.	DATE	DESCRIPTION	DES	DR	CH	APP

DESIGNED BY
M.J.L.
DRAWN BY
SCG
CHECKED BY
M.J.O.
APPROVED BY
DATE
06/09

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GEI CONSULTANTS

110 WALT WHITMAN ROAD
SUITE 204
HUNTINGTON STATION, NY 11748
631-760-9300, FAX 631-760-9301
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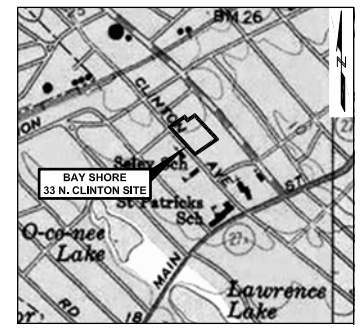
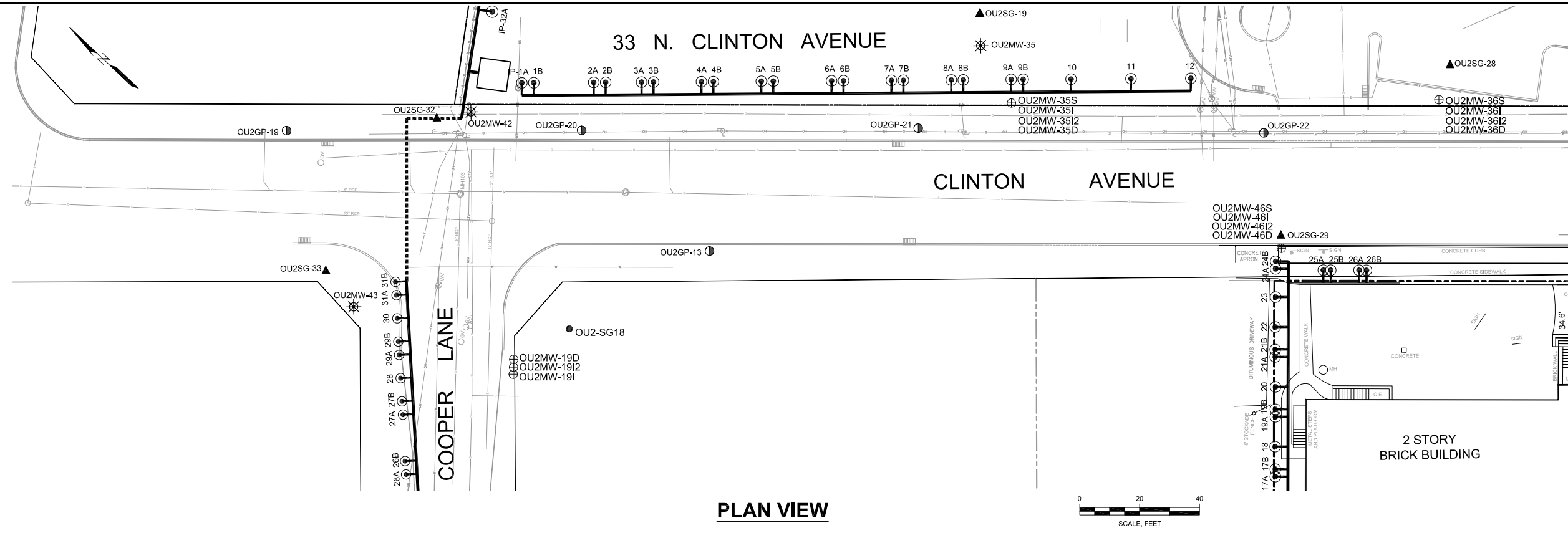
OXYGEN INJECTION SYSTEM DESIGN SCHEMATICS
33 N CLINTON/COOPER LANE - OPERABLE UNIT NO. 2
BAYSHORE/BRIGHTWATERS FORMER MANUFACTURED GAS PLANT SITE
BAY SHORE, NEW YORK

INJECTION POINT LAYOUT AND SCHEMATIC FOR 33 N. CLINTON/COOPER LANE LINE

FIG. NO. **4**

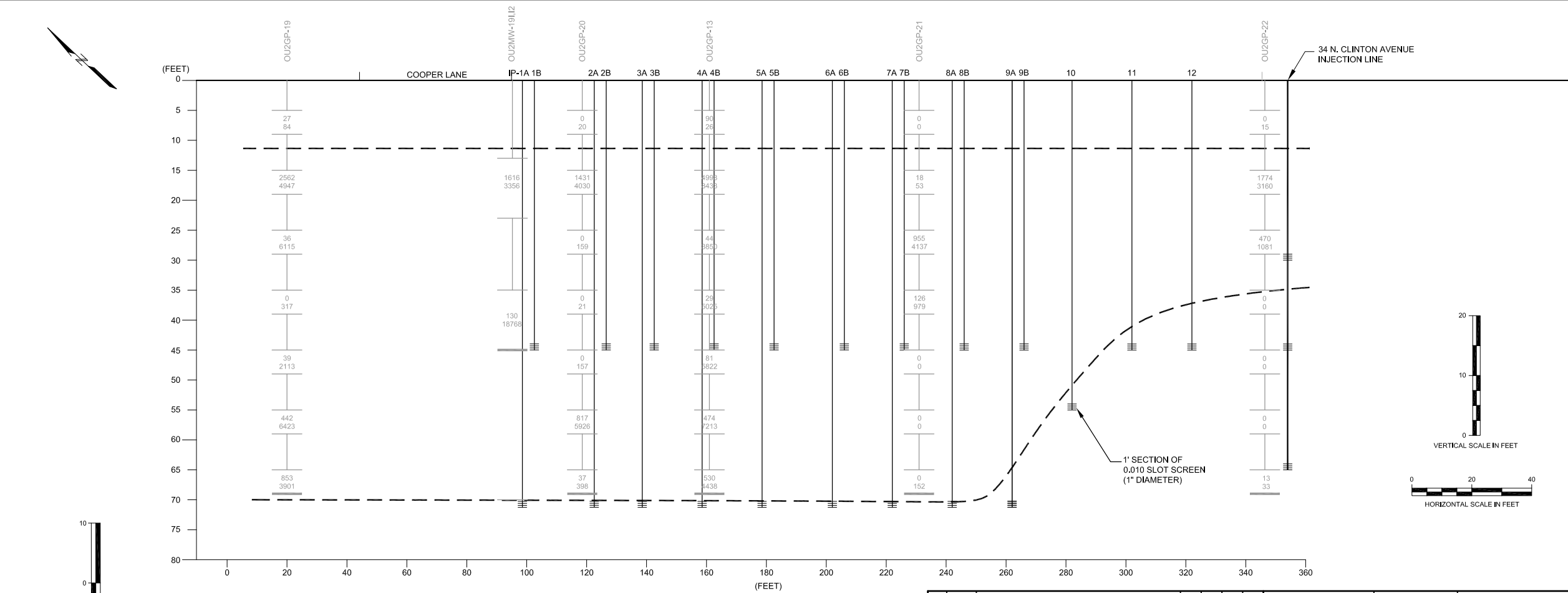
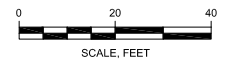
ISSUE **A**

GEI PROJECT SHEET NO. 061140-10-1905 4 of 8

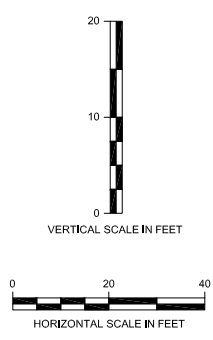


- LEGEND**
- OU2MW-33 PROPOSED MONITORING WELL LOCATION
 - OU2SG-26 PROPOSED SOIL VAPOR MONITORING POINT
 - OU2GP-16 GROUNDWATER PROBE LOCATION
 - OU2SG-12 PERMANENT SOIL VAPOR SAMPLING LOCATION
 - EXISTING MONITORING WELL CLUSTER LOCATION
 - S=SHALLOW
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 - D=DEEP
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 - EXISTING OR PROPOSED MONITORING WELL OR MONITORING POINT LOCATION
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 - WATER MAIN
 - SANITARY SEWER
 - UNDERGROUND GAS
 - UNDERGROUND ELECTRIC
 - UNDERGROUND TELEPHONE
 - OVERHEAD WIRES
 - UNDERGROUND CABLE TELEVISION

PLAN VIEW



CROSS-SECTION VIEW



- NOTES:**
- GROUNDWATER PROBE DATA COLLECTED QUARTER 4, 2007 AND QUARTER 1, 2008 BY GEI CONSULTANTS, INC.
 - MONITORING WELL DATA COLLECTED QUARTER 2, 2008 BY GEI CONSULTANTS, INC.

NO.	DATE	DESCRIPTION	DES	DR	CH	APP

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M/JL
DRAWN BY
SCG
CHECKED BY
M/O
APPROVED BY
DATE
06/09

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110 WALT WHITMAN ROAD
SUITE 204
HUNTINGTON STATION, NY 11748
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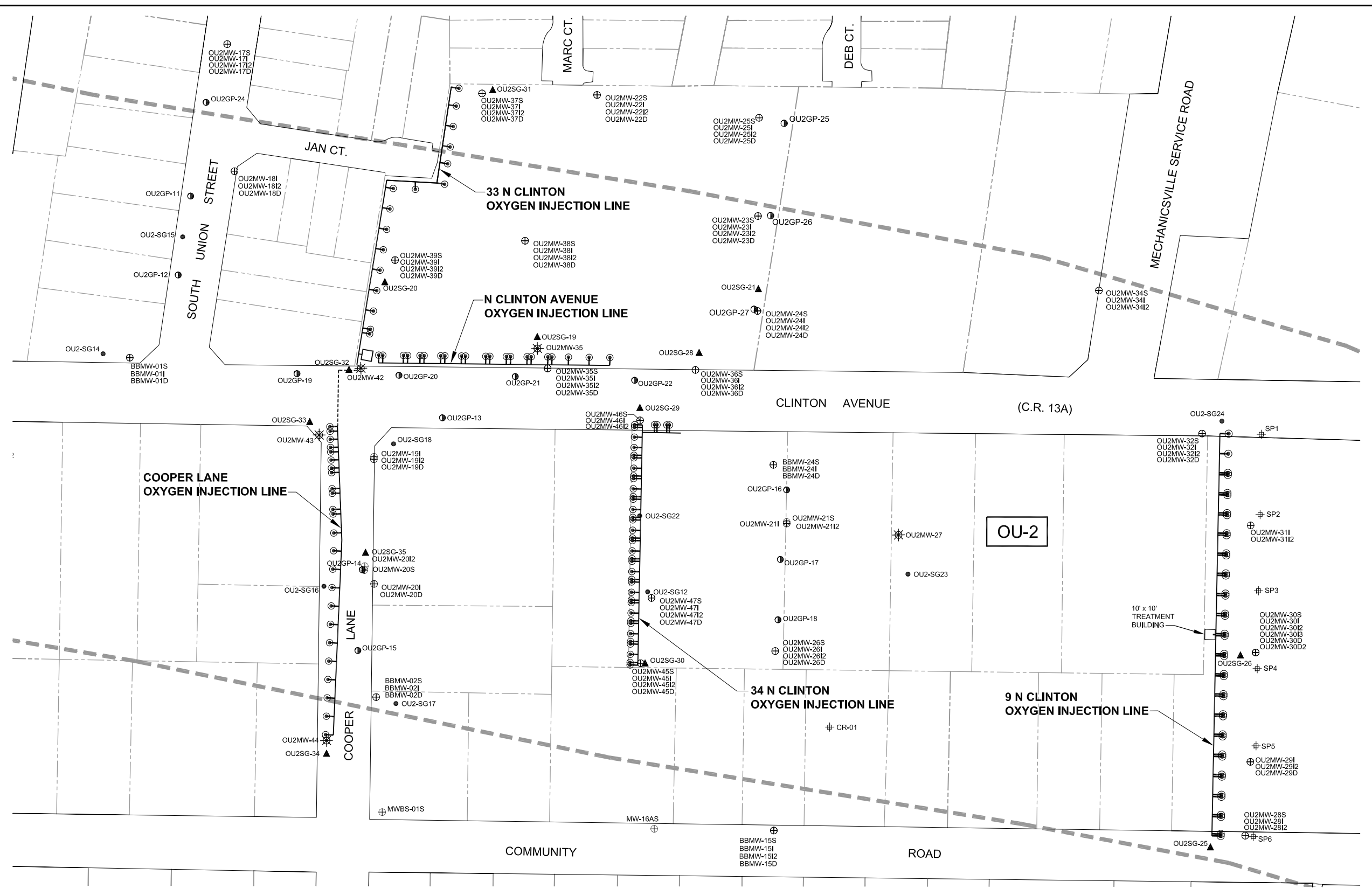
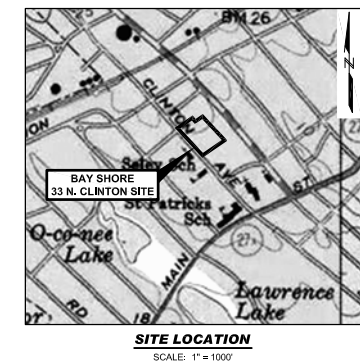
OXYGEN INJECTION SYSTEM DESIGN SCHEMATICS
33 N CLINTON/COOPER LANE - OPERABLE UNIT NO. 2
BAYSHORE/BRIGHTWATERS FORMER MANUFACTURED GAS PLANT SITE
BAY SHORE, NEW YORK

INJECTION POINT LAYOUT AND SCHEMATIC FOR CLINTON LINE

FIG. NO. **5**

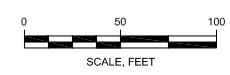
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GEI PROJECT SHEET NO. 061140-10-1905 5 of 8

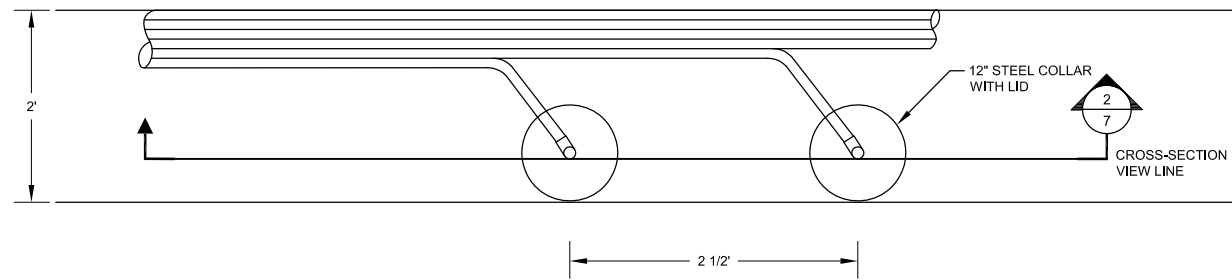


- LEGEND**
- ⊛ OU2MW-33 PROPOSED MONITORING WELL LOCATION
 - ▲ OU2SG-26 PROPOSED SOIL VAPOR MONITORING POINT
 - ⊕ OU2MW-01S S=SHALLOW
OU2MW-01I I=INTERMEDIATE
OU2MW-012 I2= INTERMEDIATE TWO
OU2MW-01D D=DEEP
 - OU2-SG02 PERMANENT SOIL VAPOR SAMPLING LOCATION
 - ⊙ OU2GP-16 GROUNDWATER PROBE LOCATION
 - ⊕ SP2 SUFFOLK COUNTY GROUNDWATER SAMPLE LOCATION
 - OU-2 EXTENT FROM 2004 RI BASED ON >100 ug/L TOTAL BTEX OR >100 ug/L TOTAL PAHs DETECTED IN GROUNDWATER

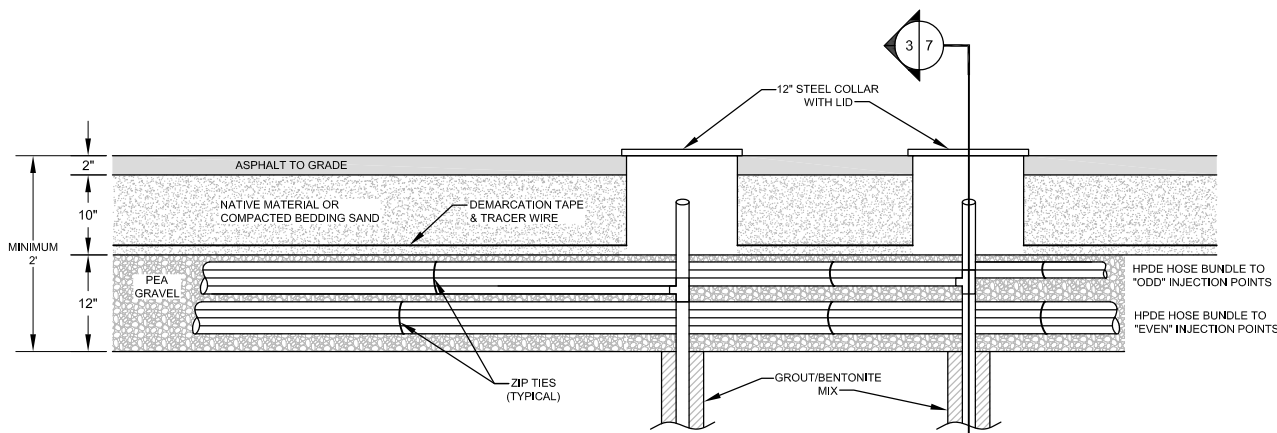
- SOURCES:**
- MAP TITLED "BAY SHORE/BRIGHTWATERS, FORMER MGP SITE FINAL REMEDIAL INVESTIGATION, BAY SHORE, NEW YORK, OFF-SITE SAMPLE LOCATION MAP" DATED: SEPT. 2002 BY DVIRKA AND BARTLUCCI.
 - FIGURE 2. GROUNDWATER MONITORING WELL AND SURFACE WATER GAUGING STATION LOCATION MAP. BAY SHORE/BRIGHTWATERS FORMER MGP SITE, SCALE: 1"=200', DATED JANUARY 2004, PREPARED BY VANASSE HANGEN BRUSTLIN, INC., MIDDLETOWN, CONNECTICUT.
 - DRAWING C-1, OFF-SITE SAMPLE LOCATION MAP, BAY SHORE/BRIGHTWATERS FINAL REMEDIAL INVESTIGATION, SCALE: 1"=200', DATED OCTOBER 15, 2003, PREPARED BY VANASSE HANGEN BRUSTLIN, INC., MIDDLETOWN, CONNECTICUT.
 - PROPERTY BOUNDARY LOCATIONS WERE DETERMINED BY OTHERS USING AERIAL PHOTOGRAPHS AND TAX MAPS. PROPERTY BOUNDARIES ARE APPROXIMATE AND MONITORING WELLS LOCATED NEAR OR AT PROPERTY BOUNDARIES DEPICTED ON THE MAP ARE WITHIN THE ROAD RIGHT-OF-WAY.
 - WELL SURVEY CONDUCTED IN NOVEMBER 2007 BY NELSON & POPE, 572 WALT WHITMAN ROAD, MELVILLE, N.Y
 - PROJECT LIMITS ARE BASED ON MAP TITLED "PARTIAL EXISTING CONDITIONS MAP OF PROPERTY, ST. PATRICK'S SCHOOL SITUATED AT BAY SHORE, TOWN OF ISLIP, SUFFOLK COUNTY, NEW YORK, SCTM DISTRICT 500 SECTION 419 BLOCK 1 LOT 4", FIELD SURVEY DATE: MARCH 26, 2008 BY NELSON & POPE, 572 WALT WHITMAN ROAD, MELVILLE, N.Y.



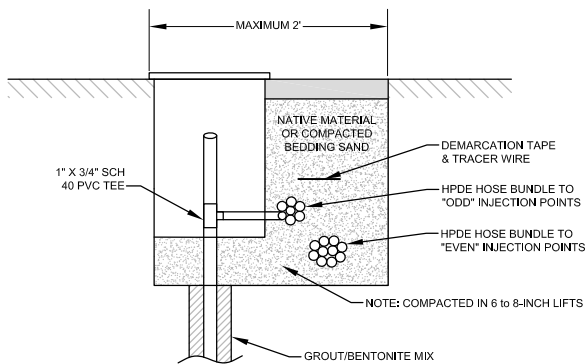
					DESIGNED BY MJO		OXYGEN INJECTION SYSTEM DESIGN SCHEMATICS 33 N CLINTON/COOPER LANE - OPERABLE UNIT NO. 2 BAYSHORE/BRIGHTWATERS FORMER MANUFACTURED GAS PLANT SITE BAY SHORE, NEW YORK		FIG. NO. 6	
					DRAWN BY SCG			PROPOSED MONITORING LOCATIONS		ISSUE A
					CHECKED BY M/JL			GEI PROJECT 061140-10-1905		SHEET NO. 6 of 8
					APPROVED BY			DATE 06/09		
NO.	DATE	DESCRIPTION	DES	DR	CH	APP				



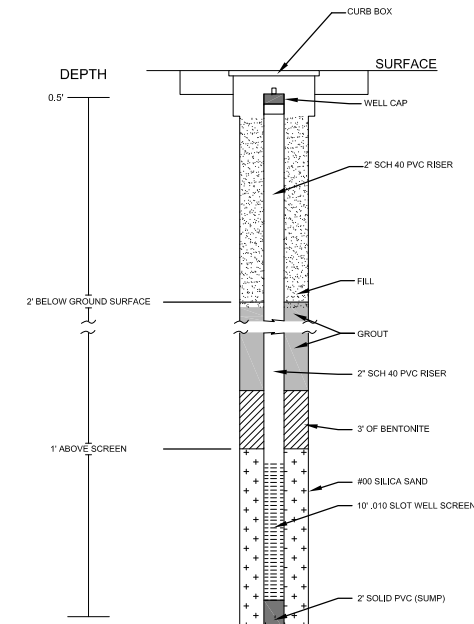
1 TYPICAL TRENCH PLAN VIEW
3/7



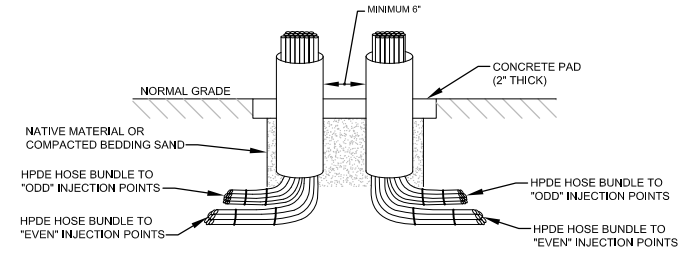
2 TYPICAL TRENCH CROSS SECTION (NE TO SW)
7



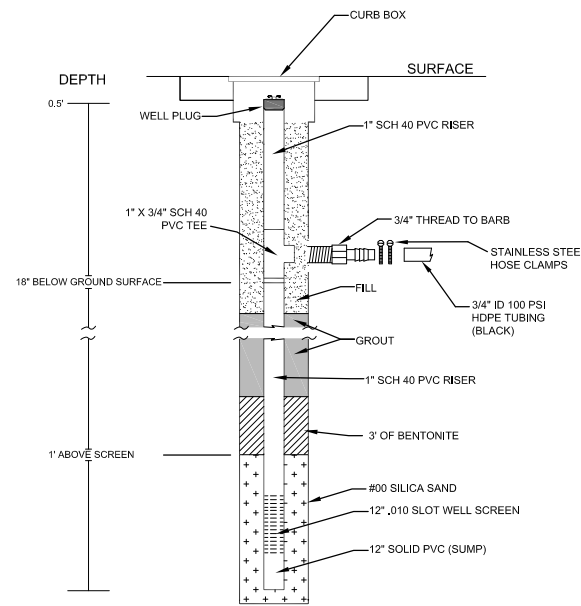
3 TYPICAL TRENCH DETAIL
7



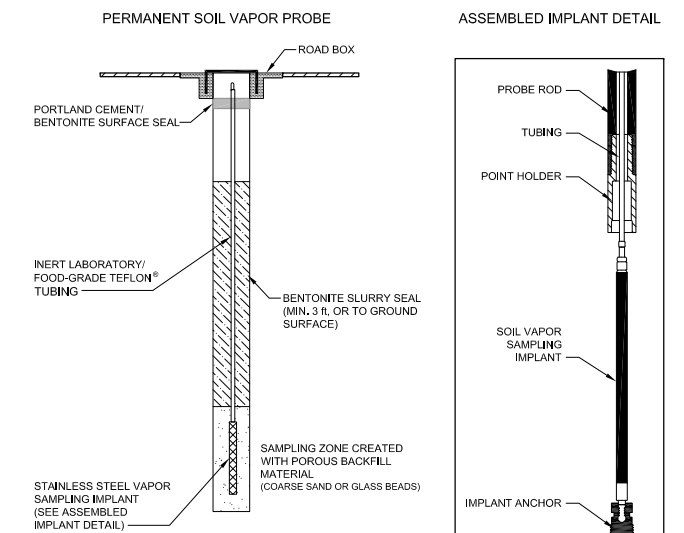
TYPICAL MONITORING WELL DETAIL
NOT TO SCALE



STUB-UP SCHEMATIC
NOT TO SCALE



TYPICAL INJECTION WELL CONSTRUCTION DIAGRAM
NOT TO SCALE



PERMANENT SOIL VAPOR POINT INSTALLATION
NOT TO SCALE

NOTES:

- SCALE: 1" = 10' EXCEPT PIPE/HOSE SIZE.
- CONNECTION TO INJECTION POINT SHOULD BE MADE WITH SCH 40 PVC TEE AT A MINIMUM OF 18" BELOW GROUND SURFACE.
- NATIVE MATERIAL OR BEDDING SAND WILL BE COMPACTED IN 6-INCH LIFTS.
- EACH HDPE HOSE LINE WILL BE LABELED ACCORDING TO ITS RESPECTIVE INJECTION POINT EVERY TWENTY FEET.

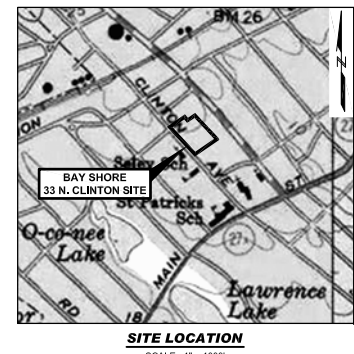
NO.	DATE	DESCRIPTION	DES	DR	CH	APP

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APPROVED BY
DATE 06/09

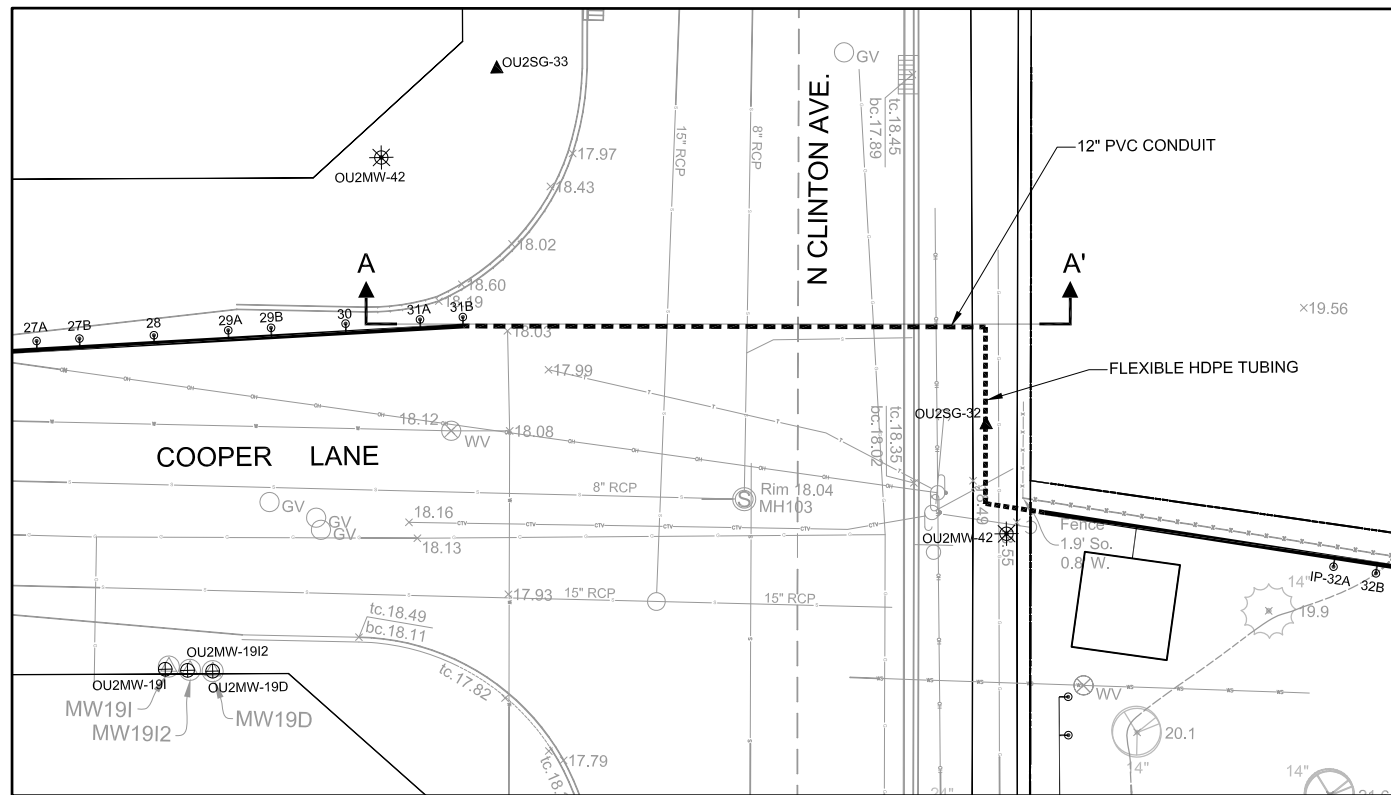
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SUITE 204
HUNTINGTON STATION, NY 11748
631-760-9300, FAX 631-760-9301
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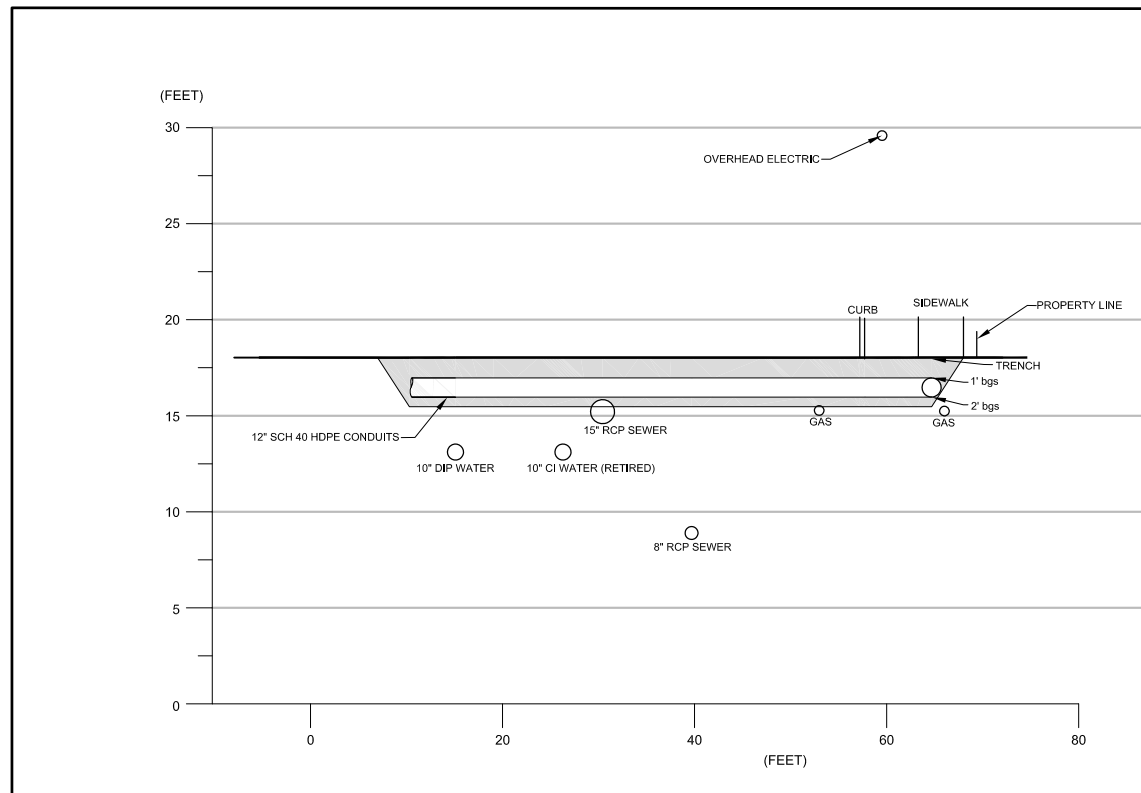
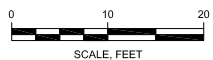
OXYGEN INJECTION SYSTEM DESIGN SCHEMATICS 33 N CLINTON/COOPER LANE - OPERABLE UNIT NO. 2 BAYSHORE/BRIGHTWATERS FORMER MANUFACTURED GAS PLANT SITE BAY SHORE, NEW YORK		FIG. NO. 7
TRENCH AND INJECTION POINT DETAILS	GEI PROJECT 061140-1905	SHEET NO. 7 of 8
ISSUE A		



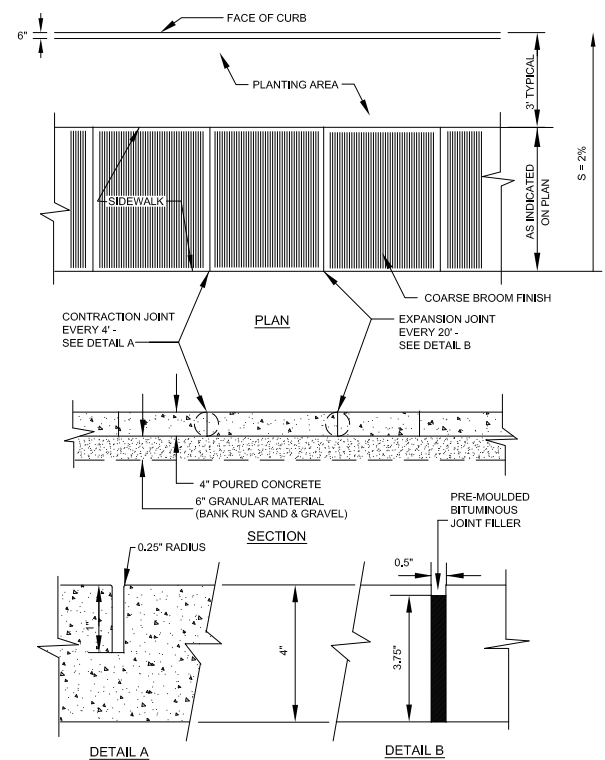
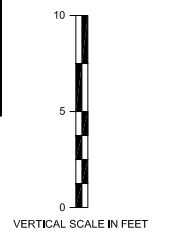
SITE LOCATION
SCALE: 1" = 1000'



PLAN VIEW



CROSS-SECTION VIEW



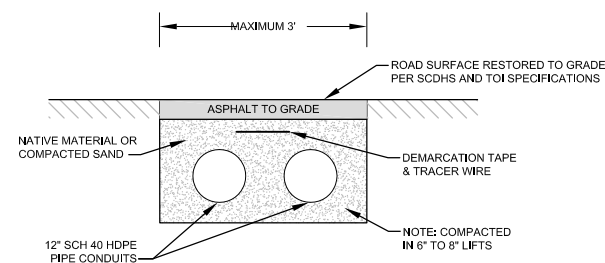
SIDEWALK NOTES:

1. USE 4,000 PSI AIR-ENTRAINED CONCRETE.
2. CAST 1 SET OF CYLINDERS FOR TESTING FOR EACH POUR.
3. SIDEWALK THICKNESS = 6" AT DRIVEWAYS

CONCRETE SIDEWALK DETAIL

SOURCE: TOWN OF ISLIP
DEPARTMENT OF PLANNING AND DEVELOPMENT
ITEM 105
NOT TO SCALE

1/8



**TYPICAL N. CLINTON AVENUE
PIPE CONDUIT TRENCH CROSS SECTION**

3/8

GENERAL NOTES:

1. SCALE: 1" = 10' EXCEPT PIPE/HOSE SIZE.
2. CONNECTION TO INJECTION POINT SHOULD BE MADE WITH SCH 40 PVC TEE AT A MINIMUM OF 18" BELOW GROUND SURFACE.
3. NATIVE MATERIAL OR BEDDING SAND WILL BE COMPACTED IN 6-INCH LIFTS.

NO.	DATE	DESCRIPTION	DES	DR	CH	APP

DESIGNED BY M/JL
DRAWN BY SCG
CHECKED BY M/O
APPROVED BY
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110 WALT WHITMAN ROAD
SUITE 204
HUNTINGTON STATION, NY 11748
631-760-9300, FAX 631-760-9301
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OXYGEN INJECTION SYSTEM DESIGN SCHEMATICS
33 N CLINTON/COOPER LANE - OPERABLE UNIT NO. 2
BAYSHORE/BRIGHTWATERS FORMER MANUFACTURED GAS PLANT SITE
BAY SHORE, NEW YORK

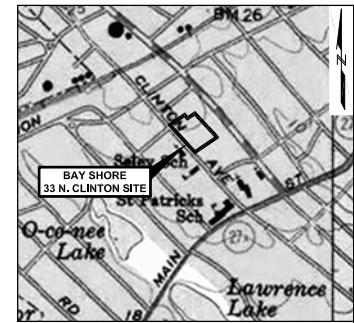
**NORTH CLINTON AVENUE CROSSING LOCATION
AND DETAILS**

FIG. NO.
8

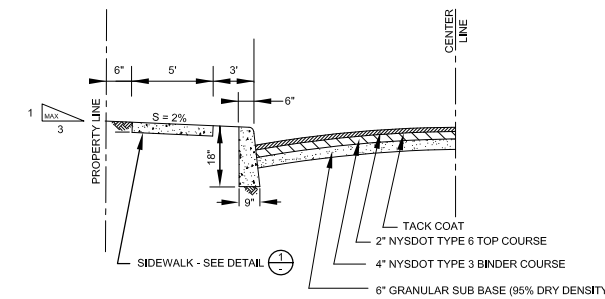
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A

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061140-10-1905

SHEET NO.
8 of 8



SITE LOCATION
SCALE: 1" = 1000'



ROADWAY DETAIL

SOURCE: TOWN OF ISLIP
DEPARTMENT OF PLANNING AND DEVELOPMENT
NOT TO SCALE

2/8

ROADWAY NOTES:

1. CONSTRUCT ROAD SYMMETRICAL ABOUT CENTER LINE.
2. SURFACE THE FULL WIDTH OF THE TRAVEL WAY.
3. GRADE IN ACCORDANCE WITH EXISTING CONDITIONS.
4. COMPACT ASPHALT TO 95% OF DESIGN DENSITY. A LABORATORY SPECIMEN MADE IN THE PROPORTIONS OF THE JOB MIX FORMULA FOR EACH CLASS MIX COMPACTED BY 75 BLOWS ON EACH FACE OF A 2.5" THICK SPECIMEN BY A STANDARD MARSHALL HAMMER SHALL BE AS THE STANDARD FOR DENSITY COMPARISON.
5. ASPHALT SURFACE COMPRESSIVE STRENGTH = 100 PSI.
6. C.B.R. VALUE OF 6" GRANULAR SUB-BASE = 80.
7. C.B.R. VALUE OF SUB-BASE = 20.

EXCAVATION AND RESTORATION NOTES:

1. CONTACT NYC ONE CALL TO OBTAIN A UTILITY MARK OUT PRIOR TO CONDUCTING ANY INVASIVE WORK.
2. HAND CLEAR ALL UTILITIES (USING NON-SPARKING TOOLS AS NECESSARY) TO CONFIRM LOCATION WITHIN THE DEPTH OF THE TRENCH EXCAVATION.
3. ENSURE THAT NO DEBRIS, MATERIALS, ETC INTERFERES WITH THE ADJACENT OPEN TRAVEL LANES AND SIDEWALKS.
4. ALL PAVEMENT SAW CUTS WILL BE FULLY PENETRATING. RESTORE ALL PAVEMENT CUTS FLUSH WITH THE EXISTING PAVEMENT.
5. MAINTAIN ACCESS TO PRIVATE PROPERTIES ADJACENT TO THE WORK ZONE.
6. MAINTAIN SIDEWALK ACCESS ON AT LEAST ONE SIDE OF THE STREET AT ALL TIMES.
7. CLEAR ALL ROADWAY SURFACES OF DEBRIS, MATERIALS, TOOLS, ETC. AT THE END OF EACH WORKDAY.
8. CLEAR ALL AREAS WITHIN THE ROW OF CONSTRUCTION DEBRIS TO THE SATISFACTION OF THE ENGINEER AT THE COMPLETION OF THE WORK.
9. NO TREES OR VEGETATION WILL BE REMOVED WITHOUT WRITTEN PERMISSION FROM THE ENGINEER.
10. RESTORE ALL DRIVEWAYS AS DIRECTED BY THE ENGINEER.
11. SWEEP ALL TRAVEL LANES PRIOR TO REOPENING LANE TO TRAFFIC.